
**University
of California,
Santa Cruz**

General Catalog
2010–12

About the Catalog

This catalog contains the basic information about UC Santa Cruz. A complete list of academic programs and concentrations, both graduate and undergraduate, appears on pages 8–9.

The next part of the catalog, pages 10–117, is divided into sections describing various aspects of the campus: undergraduate admission and financial information, the undergraduate academic program (including advising and support services), graduate education (including information on graduate student admission, expenses, and financial support), research programs and facilities, and the ten residential colleges and student life.

The academic programs and courses offered at UCSC are described in detail on pages 120–466. The listings are alphabetical, with appropriate cross-references.

The Santa Cruz teaching staff and their academic qualifications, the University of California administration, and the Santa Cruz campus administrative staff appear on pages 467–498.

The catalog constitutes the campus's document of record. While every effort is made to ensure the correctness and timeliness of information contained in this catalog, changes are likely to occur after publication. On an ongoing basis, the university is examining ways to bring the greatest possible efficiency to the delivery of its programs and curricula. This process may result in changes in services, teaching and administrative staff, and curricula and courses that could not be reflected

in this catalog, which was prepared well in advance of the 2010–12 academic years. Updates to catalog information are available in the quarterly *Schedule of Classes*, which is on the World Wide Web at reg.ucsc.edu/soc/. (Additional web sites are referenced throughout this catalog. However, they are maintained by individual units and may not reflect approved general information, curricula, or course information.) In addition, several publications are available that include detailed information about specific subjects such as graduate programs, housing, and financial aid. Each college issues a handbook.

It is the responsibility of the individual student to become familiar with the announcements and regulations of the university that are printed in this catalog and other campus publications. The catalog is the document of record for undergraduate major requirements. It is updated annually on the web at reg.ucsc.edu/catalog.

More detailed information on particular subjects is available from appropriate campus units. (A list of key phone numbers appears on the inside back cover.) Most office hours are Monday through Friday, 8 A.M. to noon and 1 to 5 P.M. during the academic year; most offices close from noon to 1 P.M. and on weekends and holidays.

Campus information:

University of California, Santa Cruz
1156 High Street
Santa Cruz, CA 95064-1077
(831) 459-0111 (directory assistance)
Web: www.ucsc.edu

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Alternate formats of this document—such as large-print, audiotape, braille, or electronic—can be provided. Please call (831) 459-4446 for referral.

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Welcome

Welcome to UC Santa Cruz. Whether you're here for undergraduate or graduate study, you are beginning an extraordinary chapter of your life. Your years here will be transformational, and I encourage you to take advantage of all that UCSC has to offer.

The stunning natural beauty of our campus is a compelling backdrop for your educational journey. Our redwood forests, expansive meadows, and breathtaking views of the Monterey Bay are unmatched. Prepare to be inspired by your surroundings.

But you will quickly learn that UC Santa Cruz is much more than a pretty place.

Our distinguished faculty make this a dynamic university. They provide classroom experiences that challenge, inspire, and reward students, and they conduct outstanding research that expands the bounds of knowledge. More than 60 percent of UCSC undergraduates gain hands-on research experience during their years here. Faculty are your partners on this educational pathway, and their dedication will help you achieve your goals.

Your fellow students are another invaluable resource. Together, you will share experiences and create lifelong memories. In residence halls, classrooms, laboratories, performance halls, and field sites, the diversity of our student body will enrich what you learn—and how you learn it.

This campus is known as a place where artists work with computer scientists, biologists collaborate with engineers, and environmentalists team up with educators. Our researchers reach across the borders of traditional disciplines to form creative collaborations that have produced some of UCSC's proudest achievements. I hope you will bring an adventurous spirit to your studies, delving into unfamiliar territory to expand your horizons.

I congratulate you on choosing UCSC, and I welcome you to our community of proud Banana Slugs. I look forward to congratulating you again at graduation, when you join the distinguished family of UCSC alumni.

Sincerely,

George R. Blumenthal

GEORGE R. BLUMENTHAL

Chancellor

August 2010

FACING PAGE: *McHenry Library, which houses the campus's collections in the humanities, arts, and social sciences. The photograph was taken in 1965—UCSC's first year—by the late Ansel Adams.*

Introducing UCSC

The University of California

The University of California was chartered as a land-grant college in 1868. From its rural beginning, the university has developed into one of the world's most distinguished universities, acclaimed for its research, scholarship, and dedication to undergraduate and graduate education. There are 10 University of California campuses located regionally throughout the state: Berkeley, Davis, Irvine, Los Angeles, Merced, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. In addition, there are some 800 associated research institutes, laboratories, agricultural field stations, and extension centers serving California and the nation. The university is the primary state-funded academic agency for research. Its library collection, with 34 million volumes, is among the best in the country.

The University of California faculty, more than 8,700 in number, is distinctive in its 27 living Nobel Laureates and 372 members of the National Academy of Sciences—more than any other college or university system. Faculty membership in the American Academy of Arts and Sciences totals 519.

There are more than 160,000 undergraduates culled from the top 12.5 percent of the state's high school graduates and approximately 50,000 graduate students. The 1.5 million living alumni enrich the nation with public service and leadership.

The Santa Cruz Campus

Since its inception in 1965, the University of California, Santa Cruz, has been dedicated to excellence in undergraduate education, graduate studies, and research. UCSC students can take advantage of innovative academic planning combined with the research resources and scholarship strengths of the University of California system. At UC Santa Cruz, a program of general education is enhanced with opportunities for academic specialization.

Among the faculty and emeriti drawn to UC Santa Cruz by the opportunity for innovative teaching and scholarship are 14 members of the National Academy of Sciences, 24 members of the American Academy of Arts and Sciences, and 31 members of the American Association for the Advancement of Science. Numerous faculty have been awarded Guggenheim Fellowships, and several have been awarded national awards for distinguished teaching. Furthermore, two faculty members, three bach-

elor's degree recipients, and two Ph.D. recipients have been named MacArthur Fellows, and since 1972, when UC Santa Cruz began participating in the program, about 115 Fulbright scholarships have been awarded to UC Santa Cruz students and alumni. Five UC Santa Cruz alumni have been awarded Pulitzer Prizes.

The planned enrollment of the campus for 2010–12 is approximately 16,000 students, of whom some 1,500 will be graduate students. UCSC seeks and welcomes students, faculty, and staff of diverse ethnic and cultural experiences. UCSC plans to increase both its enrollment and resources and to diversify its educational and research opportunities over the next few years. New facilities are being built to meet current and future needs. The McHenry Library has been expanded by more than 75 percent and the original building has been seismically reinforced. The 27,000-square-foot Digital Arts building was completed in 2010.

The residential college is an important part of the Santa Cruz undergraduate experience. The 10 colleges divide the university into smaller communities that serve as a social and intellectual gathering place for 1,200 to 1,600 students and 30 to 110 faculty fellows from a variety of academic disciplines. Every undergraduate student affiliates with a particular college while participating in a campuswide academic program. All academic majors are open to students from all colleges.

Each college has a distinctive quality derived from its core course and extracurricular programs, and its faculty and their academic disciplines. Detailed descriptions of the ten colleges begin on page 87.

Undergraduate education. The campus offers more than 60 major programs within the arts, engineering, humanities, physical and biological sciences, and social sciences—as well as interdisciplinary-major programs. A complete list of academic programs and concentrations appears on pages 8–9, and detailed descriptions begin on page 120.

The major programs are administered by departments. In most cases, departments are composed of faculty in the same field, but interdisciplinary programs draw on faculty from several fields. In addition to established major programs, individual majors are available.

At Santa Cruz, letter grades are assigned in all credit courses. In addition, academic performance in each course may be recorded by a narrative performance evaluation. (See pages 37–40.)

Undergraduate education at Santa Cruz is focused on the individual student. UCSC's college core courses give first-year students

a small-seminar experience; intensive work in writing, discussion, and critical reasoning; as well as an orientation to academic life. To fulfill UCSC's rigorous comprehensive requirement, every senior must pass a comprehensive examination or complete an equivalent body of work.

Individual research is encouraged, and hundreds of research papers coauthored by Santa Cruz undergraduates and their professors have been published in journals.

Annually, about 500 Santa Cruz students broaden their academic careers through the UC Education Abroad Program (EAP), which allows students to incorporate full-time study abroad as UC credit toward their major. The EAP provides a vital international connection for academic preparation in an increasingly interdependent world (see page 45).

The UCSC campus strongly encourages undergraduate students to take advantage of the many opportunities for public service such as those provided through the campus's field programs, colleges, and Career Center. Individual studies, apprentice teaching, field studies, and internships can be important parts of the undergraduate experience. Over 1,400 students participate in the campus's field programs each year (see pages 46–48).

In a recent survey of graduating seniors, 73 percent indicated plans to continue their education in advanced-degree programs. In a study of more than 60 elite Association of American Universities member schools, UCSC ranked 15th in the ratio of bachelor's degree recipients who went on to receive doctorates. UCSC ranked third in the nation in the percentage of master's degrees awarded to women (44.2 percent). UCSC alumni also display a strong commitment to providing service to others: UCSC ranks 21st nationwide among universities with more than 15,000 undergraduates in the number of volunteers who are serving in the U.S. Peace Corps in 2010. UCSC graduates excel both inside and outside the classroom.

Graduate education. The UCSC campus offers graduate programs in more than 30 fields. Within the graduate programs, there are a range of options for concentrated study in a specialized field. Graduate study at Santa Cruz emphasizes close interaction between faculty and students, independent student research, supervised teaching experience, and interdisciplinary work. Further graduate information begins on page 53.

A number of major university research units are based or have a branch at the Santa Cruz campus: UC Observatories/Lick Observatory, the Institute of Marine Sciences,

the Santa Cruz Institute for Particle Physics, the Institute of Geophysics and Planetary Physics, the Institute for Quantitative Biomedical Research (QB3), and the Center for Information Technology Research in the Interest of Society (CITRIS). The campus supports other organized research endeavors ranging from Dickens studies to Chicano/Latino research to agroecology. Programs stem from existing academic strengths and the unique assets afforded the campus by its location in the Monterey Bay region (see page 63).

The central Santa Cruz campus occupies 2,000 acres on the west side of the city of Santa Cruz, on Monterey Bay, about 75 miles south of San Francisco and 35 miles southwest of San Jose. Expansive meadows at the campus entrance gradually slope up to a redwood forest that covers most of the site. Each residential college is within easy access of the campus's central core, which includes an extensive library, science laboratories, lecture halls, art studios, theater arts and music centers, a student union, and athletic facilities. Although the campus is spread out over many acres of hilly

terrain, its programs are accessible to people with mobility impairments (see page 44).

The city of Santa Cruz is a well-known recreational area and center for the arts. Mild weather, miles of beaches, and many cultural opportunities combine to make Santa Cruz an enjoyable place to study and live.

Accreditation. The University of California, Santa Cruz, is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges (WASC), 985 Atlantic Avenue, Suite 100, Alameda, CA 95501, (510) 748-9001, an institutional accrediting body recognized by the Council for Higher Education and the U.S. Department of Education.

UC Santa Cruz is also accredited by the Accreditation Board for Engineering and Technology (Computer Engineering and Electrical Engineering), the American Chemical Society Committee on Professional Training (Chemistry), and the California State Commission on Teacher Credentialing (Education).

Persons interested in reviewing the accreditation documents should contact the Office of the Campus Provost and Executive Vice Chancellor, Kerr Hall, (831) 459-3885.

The UCSC campus (foreground) is located on 2,000 acres of forest and meadows overlooking the city of Santa Cruz and the Monterey Bay National Marine Sanctuary. Ten residential colleges surround a central core, which includes an extensive library, science laboratories, lecture halls, art studios, theater arts and music centers, a student union and bookstore, and athletic facilities featuring a fitness center, playing fields, and a 50-meter pool.



Fields of Study

Programs and concentrations. Page numbers refer to the detailed discussion of each program, including its courses, later in the catalog.

| | Undergrad. Education | | | | Graduate Education | | | |
|---|----------------------|------|-------|-------------|--------------------|------|-------|---------------------|
| | B.A. | B.S. | Minor | Certificate | M.A. | M.S. | Ph.D. | Designated Emphasis |
| American literature: <i>see</i> Literature | | | | | | | | |
| American studies (pp. 121–125) | • | | | | | | | • |
| Anthropology (pp. 125–135) | • | | • | | | | • | • |
| Archaeology | | | | | | | c | |
| Cultural anthropology | | | | | | | c | |
| Physical anthropology | | | | | | | c | |
| Applied mathematics (p. 226) | | | • | | | | | |
| Applied mathematics and statistics (pp. 225–230) | | | | | | • | • | |
| Applied physics (p. 411) | | • | | | | | | |
| Art (pp. 135–141) | • | | | | | | | |
| Art history: <i>see</i> History of art and visual culture | | | | | | | | |
| Asian studies; <i>see</i> East Asian studies | | | | | | | | |
| Astronomy and astrophysics (pp. 142–146) | | | | | | | • | |
| Astrophysics (p. 411) <i>see also</i> | | | | | | | | |
| Physics (Astrophysics) | | | • | | | | | |
| Bilingual-multicultural education: <i>see</i> Education | | | | | | | | |
| Biochemistry and molecular biology (pp. 146–147) | | | • | | | | | |
| Bioengineering (pp. 230–233) | | | • | | | | | |
| Bioelectronics | | | c | | | | | |
| Biomolecular | | | c | | | | | |
| Rehabilitation | | | c | | | | | |
| Bioinformatics (pp. 234–237) | | | • | • | | | | |
| Biomolecular engineering and bioinformatics (p. 233) | | | | | | • | • | |
| Biological sciences (pp. 147–153) | | | | | | | | |
| Biology | • | • | • | | | | | |
| Bioeducation | c | | | | | | | |
| Ecology and evolution | | | • | | | | | |
| Ecology and evolutionary biology | | | | | | • | • | • |
| Human biology | | | • | | | | | |
| Marine biology | | | • | | | | | |
| Molecular, cell, and developmental biology | | | • | | | • | • | |
| Neuroscience | | | • | | | | | |
| Plant sciences | | | • | | | | | |
| Chemistry (pp. 165–173) | • | • | • | | | • | • | |
| Biochemistry | | c | | | | | | |
| Environmental chemistry | | c | | | | | | |
| Chinese language (pp. 173) | | | | | | | | |
| Classical studies (pp. 173–174) (<i>see also</i> Literature) | • | | • | | | | | |
| Cognitive science (pp. 174–175) (<i>see also</i> Psychology) | | | • | | | | | |
| Community studies (pp. 178–182) | • | | | | | | | |
| Computer engineering ² (pp. 240–251) | | | • | • | | • | • | |
| Computer systems | | | c | | | | | |
| Digital hardware | | | c | | | | | |
| Networks | | | c | | | | | |
| Robotics and control | | | c | | | | • | |
| Systems programming | | | c | | | | | |
| Computer science (pp. 251–263) | • | • | • | | | • | • | • |
| Computer science: Computer game design (pp. 254–255) | | | • | | | | | |
| Computer technology (pp. 243–251) | | | • | | | | | |
| Creative writing: <i>see</i> Literature | | | | | | | | |
| Dance: <i>see</i> Theater arts | | | | | | | | |
| Digital arts and new media ³ (pp. 185–189) | | | | | • | | | |
| Drama: <i>see</i> Theater arts | | | | | | | | |
| Dramatic literature: <i>see</i> Theater arts | | | | | | | | |
| Earth sciences (pp. 189–200) | | | | | | | | |
| Environmental geology | | c | | | | | | |
| Geochemistry | | | | | c | c | | |
| Geology | | | | | c | c | | |
| Geophysics | | | | | | | c | c |
| Ocean sciences | | c | | | | | | |
| Planetary sciences | | c | | | | | c | c |
| Science education | | c | | | | | | |
| East Asian studies: <i>see</i> History | | | • | | | | | |
| Ecology and evolution (pp. 150–151) | | • | | | | | | |
| Ecology and evolutionary biology (pp. 154–159) | | | | | | • | • | |
| Economics ⁴ (pp. 200–212) | • | • | | | | | | |
| Applied economics and finance | | | | | | | • | |
| Business management economics | • | | | | | | | |
| Global economics | • | | | | | | | |
| International economics | | | | | | | | • |
| Education ⁴ (pp. 212–221) | | | • | • | • | • | • | • |
| Science, technology engineering, and mathematics | | | • | | | | | |
| Bilingual-multicultural education | | | | | | | c | |
| Multiple subjects credential (elementary) | | | | | | | c | |
| Single subjects credential (secondary) | | | | | | | c | |
| Language, literacy, and culture | | | | | | | | c |
| Learning and teaching | | | | | | | | c |
| Mathematics and science education | | | | | | | | c |
| Social and cultural contexts of education | | | | | | | | c |
| Teachers and teacher development | | | | | | | | c |
| Electrical engineering (pp. 263–272) | | • | • | | | • | • | |
| Electronics/Optics | | c | | | | | | |
| Communications, signals, systems, and controls | | c | | | | | | |
| English: <i>see</i> Literature <i>and</i> Linguistics | | | | | | | | |
| Environmental studies (pp. 277–288) | | • | | | | | | • |
| Environmental toxicology: <i>see</i> Microbiology and Environmental Toxicology | | | | | | | | |
| Feminist studies (pp. 288–294) | | • | | | | | | • |
| Culture, power, and representation | | c | | | | | | |
| Law, politics, and social change | | c | | | | | | |
| Science, technology, and medicine | | c | | | | | | |
| Sexuality studies | | c | | | | | | |
| Film and digital media (pp. 294–303) | | • | • | | | | | • |
| Critical studies | | c | | | | | | |
| Integrated critical practice | | c | | | | | | |
| Production | | c | | | | | | |
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| French literature: <i>see</i> Literature | | | | | | | | |
| Geology: <i>see</i> Earth sciences | | | | | | | | |
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| German literature: <i>see</i> Literature | | | | | | | | |
| German studies (pp. 305–306) | | • | | | | | | |
| Global information and social enterprise studies (p. 443) | | | | | | | | • |
| Greek language: <i>see</i> Greek (p. 306); Literature (p. 359) | | | | | | | | |
| Greek literature: <i>see</i> Literature | | | | | | | | |
| Hebrew language (pp. 306–307) | | | | | | | | |
| History (pp. 307–319) | • | • | | | • | • | | • |
| Americas and Africa | c | | | | | | | |
| Asia and the Islamic world | c | | | | | | | |
| Colonialism, nationalism, and race | | | | | | | | c |
| Europe | c | | | | | | | |
| History of gender | | | | | | | | c |
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| History of consciousness (pp. 328–332) | | | | | | | | • |
| Human biology (p. 152–153) | | • | | | | | | |

| | Undergrad. Education | | | | Graduate Education | | | | | Undergrad. Education | | | | Graduate Education | | | |
|---|----------------------|------|-------|-------------|--------------------|------|-------|---------------------|---|----------------------|------|-------|-------------|--------------------|------|-------|---------------------|
| | B.A. | B.S. | Minor | Certificate | M.A. | M.S. | Ph.D. | Designated Emphasis | | B.A. | B.S. | Minor | Certificate | M.A. | M.S. | Ph.D. | Designated Emphasis |
| Information systems management (pp. 272–277) | | • | | | | | | | | | | | | | | | |
| Information systems and technology management (pp. 274–277) | | | | • | | | | | | | | | | | | | |
| Italian language (pp. 333) | | | | | | | | | | | | | | | | | |
| Italian literature: <i>see</i> Literature | | | | | | | | | | | | | | | | | |
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| Chinese | c | | c | | | | | | | | | | | | | | c |
| French | c | | c | | | | | | | | | | | | | | c |
| German | c | | c | | | | | | | | | | | | | | c |
| Italian | c | | c | | | | | | | | | | | | | | |
| Japanese | c | | c | | | | | | | | | | | | | | |
| Modern Hebrew | c | | c | | | | | | | | | | | | | | |
| Russian | c | | c | | | | | | | | | | | | | | |
| Spanish | c | | c | | | | | | | | | | | | | | |
| Latin American and Latino studies (pp. 341–350) | • | | • | | | | | | | | | | | | | | • |
| Latin language: <i>see</i> Latin (p. 340); Literature (p. 359) | | | | | | | | | | | | | | | | | |
| Latin literature: <i>see</i> Literature | | | | | | | | | | | | | | | | | |
| Legal studies (pp. 350–354) | • | | • | | | | | | | | | | | | | | |
| Linguistics (pp. 354–359) (<i>see also</i> Language studies) | • | | • | | • | | • | | | | | | | | | | |
| Theoretical linguistics | c | | | | c | | c | | | | | | | | | | |
| Literature ⁵ (pp. 359–371) | • | | • | | • | | • | | • | | | | | | | | |
| Creative writing | c | | | | | | | | | | | | | | | | |
| English-language literatures | c | | | | c | | c | | | | | | | | | | |
| French literature | c | | | | c | | c | | | | | | | | | | |
| German literature | c | | | | | | | | | | | | | | | | |
| Greek and Latin literatures | c | | | | | | | | | | | | | | | | |
| Italian literature | c | | | | | | | | | | | | | | | | |
| Modern literary studies | c | | | | c | | c | | | | | | | | | | |
| Pre- and early modern studies | c | | | | c | | c | | | | | | | | | | |
| Spanish/Latin American/Latino literatures | c | | | | c | | c | | | | | | | | | | |
| World literature and cultural studies | c | | | | c | | c | | | | | | | | | | |
| Marine biology (pp. 151) | | • | | | | | | | | | | | | | | | |
| Marine sciences: <i>see</i> Ocean sciences | | | | | | | | | | | | | | | | | |
| Mathematics (pp. 371–379) | • | | • | | • | | • | | | | | | | | | | |
| Computational mathematics | c | | | | | | | | | | | | | | | | |
| Mathematics education | c | | | | | | | | | | | | | | | | |
| Pure mathematics | c | | | | c | | c | | | | | | | | | | |
| Medieval studies (p. 359) | | | | | | | | | | | | | | | | | |
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| Molecular, cell, & developmental biology (pp. 159–164) | | • | | | • | | • | | • | | | | | | | | |
| Music ⁶ (pp. 384–394) | • | | | | • | | • | | • | | | | | | | | |
| Electronic music | | | | • | | | | | | | | | | | | | |
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| Neuroscience (pp. 153) | | • | | | | | | | | | | | | | | | |
| Ocean sciences (pp. 395–400) | | | | | | | • | | • | | | | | | | | |
| Biology (<i>see also</i> Marine biology) | | | | | | | c | | | | | | | | | | |
| Biological oceanography | | | | | | | | | c | | | | | | | | |
| Chemical oceanography | | | | | | | | | c | | | | | | | | |
| Chemistry | | | | | c | | | | | | | | | | | | |
| Earth sciences | | | | | | | c | | | | | | | | | | |
| Geological oceanography | | | | | | | | | c | | | | | | | | |
| Physical oceanography | | | | | | | | | c | | | | | | | | |
| Physics | | | | | | | c | | | | | | | | | | |
| Philosophy (pp. 400–407) | • | | • | | • | | • | | • | | | | | | | | |
| Religious thought | c | | | | | | | | | | | | | | | | |
| Photography: <i>see</i> Art | | | | | | | | | | | | | | | | | |
| Physics (pp. 409–416) | | • | • | | | | | | • | | | | • | | • | | |
| Physics (Astrophysics) (pp. 411) | | • | | | | | | | | | | | | | | | |
| Physics education (pp. 411) | | • | | | | | | | | | | | | | | | |
| Plant sciences (pp. 151–152) | | • | | | | | | | | | | | | | | | |
| Playwriting: <i>see</i> Theater arts | | | | | | | | | | | | | | | | | |
| Politics (pp. 416–424) | • | | • | | | | | | | | | | | | • | • | |
| Portuguese language (pp. 426–427) | | | | | | | | | | | | | | | | | |
| Psychology ⁵ (pp. 427–437) | • | | • | | | | | | | | | | | | | | • |
| Cognitive psychology | | | | | | | | | | | | | | | | | c |
| Developmental psychology | | | | | | | | | | | | | | | | | c |
| Social psychology | | | | | | | | | | | | | | | | | c |
| Religious studies (p. 437) | | | | | | | | | | | | | | | | | |
| Russian language (p. 437–438) | | | | | | | | | | | | | | | | | |
| Science communication: Science writing (pp. 438–439) | | | | | | | | | | • | | | | | | | |
| Social documentation (pp. 439–441) | | | | | | | | | | | | | • | | | | |
| Sociology ⁵ (pp. 442–452) | • | | • | | | | | | | | | | | | • | • | |
| Spanish for Spanish speakers (pp. 453) | | | | | | | | | | | | | | | | | |
| Spanish language (pp. 453–455) | | | | | | | | | | | | | | | | | |
| Spanish literature: <i>see</i> Literature | | | | | | | | | | | | | | | | | |
| Statistics (p. 226–230) | | | | | | | | | | • | | | | | | | • |
| Statistics and Applied Mathematics | | | | | | | | | | | | | | | | | • |
| Technology and information management | | | | | | | | | | | | | | | | | • |
| Theater arts (pp. 456–463) | • | | • | | • | | • | | | | | | | | | | |
| Asian theater | | | | | | | | | | | | c | | | | | |
| Dance | | | | | c | | c | | | | | | | | | | |
| Design and technology | | | | | c | | c | | | | | | | | | | |
| Drama | | | | | c | | c | | | | | | | | | | |
| Dramatic literature | | | | | | | | | | | | c | | | | | |
| Playwriting | | | | | | | | | | | | c | | | | | |
| Visual studies | | | | | | | | | | | | | | | | | • |
| Western civilization (p. 359) | | | | | | | | | | | | | | | | | • |
| Writing (pp. 463–466) | | | | | | | | | | | | | | | | | |

Combined majors. In addition, students may complete a combined major leading to a B.A. degree in a number of designated fields. Combined majors currently available include those in Earth sciences/anthropology, economics/mathematics, environmental studies/biology, environmental studies/Earth sciences, environmental studies/economics, Latin American and Latino studies/global economics, Latin American and Latino studies/literature, Latin American and Latino studies/politics, and Latin American and Latino studies/sociology. Students also have the option of pursuing a double major (*see* page 37).

c = concentration, or emphasis, within a program. Some programs give students the option of following a general course of study or selecting a concentration; other programs require students to choose a concentration. Consult the program on the page indicated.

¹ Combined B.A./M.S. programs in business management economics, economics/applied economics and finance, and global economics are also available.

² A combined B.S./M.S. program in computer engineering is also available.

³ A master of fine arts (M.F.A.) degree is awarded in digital arts and new media.

⁴ Because California state law requires prospective teachers to earn a bachelor's degree in an academic discipline other than education, no undergraduate major is offered. All teaching credentials are earned postbaccalaureate. UCSC offers the professional clear Crosscultural, Language and Academic Development (CLAD) and Bilingual Crosscultural, Language and Academic Development (BCLAD) multiple subjects credentials, which are used in self-contained elementary classrooms (K–6) where all subjects are taught by the same teacher. UCSC also offers the CLAD and BCLAD single subjects credentials, which are used in departmentalized settings where the teacher is responsible for one subject (7–12). A Doctor of Education (Ed.D.) in collaborative leadership is also available.

⁵ An intensive major is also available.

⁶ B.M. degree in music also available. Doctorate of musical arts (D.M.A.) degree in composition also available.

Academic Calendar

Fall Quarter 2010

| | |
|----------------------------|---------------------------|
| Fall quarter begins | September 18 |
| Instruction begins | September 23 |
| *Veterans Day | November 11 |
| *Thanksgiving recess | November 25–26 |
| Instruction ends | December 3 |
| Final examinations | December 6–9 |
| Fall quarter ends..... | December 9 |
| **Campus closure..... | December 24– January 2 |

Winter Quarter 2011

| | |
|---|-------------|
| Winter quarter begins | January 3 |
| Instruction begins | January 4 |
| *Birthday of Martin Luther King Jr. | January 17 |
| *Presidents' Day | February 21 |
| Instruction ends | March 14 |
| Final examinations | March 15–18 |
| Winter quarter ends | March 18 |

Spring Quarter 2011

| | |
|-----------------------------|------------|
| Spring quarter begins | March 28 |
| Instruction begins | March 28 |
| *Memorial Day holiday..... | May 30 |
| Instruction ends | June 3 |
| Final examinations | June 6–9 |
| Spring quarter ends | June 9 |
| Commencements | June 10–12 |

Fall Quarter 2011

| | |
|----------------------------|---------------------------|
| Fall quarter begins | September 17 |
| Instruction begins | September 22 |
| *Veterans Day | November 11 |
| *Thanksgiving recess | November 24–25 |
| Instruction ends | December 2 |
| Final examinations | December 5–8 |
| Fall quarter ends..... | December 8 |
| **Campus closure..... | December 24– January 2 |

Winter Quarter 2012

| | |
|---|-------------|
| Winter quarter begins | January 6 |
| Instruction begins | January 9 |
| *Birthday of Martin Luther King Jr. | January 16 |
| *Presidents' Day | February 20 |
| Instruction ends | March 16 |
| Final examinations | March 19–22 |
| Winter quarter ends | March 22 |

Spring Quarter 2012

| | |
|-----------------------------|------------|
| Spring quarter begins | April 2 |
| Instruction begins | April 2 |
| *Memorial Day holiday | May 28 |
| Instruction ends | June 8 |
| Final examinations | June 11–14 |
| Spring quarter ends | June 14 |
| Commencements | June 15–17 |

*Academic and administrative holiday

**Pending approval

Web: reg.ucsc.edu/calendar/



Undergraduate Admission and Financial Information

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Admission

Undergraduate admission to the University of California is based on two principles: that the best predictor of a student's success in the university is high scholarship in previous work and that the study of certain subjects gives a student good preparation for university work. Minimum admission requirements are the same for each UC campus, but each one sets additional standards when the number of qualified applicants exceeds capacity.

If you are considering applying to UC Santa Cruz, the Office of Admissions wants to help you learn more about the campus and its distinctive educational programs. For more information, see admissions.ucsc.edu.

If you are able to visit the campus, you may wish to take a student-led tour. The Office of Admissions offers tours on weekdays, and reservations are required. Visit our web site at admissions.ucsc.edu/campustours for information and reservations for campus tours. Please see admissions.ucsc.edu/transferworkshops for information and reservations for transfer information sessions. If you do not have Internet access, please call (831) 459-4008.

The University of California, Santa Cruz, continues to take positive steps to increase the diversity of the student population, including applicants coming from low socioeconomic backgrounds, students with disabilities, military veterans, and non-traditionally aged students. The university does not discriminate on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (pregnancy, childbirth, and medical conditions related to childbirth), disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a military veteran or special disabled veteran in admission to or participation in its programs, activities, or services.

Educational Opportunity Programs at UCSC are designed to encourage students from educationally and/or economically disadvantaged backgrounds to prepare for and enter the university. For a description of these programs, see page 42.

Admission by Exception. Special consideration may be given to a limited number of applicants who do not meet standard admission requirements. Admission by Exception is granted to a very small percentage of those considered for admission. Such factors as academic accomplishments in light of a person's life experiences and/or special circumstances,

socioeconomic background, special talents and/or achievements, contributions to the community, and the quality of the applicant's personal statement are taken into consideration when reviewing applicants seeking Admission by Exception.

Graduation rates. The following graduation-rate information is listed in compliance with the 1990 Title I: Federal Right-to-Know Act, Section 103. Fifty percent of the students who entered as first-year students in 2004 graduated in four years; 69 percent of those who entered in 2003 graduated in five years; and 71 percent of those who entered in 2002 graduated in six years. In recent years, those who entered as first-year students took an average of 4.19 years to graduate, and students transferring to UCSC as juniors averaged 2.29 years. These graduation rates are well above the national averages.

In accord with the Education Amendments of 1976, Section 493A, more detailed information regarding retention is available on the Institutional Research web site at planning.ucsc.edu/irps/retengrad.asp.

Admission Procedures

The University of California Application for Undergraduate Admission and Scholarships may be accessed through admissions.ucsc.edu.

In addition to the application, the above site includes a wealth of information for prospective UC students about undergraduate education, admission, financial aid, and various topics of interest.

If you do not have web access, e-mail ucinfo@ucapplication.net for a printed application.

Application Filing Periods

Applications for the fall quarter must be submitted during the month of November. Applications for winter quarter admission are accepted only as enrollment allows. Check with the Office of Admissions in mid-June to see whether UCSC is accepting applications for winter quarter.

| Quarter of Attendance | Application Filing Period |
|-----------------------|---------------------------|
| Fall quarter 2011 | November 1–30, 2010 |
| Winter quarter 2012 | July 1–31, 2011 |
| Fall quarter 2012 | November 1–30, 2011 |
| Winter quarter 2013 | July 1–31, 2012 |

Application Fees

The application fee is \$60 (\$70 for international nonimmigrant applicants) to apply to one campus of the university. For each additional campus you select, you must pay an extra \$60 fee (\$70 for international nonimmigrant applicants). These fees are subject to change and are not refundable. The online application includes payment instructions.

Fee Waivers

The University of California will waive application fees for up to four campuses for certain students who otherwise would be unable to apply for admission. To qualify for the fee waiver, you must meet specific requirements related to your family income and size. The fee waiver is for U.S. citizens and permanent residents only.

Students who qualify for fee waivers and who select more than four campuses must pay \$60 for each additional choice.

There are several ways to apply for a fee waiver, as described below. To qualify, you must meet the same income and family-size guidelines, regardless of the application method you use.

An online fee waiver form is available to applicants when they apply. The application automatically determines if you are eligible for the fee waiver as soon as it is complete.

Other methods for waiving the application fee are listed below.

- High school students: Use the College Board fee waiver. It is available from your school counselor.
- EOPS community college students: If you are enrolled in Extended Opportunity Programs and Services (EOPS) at a California community college, obtain a fee waiver authorization from the EOPS Office.
- Other applicants: Qualified students may obtain a UC fee waiver authorization at a UC campus Admissions, Relations with Schools, or Educational Opportunity Programs Office. When requesting a fee waiver authorization, be prepared to answer questions about your gross family income and family size.

University of California College Prep (UCCP)

UCCP publishes free high-quality online courses and content to benefit California students, with a special emphasis on helping underserved students gain college eligibility. A

statewide University of California program, UCCP mines the educational resources of UC faculty and programs to develop the highest-quality online courses. The program makes its UC-approved Advanced Placement® and college-prep courses freely available to California students, teachers, and schools. UCCP courses are aligned to California content standards and are College Board certified. In 2008–2009, more than 200,000 California students and teachers accessed UCCP content and about 1 million more students and teachers worldwide viewed our courses. The program currently licenses a catalog of 17 high school courses and 34 community college courses through educational partnerships. View UCCP courses at www.uccollegeprep.org.

Admission as a Freshman

The university considers you a freshman applicant if you have graduated from high school and have not enrolled in a regular session at any college or university. If you attend a summer session immediately after graduating from high school, you are still a freshman applicant.

The admission and selection process for freshmen to UC Santa Cruz reflects the academic rigor and preparation needed for admission to a major research institution. Meeting the minimum eligibility requirements for the university does not guarantee you admission as a freshman. Students are encouraged to achieve well beyond the minimum requirements to enhance their chances for selection.

Information regarding the admission and selection process for UC Santa Cruz can be accessed at admissions.ucsc.edu. This site provides information on establishing UC eligibility for both residents and nonresidents of California. If you are unable to access the online information, please call the Admissions Office at (831) 459-4008.

High School Preparation for University Work

Carefully planned high school course work provides you with the best preparation for your undergraduate university studies, and allows for advanced preparation for your chosen field of study. Most important, students who master certain basic knowledge and skills in high school substantially increase their chances of success at the university. (Requirements for transfer students are explained in the “Admission as a Transfer Student” section.)

The basic foundation of UC eligibility is the completion of the high school courses required for admission (see “a–g” Subject Requirement). However, you should take courses beyond the minimum levels in reading, writing, and mathematics in order to be adequately prepared for basic university courses that you may be expected to take freshman year.

A well-prepared student will have mastered the equivalent of four years of English composition and literature with a focus on expository writing; four years of mathematics, including a precalculus course in the senior year; two to three years of a language other than English; two to three years of laboratory science; two or more years of history and social sciences; and one or more years of visual or performing arts.

You should also give careful thought to the general field of study, and perhaps the specific major, you want to pursue at the university. By making this decision in advance, you can plan to take additional courses in high school related to the field.

Reading. University students must be able to read and understand scholarly publications, analyze what they read, and question themselves about an author’s intentions, viewpoint, arguments, and conclusions. You should read commentaries and essays as well as textbooks, and a wide variety of other material—including literature, biography, nonfiction, and criticism—in addition to what you are required to read in class.

Writing. You must learn to write clearly and skillfully in English and to think critically and analyze what you learn in class and in your reading, so that you can present your ideas in a clear and persuasive manner.

University students proficient in composition must be able to understand the assigned topic, select and develop a theme by argument and example, use words and sentences that clearly and precisely express what they mean, demonstrate an understanding of the rules of standard English, and punctuate and spell correctly.

Mathematics. A number of fields of study require preparation in mathematics beyond the three years necessary for admission to UCSC. All majors in engineering and the physical, mathematical, and life sciences include courses in calculus, as do programs leading to professional degrees in medicine, dentistry, optometry, and pharmacy. Moreover, many majors in the social sciences, business, and economics require statistics and/or calculus.

The recommended four years of high school mathematics should include basic operations with numerical and algebraic functions; operations with exponents and radicals; linear equations and inequalities; polynomials and polynomial equa-

tions; functions and their graphs; trigonometry, logarithms, and exponential functions; and applications and word problems.

Senior-Year Program. The senior year should be used to prepare you for your first year at the university and should include honors and advanced courses, as well as courses that will strengthen overall preparation. A challenging, successfully completed senior-year program is a natural bridge between high school and university course work in the intended major. A strong senior program will also strengthen your chances for admission to UC Santa Cruz.

High School Proficiency Examination

While the University of California expects freshman applicants to have graduated from high school, in lieu of the regular high school diploma, the university will accept the following:

- Certificate of Proficiency, awarded by the State Board of Education upon successful completion of the California High School Proficiency Examination
- General Educational Development (GED) Certificate
- Proficiency tests from other states

Transfer Credit

Transfer credit may be granted to a freshman applicant for acceptable college courses taken while still in high school if an official transcript is received from the college where the course work was completed.

Transfer credit is granted for specified College Board Advanced Placement Examinations completed with a score of 3, 4, or 5 and for specified International Baccalaureate Higher Level Exams completed with a score of 5, 6, or 7. A score of 30 or higher on the International Baccalaureate Diploma is also awarded transfer credit.

Admission as a Freshman: Fall 2012 Changes. The UC Board of Regents in February 2009 adopted a proposal to change freshman admission to give more high-achieving students the chance to apply to UC and receive a full review of their applications. The new rules will take effect for the fall 2012 entering class. For more information, see www.universityofcalifornia.edu/news/eligibilitychanges/.

Subject Requirements

a. History/social science—two years required. Two years of history/social science, including one year of world history, cultures, and geography; and one year of U.S. history or one half year of U.S. history and one half year of civics or American government.

b. English—four years required. Four years of college preparatory English that include frequent and regular writing, and reading of classic and modern literature. No more than one year of ESL-type courses can be used to meet this requirement.

c. Mathematics—three years required, four years recommended. Three years of college preparatory mathematics that include the topics covered in elementary and advanced algebra and two- and three-dimensional geometry. Approved integrated math courses may be used to fulfill part or all of this requirement, as may math courses taken in the seventh and eighth grades that your high school accepts as equivalent to its own math courses.

d. Laboratory science—two years required, three years recommended. Two years of laboratory science providing fundamental knowledge in at least two of these three foundational subjects: biology, chemistry, and physics. Advanced laboratory science courses that have biology, chemistry, or physics as prerequisites and offer substantial additional material may be used to fulfill this requirement. The last two years of an approved three-year integrated science program that provides rigorous coverage of at least two of the three foundational subjects may be used to fulfill this requirement.

e. Language other than English—two years required, three years recommended. Two years of the same language other than English. Courses should emphasize speaking and understanding, and include instruction in grammar, vocabulary, reading, composition, and culture. Courses in languages other than English taken in the seventh and eighth grades may be used to fulfill part of this requirement if your high school accepts them as equivalent to its own courses.

f. Visual and performing arts discipline (VPA)—one year required. A single yearlong approved arts course from a single discipline: dance, drama/theater, music, or visual art.

g. College preparatory electives—one year required. One year (two semesters), in addition to those required in “a–f” above, chosen from the following areas: visual and performing arts (non–introductory level courses), history, social science, English, advanced mathematics, laboratory science, and a language other than English (a third year in the language used for the “e” requirement or two years of another language).

which transfer courses may be used to satisfy major requirements.

Because a total of 70 semester units (105 quarter units) of credit toward a university degree may be earned at a community (two-year) college, only subject credit will be granted for courses taken in excess of these amounts.

Applicants will not be considered for admission if they have completed 90 semester units (135 quarter units) or more of UC–transferable credit. If students have earned all of their credits from community college, they are not affected by this limit. Advanced Placement (AP) or International Baccalaureate Higher Level (IBH) credit is permitted to exceed the 90 semester unit maximum by the number of AP or IBH units granted.

Opportunities to take courses at UC Santa Cruz as a nonmatriculated student are available through Summer Session, Open Campus/ Concurrent Enrollment through UC Extension, and Intersegmental Cross-Enrollment.

UC Santa Cruz Transfer Services

The Office of Admissions provides information to all students who wish to transfer to UC Santa Cruz. For prospective transfer students and their families, the Office of Admissions offers Transfer Information Sessions. Designed for prospective transfer students and their families, Transfer Information Sessions are small-group meetings in which an Admissions adviser presents information about transfer admissions matters and transfer-related student services. Please note that pre-evaluations of transcripts are not available as part of the sessions. This workshop is designed for students who have not yet applied to UCSC. Students and their families may make reservations at admissions.ucsc.edu/transferworkshops.

Student-led guided tours take place year-round and also require advance reservations. Please see admissions.ucsc.edu/campustours to make a reservation. If you do not have Internet access, please call (831) 459-4008.

In addition, UCSC Admissions counselors visit many community colleges in California. Check with your counseling department or transfer center to determine whether a UCSC counselor will be visiting your community college.

Admission as a Transfer Student

The University of California defines a transfer applicant as a student who has been a registered student in a college or university, or in college-level extension classes following high school graduation. Summer session attended immediately following high school graduation is excluded in this determination. If you are a transfer applicant, you cannot disregard your college record and apply for admission as a freshman.

The admission and selection process for transfer students reflects the academic rigor and preparation needed for admission to a major research institution. UC Santa Cruz gives highest priority to junior-level transfers from California community colleges.

Information regarding the admission and selection process for UC Santa Cruz can be accessed at admissions.ucsc.edu. This site provides information on eligibility and selection for both residents and nonresidents of California. If you are unable to access the online information, please call the Admissions Office at (831) 459-4008.

Credit for Courses Taken Elsewhere

The university gives unit credit to transfer students for courses they have completed at other accredited colleges and universities, including courses taken at recognized institutions outside of the U.S. To be accepted for credit, your courses must be comparable to those offered at the university, as determined by the UC Santa Cruz Admissions Office. The UC Santa Cruz department sponsoring your major decides

Admission of International Students

The University of California welcomes applications from international students. The academic credentials of applicants from other countries are evaluated in accordance with the general regulations governing admission.

UC Santa Cruz accepts applications from international students for the fall quarter, and students should begin application inquiries a year before the quarter of desired admission. Openings for the winter quarter may be limited. If you are interested in applying for winter, check with the Office of Admissions. For information, write to admissions@ucsc.edu or the International Admissions Specialist, Office of Admissions, University of California, Santa Cruz, 1156 High Street, Santa Cruz, CA 95064.

If your native language is not English, you must certify proficiency in English by one of the following methods: earning a score of 83 or higher on the Internet-based Test of English as a Foreign Language (minimum 550 if paper-based TOEFL; minimum 220 if computer-based TOEFL), or earning a minimum score of 7.0 on the International English Language Testing System (IELTS) exam, or completing two transferable English composition courses with grades of B or higher in a U.S. college or university.

A financial certificate and official academic records will be required if you are admitted to the university. Generally, nonimmigrant students must provide documentation that sufficient funds will be available to cover non-resident tuition, educational fees, and living expenses. The university does not offer financial assistance to international students.

For information about services for international students, see International Education Office.

Readmission

If you are an undergraduate who wants to return to UC Santa Cruz after an absence of a portion of a quarter or more, you must file an Application for Readmission. The application form is available online at advising.ucsc.edu/student/read and from your college office. The completed application should be filed, along with the nonrefundable \$60 application fee, with the Office of Admissions during the appropriate period:

| Quarter of Attendance | Application Filing Period* |
|-----------------------|----------------------------|
| Fall quarter | November 1–July 31 |
| Winter quarter | July 1–October 31 |
| Spring quarter | October 1–January 31 |

*Filing deadlines for priority enrollment: fall, April 1; winter, October 1; spring, January 1.

If during your absence you attended another UC campus, an official transcript must be submitted to the Office of Admissions before your application will be sent to your college for approval. If you attended another collegiate institution, your UC Santa Cruz college may require a transcript. If you left for health reasons, clearance from the Cowell Student Health Center is required. You must pay all outstanding bills owed to the university before you will be permitted to register.

Admission to Special Categories

For information on applying for admission in the categories described below, please contact the Office of Admissions at admissions@ucsc.edu or University of California, Santa Cruz, 1156 High Street, Santa Cruz, CA 95064, (831) 459-2131.

Second Bachelor's Degree

Applications from students interested in pursuing a second baccalaureate or limited-status program will be considered as campus enrollment allows. Priority is given to applicants who have not yet had the opportunity to complete a bachelor's degree.

If your educational goals have changed substantially since receiving your bachelor's degree, you may be eligible to pursue a second undergraduate degree in an established major at UCSC.

You must meet regular university admission requirements, and your experience or previous scholarship record must show potential for academic success in your proposed area of study. Additional selection criteria may be applied. Admission is also subject to approval by the appropriate department and the college.

For a second degree, you must fulfill major and residence requirements, as well as system-wide requirements in American history and institutions and the Entry Level Writing Requirement (see pages 25–26). You must enroll for at least three quarters and are usually restricted to six quarters total.

Limited Status

If you have already completed an undergraduate degree and you have a particular reason to take specific undergraduate university classes, you may be eligible to enroll in a nondegree program as a limited-status student.

Your proposed program of study must either prepare you for graduate or professional school or satisfy some definite educational need or interest. Participants generally enroll full-time for a specified period that does not exceed three quarters. You must meet regular university admission requirements, and your experience or previous academic record must show potential for success in your proposed program. Additional selection criteria may be applied. Admission is subject to approval by the appropriate department or college.

Nondiscrimination and Affirmative Action Policies

Student-Related Matters

The University of California, in accordance with applicable federal and state law and university policy, does not discriminate on the basis of race, color, national origin, religion, sex, gender identity, pregnancy, physical or mental disability, medical condition (cancer related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services. The University also prohibits sexual harassment. This nondiscrimination policy covers admission, access, and treatment in University programs and activities. University policy also prohibits retaliation for bringing a complaint of discrimination or participating a complaint process or investigation pursuant to this policy.

Inquiries regarding the University's student-related nondiscrimination policies may be directed to Student Judicial Affairs, (831) 459-1738, or e-mail sja.ucsc.edu.

Inquiries regarding the University's affirmative action, equal employment opportunity, and nondiscrimination policies as they relate to student employment may be directed to the Office for Diversity, Equity and Inclusion, (831) 459-3676 or e-mail cbene@ucsc.edu.

Inquiries regarding UCSC's Policy on Sexual Assault, the UC Policy on Sexual Harassment and Procedures for Reports of Sexual Assault(s) and Sexual Harassment and/or violations of Title IX may be directed to Title IX Coordinator/Sexual Harassment Officer, (831) 459-2462, or e-mail rew@ucsc.edu.

Student inquiries regarding disability or disability accommodations may be addressed to the Director, Disability Resource Center, (831) 459-2089; or e-mail drc@ucsc.edu.

Employment-Related Matters

The University of California prohibits discrimination against or harassment of any person employed by or seeking employment with the University on the basis of race, color, national origin, religion, sex, gender identity, pregnancy, physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (as defined by the Uniformed Services Employment and Reemployment Rights Act of 1994).

University policy also prohibits retaliation against any employee or person seeking employment for bringing a complaint of discrimination or harassment pursuant to this policy, or against a person who assists someone with a complaint of discrimination or harassment for giving such assistance as the complainant may

seek, or who participates in any manner in an investigation or resolution of a complaint of discrimination or harassment for participating in a way requested by the complainant or the university.

The University of California is an affirmative action/equal opportunity employer. The university undertakes affirmative action to ensure equal employment opportunity for minorities and women, for persons with disabilities, and for covered veterans. University policy is intended to be consistent with the provisions of applicable state and federal laws.

Inquiries regarding the university's affirmative action, equal employment opportunity, and nondiscrimination policies for academic, staff and student employment may be directed to the Office for Diversity, Equity and Inclusion, (831) 459-3676, or e-mail cbene@ucsc.edu.

Sexual Harassment/Title IX

The university cherishes the free and open exchange of ideas and expansion of knowledge. To maintain this freedom and openness requires objectivity, mutual trust, and confidence; it

requires the absence of coercion, intimidation, or exploitation. The principal responsibility for maintaining these conditions must rest upon those members of the university community who exercise the greatest authority and leadership: faculty, managers, and supervisors.

The university has therefore instituted a number of measures designed to protect its community from sexual and other forms of harassment. Students, faculty, and staff who want information, advice, to file a complaint, and/or copies of the *UCSC Policy on Sexual Assault*, the *UC Policy on Sexual Harassment*, and *Procedures for Reports of Sexual Assault(s) and Sexual Harassment* should contact Rita E. Walker, Title IX/Sexual Harassment Officer, 105 Clark Kerr Hall, (831) 459-2462 or via e-mail at rew@ucsc.edu. For detailed information about the services of the Title IX/Sexual Harassment Office, visit the web site at www2.ucsc.edu/title9-sh/. The Title IX/SHO is also available to investigate other violations of Title IX.



Expenses and Financial Resources

Expenses

In determining the cost of attending UCSC each quarter, students should consider both required fees and personal expenses. The figures below are provided to help you draw up a realistic personal budget. If you then conclude that you will need financial assistance in order to attend UCSC, you should read the Financial Aid section below. Fees and additional financial information for graduate students appear on pages 57–58. *Tuition, fees, and other charges are subject to change without notice by the UC Regents. For the most current fee information, check reg.ucsc.edu.*

Required Fees

Required fees are due and payable before the start of each quarter. At the beginning of each quarter, you will need sufficient funds to cover housing charges and book costs. For many financial aid recipients, however, fees and on-campus housing charges are paid automatically from approved student aid funds. If you are a financial aid recipient, please note that checks and direct deposits for scholarships, grants, and loans in excess of university charges are not available to you until after registration and enrollment each quarter.

The **Student Services Fee** funds student services that provide a supportive and enriching learning environment and that are complementary to, but not part of, the instructional program. Programs include, but are not limited to, services related to the physical and psychological health and well-being of students; social and cultural activities and programs; services related to campus life; and educational and career support.

The **Educational Fee** helps support student financial aid and related programs; admissions; registration; administration; libraries; operation and maintenance of plant; the university's operating budget; and all costs related to instruction, including faculty salaries.

Santa Cruz campus fees help support a wide range of student services, including college and campuswide student government, extracurricular programs and recreation facilities, campus child care, community and public service projects, Educational Opportunity Programs and scholarships, and free-fare use of the local

transit systems. Campus fees paid by graduate students are provided on page 57.

In addition, all students, including foreign students, are assessed a mandatory **Health Insurance Premium**. The Cowell Student Health Center provides the primary care services for the plan while a contracted insurance company provides major medical and hospitalization insurance. There is an annual deductible, with most expenses covered at 80 percent of the customary and usual charge. Coverage includes, but is not limited to, hospital stays; surgical services; physician visits; emergency treatment; outpatient care; and pregnancy. Dependent coverage is also available. Detailed information is on the web at www2.ucsc.edu/healthcenter/billing/insurance.shtml or contact the Student Health Insurance Office, (831) 459-2389.

Waivers from the mandatory health insurance premium are available if you can show that your private insurance provides coverage equal to or better than the student health insurance plan. Deadlines for applying for a waiver are listed in the *Schedule of Classes* (reg.ucsc.edu/soc).

Some courses charge an additional **Course Materials Fee**. These fees recover the cost of materials, supplies, equipment, and support services not covered by the normal instructional budget. The fees are reviewed and approved annually by the Miscellaneous and Course Materials Fee Advisory Committee. The list of specific courses charging fees in 2008–09 is available in the quarterly *Schedule of Classes* and on the web at reg.ucsc.edu/coursefees.html.

Nonresident Tuition

If you are a resident of a state other than California or of another country, you must pay nonresident tuition, the nonresident educational fee, and other required fees (university registration and Santa Cruz campus fees). The criteria for residency appear in Appendix A.

Non-U.S. citizens note: Regardless of how long you live in California, only U.S. citizens and holders of immigrant visas may become qualified for resident classification.

Estimated Undergraduate Budget, 2010–11

| On Campus | California Residents | | Nonresidents | |
|--|----------------------|--------------------|--------------------|--------------------|
| | One Quarter | F-W-S Quarters | One Quarter | F-W-S Quarters |
| Required Fees | | | | |
| Student Services Fee | \$ 300.00 | \$ 900.00 | \$ 300.00 | \$ 900.00 |
| Educational Fee ^a | 3,134.00 | 9,402.00 | 3,420.00 | 10,260.00 |
| Santa Cruz campus fees ^b | 402.87 | 1,203.41 | 402.87 | 1,203.41 |
| Health insurance (waivable) | 451.00 | 1,353.00 | 451.00 | 1,353.00 |
| <i>Subtotal</i> ^b | \$4,287.87 | \$12,858.41 | \$4,573.87 | \$13,716.41 |
| Estimated Personal Expenses^c | | | | |
| Room and board | \$4,724.00 | \$14,172.00 | \$4,724.00 | \$14,172.00 |
| Books and supplies | 468.00 | 1,404.00 | 468.00 | 1,404.00 |
| Miscellaneous | 508.00 | 1,524.00 | 508.00 | 1,524.00 |
| Transportation | 290.00 | 870.00 | 290.00 | 870.00 |
| <i>Subtotal</i> | \$5,990.00 | \$17,970.00 | \$5,990.00 | \$17,970.00 |
| Total Budget CA Residents | \$10,277.87 | \$30,828.41 | | |
| Nonresident Tuition | | | \$7,341.00 | \$22,021.00 |
| Total Budget CA Nonresidents | | | \$17,904.87 | \$53,707.41 |

^a Undergraduates who are unable to maintain a full-time program of study because of employment responsibilities, family obligations, or health problems may be eligible for a 50 percent reduction in the Educational Fee.

^b One quarter at \$397.67; two quarters at \$402.87.

^c Estimated personal expenses for students living off campus total \$5,030 per quarter or \$15,090 for three quarters. Estimated personal expenses for students living with family total \$3,196 per quarter or \$9,588 for three quarters.



To bridge the gap between the cost of a UCSC education and what parents and students can reasonably afford to pay, the campus offers a wide variety of financial aid packages, including grants, scholarships, loans, and part-time employment. Each student requesting financial aid is assigned an adviser.

Late Fees

You may be assessed late fees if you fail to make university payments or enroll by the specified deadlines. For example, *late fees are assessed on a graduated basis for each month there is an unpaid balance on your university account*, and at \$50 each for a late registration payment and/or late enrollment and \$25 for a late housing payment. Deadlines are published in *The Navigator* (the undergraduate campus handbook) and the *Schedule of Classes*, both online at reg.ucsc.edu, and they appear on the Statement of Account.

Estimated Personal Expenses

The figures given for estimated personal expenses are for a single undergraduate living on campus. Expenses will be higher for married students, students with children, and graduate students. The information is as current and realistic as possible; however, expenses for students vary in accordance with lifestyles, priorities, and obligations.

Room and board (in college residences).

Rates for room and board in the college residence halls are expected to range from about \$10,809 to \$15,003 per year, depending on the type of accommodation and meal plan. The room and board amount of \$14,172 in the Undergraduate Budget table on page 19 is based on the weighted average of on-campus contracts

and includes an allowance for additional meals and phone service. Anticipated rates for college apartments are comparable once food and phone costs are added.

Rates are paid quarterly. The rate ranges listed above do not cover periods of academic recess, nor does the budget on page 19. Housing charges are normally payable at the beginning of each quarter. However, students may arrange with the Campus Housing Office to pay monthly.

More detailed information on room and board expenses for the individual colleges appears in a brochure distributed as part of the admission process or available from the Campus Housing Office, 104 Hahn Student Services Building, (831) 459-2394.

Miscellaneous. This budget item covers a broad range of expenses including clothing, laundry, personal grooming, recreation, and health maintenance. It also covers minimum expenses for modest travel to visit family.

Fee Refunds

Students who cancel their registration before the first day of instruction in a given quarter are refunded all required fees minus a \$10 service charge. New undergraduate students who cancel their registration before the first day of instruction are entitled to a refund of all required fees except the nonrefundable \$100 undergraduate acceptance of admission fee (applied toward the Student Services fee).

Once the quarter has begun, students must petition for withdrawal. The percentage of fees refunded is determined by the effective date of the withdrawal, according to the schedule at the left, in which day 1 is the first day of instruction. A student is not eligible for university services after the effective date of withdrawal.

A student entering the armed forces before the sixth week of the quarter is entitled to a full refund of the Student Services fee—provided no course credit is received.

More detailed information on withdrawal and refund procedures is included in the quarterly *Schedule of Classes* and *The Navigator*, both online at reg.ucsc.edu, and in the *Graduate Student Handbook* (graddiv.ucsc.edu). Information on refunds of room and board charges is contained in the campus housing contract, provided to all applicants for on-campus housing. For more information on how withdrawing affects your financial aid, refer to *Your Guide to Financial Aid* (www2.ucsc.edu/fin-aid) or contact the Financial Aid Office.

Schedules of Refunds

All Continuing and Readmitted Students and New Students Not Receiving Federal Financial Aid

| Number of calendar days | Percentage of fees refunded* |
|-------------------------|------------------------------|
| 1st day of instruction | 100 |
| 2-7 | 90 |
| 8-18 | 50 |
| 19-35 | 25 |
| 36 and over | 0 |

New Students Who Receive Federal Financial Aid and Withdraw during Their First Academic Term

| Number of calendar days | Percentage of fees refunded* |
|-------------------------|------------------------------|
| 1st day of instruction | 100 |
| 2-7 | 90 |
| 8-14 | 80 |
| 15-21 | 70 |
| 22-28 | 60 |
| 29-35 | 50 |
| 36-42 | 40 |
| 43 and over | 0 |

*For new students, the nonrefundable \$100 Undergraduate Acceptance of Admission Fee is withheld from the Student Services Fee; the schedule of refunds applies to the balance of fees. Percentages listed (days 1-35 or days 1-42) should be applied individually to Nonresident Tuition, the Educational Fee, the Student Services Fee, and Santa Cruz campus fees. The Health Insurance Fee is nonrefundable.

Deferred Payment Plan

The Deferred Payment Plan (DPP) provides an alternative method of budgeting and paying registration fees. It allows these fees, to the extent not covered by scholarships, loans, or other financial aid, to be paid in monthly installments. Students have a choice of applying for a three-month plan for individual quarterly fees, or, at the beginning of the fall quarter only, for a nine-month plan to be used for the fall, winter, and spring quarters. A nonrefundable application fee of \$25 for the three-month plan, or \$60 for the nine-month plan, is required. Any student in good financial and academic standing may apply for DPP. Students receiving financial aid sufficient to cover registration fees in full are not eligible for this plan. For more information about how to apply for DPP, application deadlines, and campus policies regarding the program, contact the Office of Student Business Services, 203 Hahn Student Services Building, (831) 459-2107, e-mail oarinfo@ucsc.edu, or visit the web site at sbs.ucsc.edu.

Financial Aid

For undergraduate students who require financial assistance, the university maintains a robust financial aid program of grants, scholarships, loans, and part-time employment. Administered by the Financial Aid and Scholarship Office, these resources help bridge the gap between the cost of education and what parents and students can reasonably contribute.

If you are a dependent student, the amount of the contribution expected from you and your parents is determined through a careful analysis of your family's financial strength, considering such variables as income, number of dependents, allowable expenses, and assets (excluding the home you live in). Federal, state, and university procedures and campus policies are used in the evaluation. The same policies apply to married and independent students.

The UC Blue and Gold Opportunity Plan ensures that undergraduate California residents whose families earn less than \$70,000 a year in 2010–11 and who qualify for financial aid will have their UC system-wide fees fully covered with gift aid. Qualified students must be in their first four years of attendance (first two for transfer students). Students must also meet application deadlines.

Application Deadlines

The Free Application for Federal Student Aid (FAFSA) may be submitted on January 1 preceding the academic year in which you wish to enroll. The deadline for applications is March 2 of the preceding academic year for which you are requesting aid. The FAFSA can be filled out online and filed electronically at www.fafsa.gov. A "FAFSA on the Web Worksheet" is available online to help you prepare for completing the FAFSA. Prior-year FAFSA applicants can use their FAFSA PIN to access their information and to complete their FAFSA on the web.

In some cases, the Financial Aid and Scholarship Office will require additional information from applicants. These applicants will be sent an e-mail instructing them to log onto the student portal at my.ucsc.edu and view their "To Do List," which will specify the required documents (e.g., copies of student and parent tax returns or other forms). These are mandatory requirements with a due date for each requested item on the "To Do List." Please be sure to keep your e-mail address current at my.ucsc.edu.

Applications received after the deadline will be reviewed after those received on time have been processed. Late applicants will be considered for aid on a funds-available basis.

The admission notification date is the financial aid application deadline for students seeking to transfer to UCSC during the winter quarter of the following academic year. Required supporting documents must be submitted by December 20.

First-year student applications will be processed first, and every effort will be made to provide frosh with an aid offer by May 1. The earlier the FAFSA is submitted after January 1, the earlier you will receive an offer. All other applicants will be notified as applications are processed after that date. If you are applying for winter or spring quarter, you will receive notification of your award as soon as possible after you are admitted or readmitted and your aid application file is complete.

Types of Aid

If you apply for financial aid and you meet the application deadlines, as outlined above, you are considered for all the types of assistance described below. Depending on funds available and your financial need, your financial aid package may include a combination of grants, scholarships, loans, and work opportunities.

Grants

The following grants are available to undergraduates.

The *Cal Grant A* program, open only to California residents, is expected to provide a maximum award of \$10,302 in 2010–11 to help offset mandatory registration fees for the academic year. Students are selected on the basis of academic achievement and financial need.

The *Cal Grant B* program, designed for California students from low-income families, will provide an annual living stipend of \$1,551 to all eligible freshman students in 2010–11. To help offset mandatory registration fees and annual living expenses, this grant will provide \$11,853 to students at the sophomore level and above.

All California residents seeking financial aid must apply for a Cal Grant by submitting a FAFSA by March 2 and listing a California college in the information-release section of the FAFSA. New applicants for the Cal Grant must also submit a GPA Verification form directly to the California Student Aid Commission by March 2. More information is available at www.csac.ca.gov.

Federal Pell Grants will provide a maximum of \$5,550 during 2010–11.

Federal Supplemental Educational Opportunity Grants are available to students with substantial financial need. The maximum award is \$4,000.

Federal Academic Competitiveness Grants provide up to \$750 for first-year college students and up to an additional \$1,300 for second-year students. To receive an Academic Competitiveness Grant, freshmen and sophomores must be Federal Pell Grant-eligible and have completed a program of rigorous high school course work as defined by their state (all regularly admitted UCSC students meet these criteria). In addition, sophomores must have earned a 3.0 GPA by the end of their freshman year. Visit federalstudentaid.ed.gov for more details. This program is authorized through 2010–11.

Federal National Science and Mathematics Access to Retain Talent (SMART) Grants provide up to \$4,000. To receive a SMART Grant, juniors and seniors must be Federal Pell Grant-eligible majoring in designated science, technology, math, or critical foreign languages, and maintain a 3.0 GPA each term during the year. Visit federalstudentaid.ed.gov for more details. This program is authorized through 2010–11.

UC Santa Cruz Grants are awarded to students based on their financial need. Funds for this grant program come in part from the

educational fees paid quarterly by students at all campuses of the university.

Scholarships

UC Santa Cruz scholarships range from \$250 to \$10,000 per year. (The average award is about \$1,500.) Funding comes from many sources—private donors, corporations, professional associations, alumni, and the university itself.

Merit scholarships are awarded competitively on the basis of high academic achievement and potential. The most prestigious merit scholarship awarded to undergraduates is the Regents Scholarship.

Other scholarships are restricted to students from particular geographic areas or family backgrounds or are limited to students in particular majors, classes, or colleges. The donors have different reasons for giving, and their varied interests are reflected in the wide range of scholarships available. Merit and restricted scholarship awards range up to \$1,500.

Regents Scholarships are awarded for periods of four years to entering frosh and for periods of two years to continuing or transfer students beginning their junior year at the university. These awards are based on academic achievement and promise, irrespective of financial need. For freshmen, the Regents Scholarship is \$20,000 paid over four years. For entering junior transfers, the Regents Scholarship is \$10,000 paid over two years. For continuing students, the amount varies based on grade level and year appointed.

Entering UCSC students apply for scholarships using the University of California Application for Undergraduate Admission. When filling out your UC application, answer the questions in the scholarship section. Your application essay will serve as your scholarship essay. Selected students are notified in April.

All continuing students will be automatically considered for UCSC scholarships based on cumulative GPA. Notifications are e-mailed in August.

Need-Based Loans

Student loan funds are administered by the Financial Aid and Scholarship Office in accordance with the regulations of the federal government. There is no interest on need-based student loans as long as the student is enrolled in college at least half-time. To qualify, students must be enrolled in a degree program and demonstrate financial need. To apply for these loans, students must submit the FAFSA.

Through the *Federal Perkins Loan Program*, students who demonstrate financial need may

borrow up to \$20,000 for undergraduate study. Repayment begins nine months after graduation or withdrawal from higher education. The interest rate is 5 percent per year.

William D. Ford Federal Direct Subsidized Student Loans are offered to students who demonstrate financial need, and annual limits for dependent students are \$3,500 for first-year students, \$4,500 for second-year students, and \$5,500 for all other undergraduates. The annual limit for graduate students is \$8,500. Students may borrow up to \$23,000 for undergraduate study and up to \$65,500 for undergraduate and graduate study combined. Students pay an origination fee of up to 1.0 percent. Repayment begins six months after graduation or withdrawal from higher education. The interest rate is 4.5 percent fixed on all loans made in 2010–11.

Non-Need-Based Loans

William D. Ford Federal Direct Unsubsidized Student Loans are offered to students who do not qualify for the subsidized loans (above), and students must first be determined ineligible for a Federal Direct Subsidized Student Loan. Interest is charged on unsubsidized loans from the date the loan is made. The interest rate is fixed at 6.0 percent on all loans made in 2010–11.

The borrower must pay an origination fee of up to 1.0 percent, which is deducted from the amount of the loan. Eligibility is calculated by subtracting any financial assistance awarded the student from the cost of education as defined by the Financial Aid and Scholarship Office (see Undergraduate Budget, page 19). Dependent students may borrow \$2,000 in Federal Direct Unsubsidized Student Loans in addition to the annual subsidized loan limits. The aggregate total loan limit for undergraduate study is \$31,500.

Independent students have higher combined Federal Direct Subsidized and Unsubsidized Student Loan limits than do dependent students. The annual limits for independent students are as follows: \$9,500 for first-year students; \$10,500 for second-year students; \$12,500 for other undergraduates; and \$20,500 for graduate students. Students may borrow up to \$57,500 for undergraduate study and \$138,500 for undergraduate and graduate study combined.

Students may begin repaying principal and interest on Federal Direct Unsubsidized Student Loans immediately, pay only interest immediately, or defer both principal and interest until they are no longer enrolled in school at least half-time.

Through *Federal Direct Parent Loans for Undergraduate Students*, parents may borrow up to the full cost of education as defined by the

UCSC Financial Aid and Scholarship Office, less any financial assistance the student receives. Parents must demonstrate creditworthiness for loan approval. Borrowers pay an origination fee of up to 4 percent, which is deducted from the loan amount. Loan payments begin 60 days after the last disbursement. The interest rate is fixed at 7.9 percent on all loans made in 2008–09.

Other loans. The UCSC Financial Aid and Scholarship Office provides information about other privately sponsored education loans at www2.ucsc.edu/fin-aid or upon request.

Further Information

For more information about applying for financial aid, deadlines for filing applications and supporting documents, and campus policy regarding refunds of overpayments, contact the Financial Aid and Scholarship Office, 205 Hahn Student Services Building, (831) 459-2963, or visit financialaid@ucsc.edu, where you may download and print the publication *Your Guide to Financial Aid*.

Veteran Services

The Veteran Services staff acts as a liaison between the Department of Veterans Affairs and students who, as veterans, veterans' dependents, or reservists, receive education benefits. The staff also assists with the California Department of Veterans Affairs' college fee-waiver program for children of veterans who have service-connected disabilities or who have died from service-related causes. Students who are California residents apply for the college fee-waiver program through their home county Veterans Services Office.

Students who are veterans or veterans' dependents should contact Veteran Services as soon as they receive notification of admission to UC Santa Cruz to ensure timely processing of their benefit claims.

Veteran Services staff members are located at 190 Hahn Student Services Building. An appointment may be arranged by calling (831) 459-2709 or by e-mail at registrar@ucsc.edu. During their transition to the university and while they are enrolled as UCSC students, military veterans are provided a broad range of academic and support services by Services for Transfer and Re-Entry Students (STARS). The main STARS office is located in room 216A of the Academic Resources Center. Contact staff at (831) 459-2552, or visit the STARS web site, stars.ucsc.edu.

Undergraduate Academic Program

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Planning Your Academic Program

At UC Santa Cruz, the academic year is organized on the quarter system. Three quarters—fall, winter, and spring—constitute the regular academic year. Most UCSC courses are equivalent to 5 quarter credits and require approximately equal amounts of work: about 15 hours per week per course. You are normally expected to enroll in 15 credits each quarter; enrolling in a reduced or expanded course load requires special approval. If you maintain a B average at UCSC, you may enroll in more courses without special approval. For specific information on how courses are organized, see page 120.

You are normally expected to graduate in four years. To do so, you must pass an average of 45 credits per year, for a total of 180 credits. In order to complete certain majors with extensive course requirements, junior transfer students may need to spend more than two years at UC Santa Cruz.

The requirements for a bachelor's degree are explained in the following section. Your adviser can help you plan a program that fulfills these requirements efficiently while meeting your own educational goals (see Advising: From Course Selection to Careers, pages 40–42).

Here is what you can expect during four years at Santa Cruz:

During your freshman year, you complete your college core course and satisfy the Entry Level Writing Requirement. You also begin to fulfill the general education requirements, which expose you to a range of disciplines, and you may begin courses in your field.

If you are uncertain about your choice of major, you may explore several fields of study during your first two years at Santa Cruz. You are expected to declare your major by the end of your sophomore year. Students interested in majors requiring heavy course prerequisites, such as music and most majors in the physical and biological sciences and engineering, should be certain they start the appropriate sequences in the first year; contact the department for advising.

During your junior and senior years at Santa Cruz, you concentrate on the upper-division requirements for your major and complete your comprehensive requirement, as well as complete your general education requirements. If you entered UCSC without having fulfilled the requirement in American history and institutions, you will need to do so before you graduate.

Transfer students should complete any lower-division requirements for their intended major that are offered at their current campus and

may also find it helpful to complete courses that fulfill campus general education requirements. The Office of Admissions can help you select appropriate courses, and you should also consult with your community college adviser.

Graduation Requirements

To qualify for a bachelor's degree, you must meet the following conditions, which are explained in more detail in the following sections:

- Earn a minimum of 180 credits, each with a grade of D or better (or Pass)
- Satisfy the university requirements in American history and institutions and in Entry Level Writing (English composition)
- Meet the UCSC residence requirement
- Satisfy each of the campus general education requirements with a course grade of C or better (or Pass)
- Satisfy requirements of your UCSC college
- Complete an approved major program, including its comprehensive requirement, with grades of Pass, C, or better in all courses satisfying major requirements. In some majors, courses graded Pass may not be used to satisfy major requirements.
- Have a grade-point average of at least 2.0 in all letter-graded courses taken at UCSC and other University of California campuses
- Have no more than 25 percent of your UCSC credits graded on a Pass/No Pass basis. This includes any credits completed in the Education Abroad Program or on another UC campus in an intercampus exchange program. Departments may require that some or all courses used to satisfy the major must be taken for a letter grade.

As a UC Santa Cruz student, you are responsible for selecting the courses necessary to fulfill graduation requirements and prepare for advanced study or a career. It is essential that you consult regularly with academic advisers about course selection.

Keep copies of your own records, including your transcripts from other institutions, admission test scores, transfer credit information, UCSC quarterly academic record reports, and performance evaluations.

Transfer students may be able to use some of the courses they completed at other schools

to help meet the 180-credit requirement. (Semester-system credits can be multiplied by 1.5 to derive equivalent quarter-system credit. The UCSC Office of Admissions determines which courses are transferable.

University Requirements

The Santa Cruz campus administers three requirements for graduation from the University of California: (1) American history and institutions, (2) Entry level writing requirement, and (3) UCSC residence. These requirements are described in detail below.

American History and Institutions

Every candidate for a bachelor's degree must demonstrate a knowledge of American history and institutions. You may fulfill this requirement in one of the following ways:*

- By achieving a score of 550 or higher on the SAT Subject Examination in U.S. History
- By achieving a score of 3, 4, or 5 on the College Board Advanced Placement Examination in U.S. History, or by achieving a score of 5, 6, or 7 on the IBH History of the Americas Examination
- By satisfactorily completing a college-level course in U.S. history and institutions
- By certification of completion of the requirement on a transcript from an accredited California institution of higher education
- By completing an acceptable history or government course in high school that satisfies the subject requirement for admission to the university, described on page 15

Entry Level Writing Requirement

Every candidate for a bachelor's degree must demonstrate an acceptable level of ability in English composition. Before your fourth quarter of enrollment, you must fulfill this requirement in one of the following ways:

- By achieving a score of 680 or higher on the Writing component of the SAT Reasoning Examination
- By achieving a score of 3, 4, or 5 on the College Board Advanced Placement Examination in English Language or English Literature, or by achieving a score

*Alternatives for satisfying this requirement vary among the campuses of the University of California. If you plan to transfer to another UC campus, consult its general catalog for information on this point.

of 5, 6, or 7 on the IBH English Language A1 Examination

- By achieving a score of 8 or higher on the systemwide UC Analytical Writing Placement Examination
- By demonstrating an acceptable level of proficiency on UCSC's Writing Placement Examination, given several times each year
- Prior to first enrollment at UC, by completing at another institution an acceptable college-level course of at least 4 quarter credits, or the equivalent, in English composition with a grade of C or better.

California high school seniors who have been admitted to UCSC must take the systemwide UC Analytical Writing Placement Examination given in May, unless they have already satisfied the requirement.

Residence

Every candidate for a bachelor's degree must be registered at UCSC for a minimum of three terms. (A term is a fall, winter, or spring quarter in which a student completes 6 or more credits. Each UCSC Summer Session in which you complete at least 2 credits is the equivalent of half a term's residence.) In addition, of the final 45 quarter credits, 35 must be in regular courses of instruction that you have taken as a registered student at UCSC. No more than 18 of the 35 credits may be completed in Summer Session. Courses taken through University Extension or the Intercampus Visitor Program do not constitute regular courses and therefore do not satisfy residence requirements.

The credit requirement for residence is applied differently to students participating in the Education Abroad Program (EAP) and the University of California in Washington, D.C. (UCDC), program. Students may satisfy the requirement in either of two ways. The first way is for students to complete 35 of their final 45 credits before leaving the Santa Cruz campus to participate in EAP or UCDC. In this scenario, students do not have to return to Santa Cruz for any additional course work after they have finished EAP or UCDC. The second way to fulfill the residence requirement is for students to complete 35 of their last 90 credits at the Santa Cruz campus, with a minimum of 12 credits completed at UCSC after their return from EAP or UCDC.

General Education Requirements

The general education requirements are designed to introduce you to various kinds of information, reasons for learning, and approach-

es to acquiring knowledge, as well as to promote responsible use of what is learned. Obviously, general education requirements alone cannot achieve these ends. You are urged to look for as many opportunities as possible to gain a richer understanding of your own cultural heritage and social situation; insight into countries, societies, and eras besides your own; proficiency in another language; understanding of the nature of ethical and moral choice; and expanded knowledge of science and technology. The formal requirements described here should be considered foundations for exploration.

New General Education Requirements for Students Entering Beginning Fall 2010

Beginning in fall 2010, all new students will be required to fulfill a new set of guide-lines for general education requirements that were approved by the UCSC Academic Senate in 2009. Continuing students and transfer students may opt to change to the new requirements or fulfill the previous general education requirements. See Catalog Rights (page 37) for more information. Contact your college adviser if you have questions.

The general education requirements are meant to accomplish several goals:

- Provide students with a base of knowledge and skills that future learning can build on.
- Expose students to a broad range of disciplines and methodologies, to better prepare them for a world of complex problems and rapid changes.
- Enhance the abilities of students to approach problems in appropriately analytical ways.
- Prepare students to function as responsible and informed participants in civic life, considering pressing societal issues (such as the environment, the economy) productively and from a variety of perspectives.

Each area has a general education code associated with it, and only those courses carrying that code satisfy the requirement. The codes appear in the course descriptions in this catalog and in the "General Education" field on the MyUCSC Class Search page. A list of courses that fulfill General Education requirements begins on page 31. The list is subject to change. Students should check the Schedule of Classes (reg.usc.edu/soc) each quarter for the most up-to-date information. Students entering using the new general education requirements should review the requirements for their proposed or

declared major(s) to ascertain whether some of their general education requirements will be fulfilled by completing their major. As a general rule, each course satisfies only one of the new general education requirements.

Types of General Education Requirements Beginning in Fall 2010

| Category | General Education Code | Number of Required Credits |
|---|------------------------|----------------------------|
| Cross-Cultural Analysis | CC | 5 |
| Ethnicity and race | ER | 5 |
| Interpreting Arts and Media | IM | 5 |
| Mathematical and Formal Reasoning | MF | 5 |
| Scientific Inquiry | SI | 5 |
| Statistical Reasoning | SR | 5 |
| Textual Analysis | TA | 5 |
| Perspectives (choose one from the following three categories) | | 5 |
| Environmental Awareness | PE-E | |
| Human Behavior | PE-H | |
| Technology and Society | PE-T | |
| Practice (choose one minimum two-credit course from the following three categories) | | 2 |
| Collaborative Endeavor | PR-E | |
| Creative Process | PR-C | |
| Service Learning | PR-S | |
| Composition | C1 & C2 | 10 |
| Disciplinary Communication | DC | 5* |

*Students satisfy the Disciplinary Communication (DC) requirement by completing one to three upper-division courses required for their major, totaling a minimum of five credits.

Cross-Cultural Analysis (CC code: one 5-credit course or equivalent). Courses in cross-cultural Analysis prepare students for a world with increased interaction and integration among peoples, companies, and governments. These courses encourage a broader and deeper understanding of cultures and societies outside the United States. Such courses might focus on an in-depth examination of one culture, or one aspect of such culture (for example, art, music, history, language). Alternatively, these courses help students develop skills of cross-cultural comparison and analysis. A third option comprises courses that explore topics that are inherently cross-cultural such as international relations or the processes of economic globalization. Whatever the approach, these courses all aim to help students develop the openness and sensitivity necessary for cross-cultural understanding.

Ethnicity and Race (ER code: one 5-credit course or equivalent). Courses in Ethnicity and race prepare students for a state and a world that are increasingly multiethnic and multiracial.

Beyond familiarizing students with the culture and/or history of one or more ethnic or racial groups, these courses also aim to develop theoretical and practical understanding of questions such as (but not limited to): how categories of ethnicity and race are constructed; the role they can play in identity formation; how ethnicity and race have historically been used to justify forms of enforced inequality; and the contributions of people of various ethnicities to society and to political change. These courses are particularly concerned with how ethnicity and race may intersect with other categories, such as gender, class, or sexual orientation, to shape self-understanding and patterns of human interaction.

Interpreting Arts and Media (IM code: one 5-credit course or equivalent). Interpreting Arts and Media courses explore the complex ways in which information of all kinds is represented by visual, auditory, or kinesthetic means, or through performance. These courses build in-depth understanding of one or more forms of artistic media: that is, media in which non-textual materials play primary roles. They offer skills in the practice, analysis, interpretation and/or history of one or more of these media, as well as the ability to analyze the means by which they encode and convey information.

Mathematical and Formal Reasoning (MF code: one 5-credit course or equivalent). In a world in which much thinking and discourse is directed by emotion and association, formal or mathematical models teach the value of dispassionate analysis. Mathematical and formal-reasoning courses emphasize the development of mathematical, logical, and/or formal reasoning skills. Mathematics-based courses that satisfy this requirement are focused on teaching significant problem-solving skills, and are often oriented toward particular application areas. Other courses that satisfy this requirement train students in formal reasoning skills and/or in the construction and use of formal models. Formal reasoning domains include mathematical proof, logic, and applied logic. Some examples of formal models are: computer programming languages, generative grammars (from linguistics), supply and demand models, and formal music theory.

Scientific Inquiry (SI code: one 5-credit course or equivalent). Courses in Scientific Inquiry teach students about the essential role of observation, hypothesis, experimentation and measurement in the physical, social, life, or technological sciences. In these courses, students acquire key concepts, facts, and theories relevant to the scientific method. By the end of

the course students should be able to articulate an understanding of the value of scientific thinking in relation to issues of societal importance.

Statistical Reasoning (SR code: one 5-credit course or equivalent). In today's globalized, media-saturated information society, we are continually presented with—or asked to present—numerical data. Statistical-reasoning courses prepare students to interpret quantitative claims and make judgments in situations of statistical uncertainty. The goal of statistical-reasoning courses is to teach skills for effective reasoning about probability and the use of quantitative information. Students acquire an understanding of making informed decisions in the presence of uncertainty. Topics addressed in statistical-reasoning courses include ways of (mis)representing data; correlation vs. causation; statistical inferences; experimental design and data analysis; understanding orders of magnitude.

Textual Analysis and Interpretation (TA code: one 5-credit course or equivalent). Even in our current multimedia world, the written word remains a major vehicle of communication. Many fields, from literature and history to law, government, science and religion, depend heavily on the understanding and interpretation of written documents. Textual analysis and interpretation courses have as their primary methodology the interpretation or analysis of texts. The aim of these courses is to develop higher-order reading skills and to

train students how to read attentively, to think critically and analytically, to produce and evaluate interpretations, to assess evidence, and to deploy it effectively in their own work. These abilities are not only necessary for academic success, but also for full participation in civic life at every level.

Perspectives (one 5-credit course or equivalent from any of the three following categories):

Perspectives: Environmental Awareness (PE-E code). The interactions between people and the earth's environments are subtle, complex, and influenced by a variety of natural, scientific, economic, cultural, and political factors. Courses satisfying the environmental-awareness requirement teach students about the complexity of particular ecosystems and/or people's interactions with nature so that they will better understand the environmental issues and trade-offs that are likely to arise in their lifetimes.

Perspectives: Human Behavior (PE-H code). Courses in human behavior help students to prepare for a world in which many of the most pressing challenges (such as genocide, environmental degradation, poverty) are impacted by human thoughts, decisions, or practices. As well, they provide a kind of "owner's manual" for students to assist them in understanding themselves, their roles (for example, parent, partner, leader), and their social groups (family, workplace, neighborhood, nation).

IGETC Subject and Unit Requirements

| <i>Subject Area</i> | <i>Courses Required</i> | <i>Units/Credits Required</i> |
|--|-------------------------|--|
| 1. English Communication One course in English composition and one course in critical thinking/English composition. (Students transferring to CSU must take an additional course in oral communication.) | 2 courses | 6 semester units or 8–10 quarter units |
| 2. Mathematical Concepts and Quantitative Reasoning | 1 course | 3 semester units or 4–5 quarter units |
| 3. Arts and Humanities Three courses with at least one from the arts and one from the humanities. | 3 courses | 9 semester units or 12–15 quarter units |
| 4. Social and Behavioral Sciences Three courses from at least two disciplines or an interdisciplinary sequence. | 3 courses | 9 semester units or 12–15 quarter units |
| 5. Physical and Biological Sciences One physical science course and one biological science course, at least one of which includes a laboratory. | 2 courses | 7–9 semester units or 9–12 quarter units |
| 6. Language Other Than English Proficiency equivalent to two years of high school in the same language. (Not required of students transferring to CSU.) | Proficiency | Proficiency |
| Total | 11 courses | 34 semester units |

Source: Student Academic Services, Office of the President, University of California, 1991.

Perspectives: Technology and Society (PE-T code). The study of technology helps satisfy the need of society for knowledgeable people able to understand, participate, and guide the rapid technological advances that play such a vital role in our world. Technology and society courses focus on understanding technological advances, how they are developed, and their impacts on society.

Practice (one minimum 2-credit course from any of the three following categories):

Practice: Collaborative Endeavor (PR-E code). Students learn and practice strategies and techniques for working effectively in pairs or larger groups to produce a finished product. For example, students might learn specialized practical information such as how to use change-management software to monitor and manage changes initiated by multiple group members. Alternatively, they might learn basic information about leadership, teamwork, and group functioning, which they can incorporate into their own group process. What is common to all courses is that some instruction regarding the process of collaboration is provided, in addition to instruction specific to the academic discipline and the products being produced.

Practice: Creative Process (PR-C code). Creative-process courses teach creative process and techniques in a context of individual or collaborative participation in the arts, including creative writing. Courses may combine theory and experiment in the creation of a new artwork, or new interpretation(s) of an existing artwork. Creative-process courses include studies in individual or group creativity or improvisation, and/or ensemble rehearsal and performance.

Practice: Service Learning (PR-S code). Service-learning courses provide students with an opportunity to integrate their academic course work with community involvement. Such courses provide supervised learning experiences in which students reflect on, communicate, and integrate principles and theories from the classroom in real-world settings. Students gain valuable practical skills, while giving back to the community.

Composition (C1 and C2 codes) (Two 5-credit courses or equivalent): C1 and C2 typically are fulfilled by your college core course and Writing 2, *Rhetoric and Inquiry*. Students must complete the Entry Level Writing Requirement to satisfy the composition requirements.

Disciplinary Communication (DC) requirement. The goal of this requirement is to ensure that students acquire the skills in writing and other forms of communication appropriate for their discipline. Students satisfy the DC requirement by completing 1 to 3 upper-division courses required for their major, totaling a minimum of 5 credits. The DC requirement is automatically fulfilled by the completion of major requirements.

General Education Requirements for Students Entering Prior to Fall 2010

Designed to expose students to diverse subject areas, the general education requirements also stress a variety of approaches to acquiring knowledge. A description of the general education requirements and a complete list of current courses that satisfy general education requirements under the pre-2010 general education reform are included.

There are nine categories of general education requirements (see table at right, Types of General Education Requirements). Each category has a general education code associated with it, and only those courses carrying that code satisfy the requirement. The codes appear in the course descriptions in this catalog and in the *Schedule of Classes*. A list of Courses That Fulfill General Education Requirements begins on page 31. The list is subject to change. Students should check the *Schedule of Classes* (reg.ucsc.edu/soc) each quarter for the most up-to-date information.

Some courses satisfy more than one general education requirement, so the total number of required courses may be 10 to 15.

Types of General Education Requirements

| Category | General Education Code | Number of Required Credits |
|---|------------------------|----------------------------|
| Introductions to disciplines—humanities and arts area* (from two different disciplines) | IH | 10 |
| Introductions to disciplines—natural sciences and engineering area* (from two different disciplines) | IN | 10 |
| Introductions to disciplines—social sciences area (from two different disciplines) | IS | 10 |
| Topical courses (one course from each of the three academic areas; appropriately designated college courses fulfill this requirement) | T | 15 |
| Quantitative course | Q | 5 |
| Composition course | C1/C2 | 5–10 |
| Writing-intensive course | W | 5 |
| Arts course | A | 5 |
| U.S. Ethnic minorities/non-Western society course | E | 5 |

*For purposes of the general education requirements, humanities and arts are combined in one academic area, as are natural sciences and engineering.

Introductions to disciplines (IH, IN, and IS codes). These courses introduce a discipline's content, scope, and methodology. Introductory courses from two different departments are required in each of three academic areas: humanities and arts (IH code), natural sciences and engineering (IN code), and social sciences (IS code). Only one language course may be used to satisfy an IH requirement, as all languages are considered to be part of the same discipline. Similarly, only one literature course may be used, and English (transfer) courses are considered to be literature. Only one of the two IH courses may be from the arts (art, film and digital media, history of art and visual culture, music, and theater arts). Transfer courses designated IN from Anatomy, Botany, Physiology, and Zoology Departments are considered to be "biology" courses for general education purposes.

Topical courses (T code). These courses expose students to introductory-level themes of broad social or intellectual relevance. Three courses are required, no more than one from each academic area. For information on which disciplines are in each area, see Arts, page 141; Engineering, page 221; Humanities, page 332; Physical and Biological Sciences, page 407; and

(continues on p. 35)

Advanced Placement Exams (AP) and International Baccalaureate Higher Level Exams (IBH) 2010-11
(General Education Requirements Pre-Fall 2010 and Beginning Fall 2010)

| <i>AP Exams Subject</i> | <i>Score</i> | <i>Quarter units</i> | <i>Gen. Ed. Pre-Fall 2010</i> | <i>Gen. Ed. Beginning Fall 2010</i> | <i>UCSC course equivalency or waiver</i> | <i>Notes</i> |
|-----------------------------------|----------------------|----------------------|-------------------------------|-------------------------------------|---|--|
| AP Art History | 3, 4, 5 | 8 | A IH | IM | | One course waived for the Art major but may not be used in lieu of lower-division courses for the History of Art and Visual Culture. |
| AP Art, Studio | | | | | | Maximum of 8 units granted for all Studio Art exams. |
| 2-D Design | 3, 4, 5 | 8 | A | PR-C | | |
| 3-D Design | 3, 4, 5 | 8 | A | PR-C | | |
| Drawing | 3, 4, 5 | 8 | A | PR-C | | |
| Drawing | 4, 5 | | | | Art 20 | |
| AP Biology | 3, 4, 5 5 | 8 | IN | SI | BIOL 20A BIOE 20B | |
| AP Chemistry | 3, 4, 5 5 | 8 | IN | SI | | Allows enrollment in Chemistry 1B. |
| AP Computer Science A | 3, 4, 5 3 4, 5 | 2 | | | Computer Science 5J Computer Science 12A, 12L | Contact the School of Engineering. |
| AP Computer Science AB | 3, 4, 5 4, 5 | 4 | IN | MF | Computer Science 12A, 12L Computer Science 12B, 12M | Last given in May 2009. |
| AP Economics | 3, 4, 5 | 4 | IS | PE-H | | Both Economics exams may be taken for credit but satisfies one IS. |
| Macroeconomics | 4, 5 | | | | Economics 2 | |
| Microeconomics | 3, 4, 5 4, 5 | 4 | IS | PE-H | Economics 1 | |
| AP English | | | | | | Satisfies Entry Level Writing Requirement (ELWR). Maximum of 8 units granted for both Language and Composition and Literature and Composition |
| Language and Composition | 3, 4, 5 4, 5 | 8 | IH C1 IH | C1 | | |
| Literature and Composition | 3, 4, 5 4, 5 | IH C1 IH | C1 | | | |
| AP Environmental Science | 3, 4, 5 | 4 | | PE-E | | |
| AP Government and Politics | | | | | | Both Government and Politics exams may be taken for credit but satisfies one IS. |
| Comparative | 3, 4, 5 | 4 | IS | CC | | |
| United States | 3, 4, 5 | 4 | IS | | | |
| AP Human Geography | 3, 4, 5 | 4 | | | | |
| AP History | | | | | | All History exams may be taken for credit but satisfies one IH. |
| European | 3, 4, 5 | 8 | IH | CC | | |
| United States | 3, 4, 5 | 8 | IH | | | |
| World | 3, 4, 5 | 8 | IH | CC | | |
| AP Language and Culture | | | | | | Each Language and Culture exam may be taken for credit. |
| Chinese | 3, 4, 5 | 8 | | | | |
| Japanese | 3, 4, 5 | 8 | | | | |
| Italian | 3, 4, 5 | 8 | | | | AP Italian Language and Culture last given in May 2009. |
| AP Language | | | | | | Each Language exam may be taken for credit. |
| French | 3, 4, 5 | 8 | | | | |
| German | 3, 4, 5 | 8 | | | | |
| Spanish | 3, 4, 5 | 8 | | | | |
| AP Latin | 3, 4, 5 | 4 | | | | AP Latin Literature last given in May 2009. |
| Literature | | | | TA | | |
| Vergil | | | | TA | | |
| AP Literature | | | | | | Each Literature exam may be taken for credit. AP French Literature last given in May 2009. |
| French | 3, 4, 5 | 8 | TA | | | |
| Spanish | 3, 4, 5 | 8 | TA | | | |
| AP Mathematics | 3, 4, 5 | 8 | IN, Q | MF | Applied Mathematics and Statistics 3 Mathematics 3 | Allows enrollment in Math 11A or 19A. |
| Calculus AB | 4, 5 | | | | Applied Mathematics and Statistics 3 Mathematics 3 Mathematics 11A Mathematics 19A | Allows enrollment in Math 11B, 19B or 20A. Enrollment in first quarter calculus is recommended for proposed majors in mathematics or the physical and biological sciences. |

Advanced Placement Exams (AP) and International Baccalaureate Higher Level Exams (IBH) 2010–11, *continued*
(General Education Requirements Pre-Fall 2010 and Beginning Fall 2010)

| <i>AP Exams Subject</i> | <i>Score</i> | <i>Quarter units</i> | <i>Gen. Ed. Pre-Fall 2010</i> | <i>Gen. Ed. beginning Fall 2010</i> | <i>UCSC course equivalency or waiver</i> | <i>Notes</i> |
|--|-------------------------------|----------------------|-------------------------------|-------------------------------------|--|---|
| AP Mathematics Calculus BC | 3, 4, 5 4, 5 | 8 | IN, Q | MF | Applied Mathematics and Statistics 3 Mathematics 3 Mathematics 11A Mathematics 19A Applied Mathematics and Statistics 3 Mathematics 3 Mathematics 11A, 11B Mathematics 19A, 19B | Allows enrollment in Math 11B, 19B, or 20A. Enrollment in first quarter calculus is recommended for proposed majors in mathematics, or the physical and biological sciences, and the School of Engineering. Allows enrollment in Math 20A, 22 or 23A. Enrollment in Mathematics 23A is recommended for proposed majors in the School of Engineering. |
| AP Music Theory | 3, 4, 5 | 8 | A | | | |
| AP Physics Physics B C Mechanics C Electr & Mag | 3, 4, 5 3, 4, 5 3, 4, 5 | 8 4 4 | IN | SI | | Maximum of 8 units granted for all Physics exams. |
| AP Psychology | 3, 4, 5 4, 5 | 4 | IS | PE-H | Psychology 1 | |
| AP Statistics | 3, 4, 5 4, 5 | 4 | IN, Q | SR | Applied Mathematics and Statistics 5 | |
| IBH Biology | 5, 6, 7 | 8 | IN | SI | | |
| IBH Chemistry | 5, 6, 7 | 8 | IN | SI | | |
| IBH Classical Languages Latin Greek | 5, 6, 7 5, 6, 7 | 8 8 | | | | Each Language exam may be taken for credit. |
| IBH Computer Science | 5, 6, 7 5 6, 7 | 8 | IN | MF | Computer Science 12A, 12L Computer Science 12A, 12L Computer Science 12B, 12M | Contact the School of Engineering. |
| IBH Economics | 5, 6, 7 | 8 | IS | PE-H | | |
| IBH English Language A1 | 5, 6, 7 | 8 | C1 IH | C1 | | Satisfies Entry Level Writing Requirement (ELWR). |
| IBH Film | 5, 6, 7 | 8 | A IH | IM | | |
| IBH Geography | 5, 6, 7 | 8 | | PE-E | | |
| IBH History Africa Americas East, S.E. Asia, Oceania Europe South Asia, Middle East | 5, 6, 7 | 8 | IH | CC CC CC CC | | |
| IBH Language: A1, A2, B (second language) | 5, 6, 7 | 8 | | | | |
| IBH Mathematics | 5, 6, 7 | 8 | IN, Q | MF | | |
| IBH Music | 5, 6, 7 | 8 | A | PR-C | | |
| IBH Philosophy | 5, 6, 7 | 8 | IH | | | |
| IBH Physics | 5, 6, 7 | 8 | IN | SI | | |
| IBH Psychology | 5, 6, 7 | 8 | IS | PE-H | | |
| IBH Social/Cultural Anthropology | 5, 6, 7 | 8 | IS | PE-H | | |
| IBH Theater Arts | 5, 6, 7 | 8 | A IH | PR-C | | |
| IBH Visual Arts | 5, 6, 7 | 8 | A | PR-C | | |

Notes: A maximum of one "IH" will be granted from the arts (art history, film and theater arts). A maximum of one "IN" will be granted from mathematics and statistics. If AP and IBH exams and/or college courses are taken in the same subject area, credit may be limited. No credit is granted for lower division language and literature other than English if it is the student's native language and at least nine years of education have been completed in that language.

Courses That Fulfill General Education Requirements for Students Beginning Fall 2010

Refer to the course listings beginning on page 119 for course descriptions.

Cross-Cultural Analysis (CC code)—One course required (5 credits)

One five-credit course or equivalent is required that emphasizes understanding of one or more cultures and societies outside the United States.

Anthropology 130A, 130B, 130C, 130E, 130F, 130H, 130I, 130J, 130L, 130M, 130O, 130T
Community Studies 136, 185
Education 170, 171
Feminist Studies 80B, 80E, 80S, 120
French 4, 5, 6
German 4, 5, 6
History of Art and Visual Culture 10, 20, 24, 70, 80, 110, 111, 122A, 122B, 123B, 124A, 124B, 124C, 124D, 127B, 162A, 162B, 172, 180
History 2A, 2B, 5A, 5B, 11A, 11B, 40A, 40B, 41, 43, 45, 62A, 62B, 65A, 70A, 70B, 70C, 80H, 80N, 80Y, 101A, 101B, 102A, 102C, 103, 106A, 107, 134B, 137A, 137B, 137C, 140B, 140C, 140D, 147A, 147B, 150A, 150C, 155, 160A, 163B, 178C
Italian 4, 5, 6
Japanese 6
Jewish Studies 101
Latin American and Latino Studies 80B, 80D, 80H, 80I, 80Q, 80S, 80X, 140, 145, 152, 169, 170, 194G, 194L, 194M
Linguistics 80C
English-Language Literature 160F
Modern Literary Studies 144E, 155B, 155J
Pre- and Early Modern Literature 102, 107A, 107B, 167C
Spanish/Latin American/Latino Literature 130A, 130E, 131B, 131H, 134G, 153
Music 11D, 80A, 80I, 80P, 80S
Politics 43, 60
Portuguese 65A, 65B
Russian 4, 5, 6
Sociology 15, 188A
Spanish 4, 5, 6, 156A
Spanish for Spanish Speakers 61, 62, 63, 125
Theater Arts 22, 80Z, 122, 161D

Ethnicity and Race (ER code)—One course required (5 credits)

One five-credit course or equivalent is required that focuses on issues of ethnicity and/or race.

American Studies 10, 80E, 112
Anthropology 130N, 159
Community Studies 80A, 152
Education 128, 177, 181
Feminist Studies 80A, 115, 139, 145
History of Art and Visual Culture 60, 140C, 140D, 170, 190J, 190X, 191C
Hebrew 106
History 14, 74, 75, 80W, 109A, 110A, 111, 115A, 115B, 121A, 121B, 125, 126, 127, 128, 134A, 178E, 185A, 185B, 185E, 185F
Languages 80F
Latin American and Latino Studies 1, 80F, 80G, 80J, 80K, 100, 143, 166, 175, 178
Literature 61R, 80L, 80N
English-Language Literatures 150A, 155D, 180D
Modern Literary Studies 144B

World Literature and Cultural Studies 127, 128
Sociology 156
Theater Arts 80A, 80M

Interpreting Arts and Media (IM code)—One course required (5 credits)

One five-credit course or equivalent is required that focuses on the practice, analysis, interpretation, and/or history of one or more artistic or mass media (media in which non-textual materials play primary roles).

American Studies 80F, 123M
Anthropology 120, 132
Art 10G, 10H, 80C, 80D, 80E, 80V
Community Studies 80L, 154
Computer Science 80K
Crown College 60
Education 102, 120
Film and Digital Media 20A, 20B, 80S, 80X
Feminist Studies 80P, 126
History of Art and Visual Culture 22, 27, 30, 31, 40, 41, 43, 50, 51, 81, 117, 122D, 127A, 127C, 135B, 135D, 135E, 137B, 137C, 137D, 137E, 140A, 140B, 141A, 141B, 141C, 141E, 141F, 141H, 141I, 143A, 143B, 143D, 151, 153, 154, 160A, 160B
Latin American and Latino Studies 128, 129, 176
English-Language Literatures 140I
Pre- and Early Modern Literature 137
Music 11A, 80N
Porter College 180
Theater Arts 10, 20, 31P, 32, 61A, 80D, 80L, 80O, 80P, 80Q, 80U, 113, 116A, 117, 130, 131P
Writing 128

Mathematical and Formal Reasoning (MF code)—One course required (5 credits)

One five-credit course or equivalent is required that emphasizes university-level mathematics, computer programming, formal logic, or other material that stresses formal reasoning, formal model building, or application of formal systems.

Applied Mathematics and Statistics 2, 3, 10, 11B, 15A, 15B, 20, 114, 147
Astronomy and Astrophysics 2, 3, 4, 5, 12, 13, 15, 16
Biology: Molecular, Cell, and Developmental 180
Biomolecular Engineering 60, 160
College Eight 81B
Computer Engineering 8, 16
Computer Science 5C, 5J, 5P, 10, 11, 12B
Earth and Planetary Sciences 11, 12, 81B
Economics 11B
Mathematics 3, 11A, 11B, 19A, 19B, 20A, 20B, 21, 22, 23A, 23B, 100
Music 100A, 100B, 100C
Philosophy 9
Physics 5A, 6A

Scientific Inquiry (SI code)—One course required (5 credits)

One five-credit course or equivalent is required that focuses on the essential roles of observation, hypothesis, experimentation and measurement in the sciences.

Anthropology 1, 3

Astronomy and Astrophysics 1, 80A
Biology: Molecular, Cell, and Developmental 80A, 80E, 80J
Chemistry and Biochemistry 1A
Earth and Planetary Sciences 2, 3, 5, 7, 8, 10, 20, 65
Electrical Engineering 80T
Environmental Studies 24
History 142
Linguistics 50
Ocean Sciences 1, 80A
Physics 1, 2, 5B, 5C, 6B, 6C
Psychology 150

Statistical Reasoning (SR code)—One course required (5 credits)

One five-credit course or equivalent is required that focuses on developing skills in approaching quantitative data and statistical reasoning.

Applied Mathematics and Statistics 5, 7, 80A, 118, 131, 132
Computer Engineering 107
Earth Sciences 125
Economics 113
Linguistics 157
Mathematics 4
Psychology 2
Sociology 103A

Textual Analysis and Interpretation (TA code)—One course required (5 credits)

One five-credit course or equivalent is required that has as its primary methodology the interpretation or analysis of texts.

American Studies 126L, 145
Biology: Molecular, Cell, and Developmental 114, 126, 127
College Eight 80A, 80B
History 1, 13, 100
Japanese 105
Latin American and Latino Studies 144, 180
Linguistics 108
Literature 1, 80Z, 102
English-Language Literatures 102A, 103A, 110A, 120E, 120H, 170A, 170C, 180B, 180H, 180K
Modern Literary Studies 103, 124A, 145B, 167K
Pre- and Early Modern Literature 183
Spanish/Latin American/Latino Literature 60
World Literature and Cultural Studies 115A
Mathematics 181
Philosophy 11
Politics 4, 20, 25
Spanish 114
Stevenson College 81A, 81B
Theater Arts 61B, 61C, 80K, 80X

Perspectives (5 credits)

Choose one five-credit course or equivalent from any of the three following categories: PE-E, PE-H, PE-T.

Environmental Awareness (PE-E code)

Courses focus on humankind's interactions with nature.

Anthropology 146
Community Studies 149
Crown College 80L
Earth and Planetary Sciences 1, 4, 9, 110A

Courses That Fulfill General Education Requirements for Students Beginning Fall 2010, continued

Electrical Engineering 80S
 Environmental Studies 25, 80A, 80B
 Latin American and Latino Studies 80P, 164, 167
 Ocean Sciences 80B
 Sociology 125, 173, 185

Human Behavior (PE-H code)

Courses focus on aspects of individual human behavior or the operation of human groups.

Community Studies 156
 Economics 1, 2
 Latin American and Latino Studies 149, 163, 174, 194F
 Politics 1, 70
 Psychology 1
 Sociology 136, 137, 172

Technology and Society (PE-T code)

Courses emphasize issues raised by the prevalence of technology in society.

Biomolecular Engineering 80G
 Computer Engineering 80E
 Computer Science 2, 80J, 80S
 Crown College 80J
 Philosophy 80G
 Politics 15

Practice (minimum 2 credits)

Choose one minimum two-credit course from any of the three following categories: PR-E, PR-C, PR-S

Collaborative Endeavor (PR-E code)

Courses provide significant experience with collaboration on a project.

Computer Engineering 123A
 Computer Science 20
 Earth and Planetary Sciences 109L, 110L, 188A
 Environmental Studies 100L
 Mathematics 30
 Music 1C, 2
 Theater Arts 50

Creative Process (PR-C code)

Courses teach creative process and techniques in the arts (including creative writing), at an individual or a collaborative level.

Anthropology 81C
 Art 20, 22, 23, 24, 24B, 26, 27, 28, 30, 32, 33, 37, 39, 40, 102, 107, 109, 112, 113, 114, 118, 119, 123, 125, 126, 129, 135, 136, 138, 141, 161
 Computer Science 80V
 Film and Digital Media 20P
 Latin American and Latino Studies 81C
 Creative Writing 10, 52, 53
 Music 9, 10, 163, 166
 Porter College 21C, 23B, 39
 Theater Arts 14, 15, 17, 19, 30, 31C, 35, 36, 37, 114, 115A, 115B, 119, 156

Service Learning (PR-S code)

Courses provide the opportunity for supervised campus or community service that contributes to a student's overall education.

Biology: Molecular, Cell, and Developmental 182
 Chemistry and Biochemistry 182
 Environmental Studies 83, 184
 Mathematics 189
 Psychology 193, 193A, 193B, 193C, 193D

**Composition (C1 and C2 code) (10 credits)
Two five-credit courses.****C1**

College Eight 80A
 College Nine 80A, 80D
 College Ten 80A, 80D
 Cowell College 80A
 Crown College 80A
 Kresge College 80A
 Merrill College 80A, 80X
 Oakes College 80A, 80D
 Porter College 80A
 Stevenson College 80A

C2

College Eight 80B
 College Nine 80B
 College Ten 80B
 Cowell College 80B
 Crown College 80B
 Kresge College 80B
 Merrill College 80B, 80Z
 Oakes College 80B
 Porter College 80B
 Stevenson College 80B, 81B
 Writing 2

Disciplinary Communication (DC code)

Students satisfy the DC Requirement by completing 1–3 upper-division courses required for their major totaling a minimum of five credits.

Courses That Fulfill General Education Requirements for Students Entering Prior to Fall 2010

Refer to the course listings beginning on page 119 for course descriptions.

Introductions to Disciplines, Humanities, and Arts (IH code)—Two courses from different departments required (10 credits)

Only one IH requirement may be satisfied with a course (equivalent to 5 credits) from the Arts Division (art, film and digital media, history of art and visual culture, music, theater arts); only one language course may be used to satisfy an IH requirement; and only one literature course may be used to satisfy an IH requirement. *Note:* Transfer courses designated IH from English departments are considered to be literature courses for general education purposes.

American Studies 10
 Chinese 4, 5, 6, 50, 107
 Cowell 118B
 Crown 60
 Feminist Studies 1
 Film and Digital Media 20A, 20B, 20C

French 4, 5, 6
 German 4, 5, 6
 Hebrew 4, 5
 History 1, 2A, 2B, 5A, 5B, 10A, 10B, 11A, 11B, 13, 14, 30, 40A, 40B, 41, 43, 62A, 62B, 65A, 70A, 70B, 70C
 History of Art and Visual Culture 20, 24, 30, 31, 43, 80
 Italian 4, 5, 6
 Japanese 4, 5, 6
 Linguistics 50, 53, 111, 112
 Literature 1, 61D, 61E, 61F, 61J, 61R
 Greek Literature 100
 Latin Literature 100
 Spanish Literature 60
 Music 11A, 11B, 11C, 11D
 Philosophy 9, 11, 22, 24, 26, 28
 Portuguese 60B, 65A, 65B
 Russian 4, 5, 6
 Spanish 4, 5, 5M, 6, 56
 Spanish for Spanish Speakers 61, 62, 63
 Theater Arts 10, 19, 20, 30, 32, 33, 36, 40, 61A, 61B, 61C, 122, 136

Introductions to Disciplines, Natural Sciences and engineering (IN code)—Two courses from different departments required (10 credits)

Transfer courses designated IN from anatomy, botany, physiology, and zoology departments are considered to be biology courses.

Anthropology 1
 Applied Mathematics and Statistics 5, 7, 11A, 11B, 15A, 15B
 Astronomy and Astrophysics 1, 2, 3, 4, 5, 12, 13, 15, 16, 18
 Biology: MCD 20A
 Biomolecular Engineering 5
 Chemistry and Biochemistry 1A, 1B, 1C
 College Eight 81B
 Computer Engineering 3, 8, 12
 Computer Science 2, 5C, 5J, 5P, 10, 12A, 12B, 13H, 20
 Earth Sciences 1, 3, 5, 6, 7, 10, 20, 65, 81B, 119
 Economics 11A, 11B
 Environmental Studies 23, 24
 Mathematics 11A, 11B, 19A, 19B, 20A, 20B
 Ocean Sciences 1
 Physics 1, 5A, 5B, 5C, 6A, 6B, 6C

*Courses That Fulfill General Education Requirements for Students Entering Prior to Fall 2010, continued***Introduction to Disciplines, Social Sciences (IS code)—Two courses from different departments required (10 credits)**

American Studies 80E
 Anthropology 2, 3, 4
 Biology: MCD 89
 Community Studies 10
 Economics 1, 2
 Education 40, 60
 Environmental Studies 25
 Latin American and Latino Studies 1, 126A, 126B
 Legal Studies 10
 Politics 1, 3, 4, 7, 15, 17, 20, 25, 43, 60, 70, 75
 Psychology 1, 65
 Sociology 1, 10, 15, 20

Topical Courses (T code)—Three courses required (15 credits)

Students entering UCSC with fewer than 45 transferable credits must take three topical courses in residence at UCSC. UCSC Summer Session courses can be used to satisfy topical requirements.

Choose one course from each academic area: natural sciences (2), social sciences (3), and humanities and arts (4). Courses labeled 5, 6, and 7 satisfy topical requirements in two different academic areas; students can apply this kind of topical course to either academic area indicated. The three topical course requirements must be satisfied with three different courses. In the *Schedule of Classes*, courses that carry a T general education code are listed as follows:

- 2—Natural Sciences Area
- 3—Social Sciences Area
- 4—Humanities and Arts Area
- 5—Humanities and Arts *or* Social Sciences Area
- 6—Natural Sciences *or* Humanities and Arts Area
- 7—Natural Sciences *or* Social Sciences Area

T2—Natural Sciences

Astronomy and Astrophysics 80A, 80D
 Biology: E&E 80N, 80P
 Biology: MCD: 80A, 80E, 80J,
 Biomolecular Engineering 80H
 Chemistry and Biochemistry 80H
 College Eight 81C
 Computer Engineering 80H, 80N, 80U
 Computer Science 80B, 80G, 80K, 80V
 Crown 80S
 Earth and Planetary Sciences 2, 4, 8, 9, 11, 12
 Electrical Engineering 80J, 80T, 81C
 Linguistics 80G
 Microbiology and Environmental Toxicology 80E
 Ocean Sciences 80A, 80B
 Physics 80A

T3—Social Sciences

Anthropology 80C, 80G, 80H, 80I, 80J, 80K, 80L, 80N, 80P, 80Y, 80Z
 College Eight 80A, 80B
 College Nine 80A, 80B
 College Ten 80A, 80B
 Community Studies 80A, 80B, 80L
 Economics 80A, 80G, 80H
 Latin American and Latino Studies 80B, 80D, 80F, 80G, 80H, 80I, 80J, 80K, 80P, 80Q, 80R, 80S, 80T
 Merrill College 80A, 80B, 80X
 Psychology 80A
 Sociology 80E, 80Z

T4—Humanities and Arts

Art 80A, 80C, 80D, 80V
 Cowell College 80A, 80B
 Feminist Studies 80S
 Hebrew 80
 History 80H, 80K, 80N, 80W, 80Y
 History of Consciousness 80A, 80B, 80H, 80K, 80U
 Languages 80D, 80F
 Latin American and Latino Studies 80E
 Linguistics 80B, 80V
 Literature 80I, 80L, 80N, 80P, 80V, 80Z
 Music 80A, 80F, 80G, 80H, 80I, 80J, 80M, 80N, 80O, 80P, 80Q, 80S, 80V, 80X
 Oakes College 80H
 Philosophy 80E, 80F, 80L
 Porter College 80A, 80B, 80E, 80W
 Stevenson College 80H
 Theater Arts 80A, 80B, 80D, 80E, 80G, 80H, 80K, 80L, 80M, 80N, 80O, 80P, 80Q, 80S, 80U, 80V, 80W, 80X, 80Y, 80Z

T5—Humanities and Arts or Social Sciences

American Studies 80F, 80G
 Crown College 80J
 Feminist Studies 80A, 80B, 80F, 80K, 80P
 Film and Digital Media 80A, 80S, 80X
 History of Art and Visual Culture 81
 History of Consciousness 80C, 80J, 80Q
 Kresge College 80A, 80B, 80H, 80T
 Latin American and Latino Studies 80X
 Linguistics 80C, 80D
 Merrill College 80C, 80Z
 Oakes College 80A, 80B
 Philosophy 80M
 Porter College 80L
 Stevenson College 80A, 80B, 80T

T6—Natural Sciences or Humanities and Arts

Art 80F
 Biomolecular Engineering 80G
 Computer Engineering 80E
 Crown 80A, 80B
 Music 80C, 80L, 80R
 Philosophy 80G, 80S
 Physics 80D
 Porter College 80K

T7—Natural Sciences or Social Sciences

Applied Mathematics and Statistics 80A
 Computer Engineering 80A
 Computer Science 80J, 80S
 Crown College 80F, 80L
 Electrical Engineering 80S, 80T
 Environmental Studies 80A, 80B
 Information Systems Management 80C
 Sociology 80V

Composition Courses (C1 and C2 code)—One course each required for students entering fall 2005 (5 credits)**C1**

College Eight 80A
 College Nine 80A, 80D
 College Ten 80A, 80D
 Cowell College 80A
 Crown College 80A
 Kresge College 80A
 Merrill College 80A, 80X
 Oakes College 80A, 80D
 Porter College 80A
 Stevenson College 80A

C2

College Eight 80B
 College Nine 80B
 College Ten 80B
 Cowell College 80B
 Crown College 80B
 Kresge College 80B
 Merrill College 80B, 80Z
 Oakes College 80B
 Porter College 80B
 Stevenson College 80B, 81B
 Writing 2

Writing-Intensive Courses (W code)—One course required (5 credits)

American Studies 100, 105A, 114B, 125H
 Anthropology 150, 152, 170, 172, 190C, 194A, 194B, 194D, 194F, 194G, 194I, 194K, 194L, 194M, 194N, 194P, 194Q, 194R, 194S, 194T, 194U, 194V, 194X, 194Y, 194Z
 Applied Mathematics and Statistics 156
 Art 149A, 149B, 150C
 Astronomy and Astrophysics 80D
 Biochemistry 110
 Biology: E&E 141L, 145L, 150L, 151B, 158L, 159A, 161L, 183L, 188
 Biology: MCD 100L, 105L, 105M, 109L, 110L, 115L, 119L, 186L
 Chemistry and Biochemistry 122
 Community Studies 114, 194
 Computer Engineering 185
 Computer Science 166B
 Crown College 123
 Earth Sciences 195
 Economics 128, 142, 165, 166B, 183, 184, 188, 195
 Education 164
 Environmental Studies 104A, 109B, 156, 157, 172
 Feminist Studies 194I, 194N, 195
 Film and Digital Media 120, 150, 196B
 History 190A, 190B, 190C, 190D, 190E, 190F, 190I, 190K, 190L, 190M, 190N, 190O, 190P, 190Q, 190R, 190S, 190T, 190U, 190V, 190X, 190Y, 194A, 194B, 194E, 194G, 194H, 194M, 194N, 194R, 194S, 194U, 194X, 194Y, 195B, 196A, 196B, 196C, 196E, 196G, 196I, 196J, 196K, 196M, 196N, 196O, 196P, 196R, 196S, 196U, 196Y
 History of Art and Visual Culture 100A, 172
 Information Systems Management 158
 Kresge College 80T
 Latin American and Latino Studies 100W, 194H, 194P

Courses That Fulfill General Education Requirements for Students Entering Prior to Fall 2010, continued

Legal Studies 128, 183, 196
 Linguistics 101, 113, 114, 197
 Literature 1, 101
 Microbiology and Environmental Toxicology 119L, 151
 Oakes College 112
 Philosophy 120, 127, 190L, 190M, 190S, 190Y
 Physics 195B
 Porter College 80W
 Psychology 110, 119A, 119G, 119H, 119M, 125, 140G
 Science Communication 160
 Sociology 103B, 134, 195C
 Stevenson College 80T
 Theater Arts 157, 159
 Writing 64, 101, 102, 103, 104, 110A, 161, 163, 165, 166A, 166B, 166D, 167

Quantitative Courses (Q code)—One course required (5 credits)

Applied Mathematics and Statistics 2, 3, 5, 7, 10, 11A, 11B, 15A, 15B, 80A, 131
 Astronomy and Astrophysics 2, 3, 4, 5, 12, 13, 15, 16, 18
 Chemistry and Biochemistry 1A, 1B, 1C
 College Eight 81B
 Computer Engineering 8, 12, 16
 Computer Science 80B
 Earth and Planetary Sciences 11, 12, 81B, 111
 Economics 11A, 11B, 113
 Electrical Engineering 80T
 Mathematics 3, 4, 11A, 11B, 19A, 19B, 20A, 20B, 21, 110
 Ocean Sciences 1
 Philosophy 9
 Physics 1, 5A, 6A, 80A, 80D
 Psychology 2, 181
 Sociology 103A, 103B

Arts Courses (A code)—One course or equivalent required (5 credits)

Courses carrying fewer than five credits may be combined for credit toward satisfaction of the A requirement if they total at least five credits. Some two-credit music courses must be taken in sequence to fulfill the A requirement.

Anthropology 81A, 81B, 81C
 Art 10G, 10H, 20, 21, 22, 23, 24A, 24B, 26, 27, 28, 30, 39, 40, 80A, 80C, 80D, 80F, 80V, 102, 107, 109, 112, 113, 114, 118, 119, 123, 126, 135, 136, 141, 160, 161
 Community Studies 154
 Cowell College 70A, 70B, 70C
 Feminist Studies 80S, 123
 Film and Digital Media 20A, 20B, 20C, 20P, 80A, 80S, 80X, 132A, 132B, 136A, 136B, 151, 160, 165A, 170A, 170B, 176, 185D

History of Art and Visual Culture 20, 22, 24, 27, 30, 31, 40, 41, 43, 50, 51, 60, 70, 80, 81, 100A, 110, 111, 115, 116, 117, 118, 122A, 122B, 122C, 122D, 123A, 123B, 124C, 127A, 127B, 127C, 127D, 135B, 135E, 135F, 137A, 137B, 137C, 137D, 137E, 140A, 140B, 140C, 140D, 141A, 141B, 141C, 141E, 141F, 141H, 141I, 143A, 143C, 151, 153, 154, 160A, 160B, 162A, 163, 170, 172, 180, 190A, 190B, 190D, 190E, 190F, 190G, 190J, 190M, 190O, 190P, 190Q, 190R, 190U, 190V, 190W, 190X, 191A, 191B, 191C, 191D, 191E, 191F
 Kresge College 80H
 Latin American and Latino Studies 81A, 81B, 81C, 161P
 Literature/Creative Writing 10, 52, 53, 170, 180, 183
 Music 1A, 5A, 5B, 5C, 6, 10, 11A, 11B, 11C, 11D, 51, 54, 75, 80A, 80C, 80F, 80G, 80H, 80I, 80J, 80L, 80M, 80N, 80O, 80P, 80Q, 80R, 80S, 80V, 80X, 102, 103, 159A, 159B, 160, 166, 180A, 180B
 Music Sequence Courses: 1C-1C-1C, 2-2-2, 3-3-3, 4A-4A-4A, 4B-4B-4B, 4A-4A-4B, 4A-4B-4B, 8-8-8, 9-9-9, 166-166-166
 Philosophy 152
 Porter College 14, 20A, 20C, 20D, 21A, 21C, 22, 22A, 22F, 22G, 23A, 23B, 23C, 28, 32A, 33, 33A, 34B, 35, 38B, 39, 80E, 80G, 80L, 83, 120, 121, 121C
 Theater Arts 10, 12, 14, 15, 17, 18, 18C, 19, 20, 21A, 21B, 22, 23, 30, 31C, 31P, 32, 33, 35, 36, 37, 40, 50, 52, 61A, 61B, 61C, 80A, 80B, 80D, 80E, 80G, 80H, 80K, 80L, 80M, 80N, 80O, 80P, 80Q, 80S, 80U, 80V, 80W, 80X, 80Y, 80Z, 100A, 100B, 100C, 100G, 100H, 100I, 100L, 100M, 100W, 104, 105, 106, 110, 113, 114, 115A, 115B, 116A, 117, 117A, 118, 119, 121, 122, 124, 126, 128, 129, 130, 131, 131C, 131P, 132, 135, 136, 136C, 137, 138, 139, 142, 151, 152, 155, 157, 159, 160, 161A, 161C, 161D, 161M, 161P, 161Q, 161R, 161S, 161T, 161U, 161Y, 162, 163A, 163E, 163G, 164, 165, 193, 193F

U.S. Ethnic Minorities/Non-Western Society Courses (E code)—One course required (5 credits)

American Studies 10, 80E, 121C, 123F, 123H, 123M, 123T, 123X, 123Z, 125A, 125E, 125G, 125H, 125X 126B, 126C, 126L, 127A, 127C, 127D, 127E, 127F, 127K, 172
 Anthropology 80G, 80I, 80P, 130A, 130B, 130C, 130E, 130F, 130H, 130I, 130L, 130M, 130N, 130O, 130R, 130T
 Community Studies 80A, 80B, 100E, 100J, 110, 122, 152, 185
 Computer Science 80S
 Economics 120, 128
 Education 60, 128, 141, 164, 181
 Feminist Studies 80F, 80P, 102, 115, 120, 123, 124, 132, 139, 145, 151A, 194E, 194M
 Film and Digital Media 132C, 165B, 165D, 185E
 Hebrew 106
 History 5A, 11A, 11B, 14, 30, 40A, 40B, 41, 43, 45, 75, 80H, 80W, 80Y, 101A, 101B, 106A, 106B, 109A, 111, 121A, 121B, 126, 127, 128, 130, 132, 133, 134A, 134B, 137A, 137B, 137C, 140C, 140D, 141B, 145, 147A, 147B, 148, 150C,

151B, 154A, 155, 185A, 185B, 185D, 185E, 185F, 190A, 190B, 190C, 190D, 190E, 190L, 190N, 190O, 190R, 194G, 194H, 194N, 194U, 194Y, 196N
 History of Art and Visual Culture 22, 24, 27, 60, 70, 80, 110, 111, 115, 116, 117, 122B, 123A, 123B, 127C, 127D, 135E, 140C, 140D, 141C, 143C, 163, 170, 172, 180, 190A, 190B, 190J, 190M, 190W, 190X, 191A, 191B, 191C
 History of Consciousness 118
 Languages 80F
 Latin American and Latino Studies 1, 80B, 80D, 80E, 80F, 80G, 80H, 80I, 80J, 80K, 80P, 80Q, 80R, 80S, 80T, 80X, 100, 100A, 100B, 100W, 101, 111, 122, 126A, 126B, 128, 129, 140, 143, 144, 145, 152, 160, 161P, 163, 164, 166, 167, 168, 169, 170, 175, 176, 178, 180, 194E, 194G, 194H, 194M, 194P, 194R
 Legal Studies 121, 128, 135, 136
 Literature 61E, 61J, 61R, 80L, 80N, 80P
 English-Language Literatures 150A, 150C, 155D, 160E, 190D, 190G
 Modern Literary Studies 144A, 144B, 144D, 144G
 Spanish Literature 60, 102B, 130A, 130E, 131B, 131D, 131H, 134G, 134M
 World Literature and Cultural Studies 109, 118, 127, 136, 190A
 Merrill College 80A, 80B, 80X
 Music 11B, 11D, 80A, 80F, 80I, 80P, 80Q, 80X, 180A, 180B
 Oakes College 80A, 80B, 80H, 175
 Philosophy 80E
 Politics 121, 140C, 140D, 140E, 141, 146
 Psychology 110, 119B, 140B, 142, 143, 157, 158
 Sociology 15, 20, 133, 156, 169, 170, 174, 175, 188
 Stevenson College 80H, 80T, 81A, 81B
 Theater Arts 22, 80A, 80M, 100A, 100B, 100I, 100L, 100W, 161D, 161P, 161R
 Writing 128

Social Sciences, page 442; see also the list of courses on page 31. College core courses are labeled topical and carry the designation of the appropriate academic area.

Quantitative course (Q code). These courses provide methods for acquiring quantitative reasoning that involve use of advanced algebra, statistics, or calculus. One course is required.

Writing courses (C1, C2, and W codes). These courses stress explicit attention to the craft of writing. Having satisfied the Entry Level Writing Requirement by the end of your first year of enrollment at UCSC (see page 25 for a description of the Entry Level Writing Requirement), you must complete two to three courses in writing. One of these must be a writing-intensive course (W code) that provides instruction and extensive practice in writing applied to a particular subject. For some courses, only certain sections are writing intensive (look for the “W” in the Schedule of Classes when enrolling). You must take this course at UCSC.

Students satisfy the other part of the writing requirement by passing two composition courses (C1 and C2 codes). You must fulfill the composition requirement prior to the seventh quarter of enrollment and before you can enroll in a writing-intensive course.

Arts course (A code). These courses provide the exposure to creative or artistic expression necessary for a liberal arts education. One designated arts course is required; most are offered through art, film and digital media, history of art and visual culture, music, and theater arts.

Ethnic minorities/non-Western society course (E code). These courses are intended to increase knowledge of ethnic minorities in the United States and non-Western cultures, improve cross-cultural awareness, and explore relationships between ethnicity and other aspects of a liberal arts curriculum. One course is required. For additional ways to pursue ethnic studies, see page 288.

Courses of fewer than 5 credits. Students usually meet the general education requirements with 5-credit courses. Several related arts courses of fewer than 5 credits with the same code may be used to satisfy the arts (A) general education requirement if they total at least 5 credits.

Advanced Placement and International Baccalaureate Examinations

The university grants credit for College Board Advanced Placement (AP) Examinations on which a student scores 3, 4, or 5 and for International Baccalaureate Higher Level (IBH) Examinations on which a student scores 5, 6, or 7. The university does not grant credit for IB standard or subsidiary level exams. Students completing the International Baccalaureate Diploma with a score of 30 or higher receive 30 quarter credits. The credit is applied toward the total credits required for graduation and toward the UCSC campuswide general education requirements, as indicated in the table on pages 29–30, Advanced Placement (AP)/International Baccalaureate Higher Level (IBH) Examinations. Students should be aware that AP, IB, and college-level courses will not be granted duplicate credit. In these cases, the university will award credit for only one.

AP and IBH Examination Credit toward Degree Requirements

Certain departments also allow prospective majors to obtain waivers for prerequisite courses. (Please see table, pages 29–30). In all cases, a student should contact the particular department to discuss his or her plans with an adviser. Please note that approval is not automatic; a petition must be filed with most departments.

Credits for Transfer Students

General Education Requirements

Transfer students may apply courses taken at other institutions toward the general education requirements with two exceptions: The disciplinary communication course(s) (DC code) or the writing-intensive course (W code) must be taken at UCSC. Also, transfer courses are not applied to the topical requirement (T code), but topical courses are waived at entrance according to the following formula: 45–83.9 transferable quarter credits, one course waived; 84–104.9 transferable quarter credits, two courses waived; 105 or more transferable quarter credits, all three courses waived. If one topical course is required in residence at UCSC, it may be chosen from any of the three academic areas (humanities and arts, natural sciences and engineering, and social sciences). If two are required, they must be from two different areas.

If you are currently attending one of the California community colleges, see the ASSIST

web site at www.assist.org, or consult with the UCSC Office of Admissions or your current counselor to determine which college courses satisfy UCSC general education requirements.

Transfer students who have satisfied the general education or breadth requirements of another UC campus prior to transfer will be considered to have completed the UCSC general education requirements. Completion of the Intersegmental General Education Transfer Curriculum (IGETC) prior to enrollment at UCSC will also be accepted in lieu of the campus general education requirements.

Intersegmental General Education Transfer Curriculum (IGETC)

The Intersegmental General Education Transfer Curriculum (IGETC) is a series of courses that prospective California community college transfer students may complete to satisfy the lower-division breadth/general education requirements at any University of California or California State University (CSU) campus (see table, this page). This curriculum is the result of an agreement, by the University of California, the California State University, and the California community colleges, aimed at simplifying the transfer process for community college students. The IGETC is intended exclusively for California community college transfers and is not an option for continuing UCSC students or for students transferring from four-year colleges or universities.

Students should complete the IGETC prior to transfer or they will be required to satisfy the UCSC general education requirements. For students who are partially certified, please consult the Office of Admissions. Courses used to satisfy IGETC must be completed with a grade of C (2.0) or better. A grade of Credit or Pass may be used if the community college's policy states that it is equivalent to a grade of C (2.0) or better.

IGETC is not recommended for majors that require extensive course preparation, such as any major in the Jack Baskin School of Engineering or the Division of Physical and Biological Sciences.

Major Requirements and Course Prerequisites

Students who believe they have taken courses at other institutions that satisfy major requirements or UCSC course prerequisites should contact the sponsoring department for review.

College Requirements

You must fulfill the requirements of your college in addition to those of your major and of the university. Each college has established a core course, which all first-year students are required to complete. Students admitted as transfer students are exempt from the core course requirement but may take the course at their option on a space-available basis. College requirements are outlined below. The core courses are described more fully in the individual college descriptions, pages 89–107.

College Eight

- College Eight 80A, *Introduction to University Discourse: Environment and Society*, fall quarter, or College Eight 80B, *Rhetoric and Inquiry: Environment and Society*, fall quarter; and College Eight 81A, *The Environment and Us*, fall quarter.
- College Eight 81A, *The Environment and Us*, fall quarter.
- College Eight 81B, *Fundamentals of Environmental Science*, winter quarter.
- College Eight 81C, *Technological Innovation and Environmental Challenges*, spring quarter.

Note: College Eight 81A, and either 80A or 80B are mandatory for all incoming freshmen. College Eight 81B and 81C also satisfy many of UCSC's general education requirements, and admission to these courses is selective.

College Nine

- College Nine 80A, *Introduction to University Discourse: International and Global Issues*, fall quarter, or College Nine 80B, *Rhetoric and Inquiry: International and Global Issues*, fall quarter

College Ten

- College Ten 80A, *Introduction to University Discourse: Social Justice and Community*, fall quarter, or College Ten 80B, *Rhetoric and Inquiry: Social Justice and Community*, fall quarter, or College 10 80C and 80D, *Introduction to University Discourse: Social Justice and Community, Writing Intensive*.

Cowell

- Cowell 80A, *Introduction to University Discourse: Imagining Justice Past and Present*, fall quarter, or Cowell 80B, *Rhetoric and Inquiry: Imagining Justice Past and Present*, fall quarter

Crown

- Crown 80A, *Introduction to University Discourse: Ethical Issues in Emerging Technologies*, fall quarter, or Crown 80B, *Rhetoric and Inquiry: Ethical Issues in Emerging Technologies*, fall quarter.

Kresge

- Kresge 80A, *Introduction to University Discourse: Power and Representation*, fall quarter, or Kresge 80B, *Rhetoric and Inquiry: Power and Representation*, fall quarter;

Merrill

- Merrill 80A, *Introduction to University Discourse: Cultural Identities and Global Consciousness*, fall quarter, Merrill 80B, *Rhetoric and Inquiry: Cultural Identities and Global Consciousness*, fall quarter

Oakes

- Oakes 80A, *Introduction to University Discourse: Communicating Diversity for a Just Society*, fall quarter, or Oakes 80B, *Communicating Diversity for a Just Society*, fall quarter

Porter

- Porter 80A, *Introduction to University Discourse: Writing Across the Arts*, fall quarter, or Porter 80B, *Communicating Diversity for a Just Society*, fall quarter

Stevenson

- Stevenson 80A, *Introduction to University Discourse: Self and Society*, fall quarter, or Stevenson 80B, *Rhetoric and Inquiry: Self and Society*, fall quarter
- Stevenson 81A, *Self and Society 2*, winter quarter, or Stevenson 81B, *Rhetoric and Inquiry: Self and Society 2*, winter quarter

Major and Minor Requirements

To qualify for a bachelor's degree at UCSC, you must complete the minimum requirements for a major program, as well as satisfy university, campus, and college requirements.

At UCSC, you have the option of pursuing a single major, a double major, or a combined major. The minimum requirements for an established major program are set by the sponsoring department. (If you are a transfer student, the department will determine which of your transferable courses may be used to satisfy major requirements.) The major involves substantial work in the discipline and requires

no fewer than 40 upper-division or graduate credits. Only courses in which you earn a grade of Pass, C, or better satisfy major or minor requirements.

Declaring a Major

The field of interest you indicate on your application to UCSC does not automatically place you in a major. You are advised to declare your major as soon as possible. You are *required* to file a study plan and declare a major *before* enrolling in the equivalent of your third year,* in consultation with the appropriate academic advisers. You will not be allowed to enroll in classes for the equivalent of your third year until you have declared a major. Certain majors have a limit on the number of students they can serve. Be sure you are aware of all the necessary criteria for qualifying for the major. It is wise to apply for major status as soon as you feel sure of the field you wish to enter. Junior transfer students must file a study plan and declare a major during their second quarter at UCSC by the deadline printed in the Academic and Administrative Calendar in the *Schedule of Classes*.

You should determine the requirements for possible major choices as soon as possible because certain majors require substantial preparation, with many interlocking course sequences. If you intend to pursue such a major, you should start work toward it early in your undergraduate career. (Review majors that interest you in the Programs and Courses section, pages 119–466.) Academic advisers can offer assistance in selecting courses appropriate to your individual needs (see pages 40–41).

**Note:* This is the year you would become a junior given normal progress to degree. For example, if you transfer to UCSC as a beginning sophomore, it is your second year here.

Comprehensive Requirement

Every major at UCSC includes a senior exit requirement designed to integrate the knowledge and skills learned throughout the curriculum. This capstone requirement may be a senior thesis, senior seminar, comprehensive examination, or some other integrative experience designed for the major. Choices for satisfying this requirement are specified with the requirements for each major.

Minor Programs

See pages 8–9 for undergraduate minors currently offered at UC Santa Cruz. Completion of a minor is optional. If you wish, you may complete more than one minor.

The sponsoring department establishes the course requirements for a minor. The minor involves substantial work in the discipline and requires no fewer than 25 upper-division or graduate credits. The minor appears on your official transcript but not on your diploma.

Additional Majors or Minors

To complete multiple majors and minors, you must fulfill all of the requirements for all majors and minors declared, including the comprehensive requirement for each major. In general, a single thesis may not be used for more than one major. You may count courses for more than one major or minor, as long as each major includes 40 upper-division credits not used to satisfy the minimum upper-division credits of any other major or minor, and each minor includes at least 25 upper-division credits not used to satisfy the minimum upper-division credits of any other major or minor.

The diploma of a student who has completed a double major in history and music, for example, would read “Bachelor of Arts with Majors in History and Music.”

Combined Major

A combined major allows you to complete a course of study involving two disciplines offered as regular programs at UC Santa Cruz.

Examples of combined majors include environmental studies/economics and Latin American and Latino studies/politics. A combined major is designed by faculty representatives from both disciplines. In general, fewer courses are required than for a double major, and students complete the comprehensive requirements as specified for each combined major. Combined majors currently available are listed in the footnotes on page 9.

The diploma of a student who has completed a combined major in environmental studies and economics, for example, would read “Bachelor of Arts with a Major in Environmental Studies/Economics.”

Individual Major

Students may also work with three faculty members to define an individual major specific to his or her academic goals. Proposals for individual majors require considerable effort to develop, and students are advised to consider double major, combined major, and major/minor alternatives. College advising offices can

provide information on the individual major proposal and approval process.

Catalog Rights

Effective for all undergraduates who entered in fall quarter 1993 or after, students may follow the degree requirements from either the *UCSC General Catalog* published at the time of entering UCSC or subsequent catalog(s). Students need not follow a catalog in its entirety but may elect to follow different catalog years for their college requirements, university and general education requirements, requirements of their major(s), and requirements of any minor(s).

Catalog year will initially be set for the first year of enrollment at UCSC. Students may elect to follow requirements from other catalog year(s) when filing the Petition for Major/Minor Declaration. All requirements for graduation outlined in the catalog(s) selected must be met before graduation. Changing catalog year(s) for majors/minors is done by submitting a new Petition for Major/Minor Declaration.

Changing catalog year(s) for college, university, and general education requirements is done by contacting the college advising office.

Students transferring from other collegiate institutions may elect to meet as graduation requirements one of the following:

- those in effect at the time of transfer to UCSC;
- those subsequently established; or
- those in effect when the student entered a previous collegiate institution, provided that entry was not more than three years prior to the time of transfer to UCSC.

Students who seek readmission to UCSC after a break in attendance greater than two years (six regular quarters) must adhere to the graduation requirements in effect at the time of readmission or those subsequently established.

Students who entered prior to 1993 should see an adviser. Their catalog year(s) for graduation, whether the year they entered UCSC or subsequent year(s), will be decided at the discretion of their major department and/or their college.

Institutional Responsibility

Undergraduate students who have made significant progress toward a degree in a specific major can assume that a degree will be granted if they meet all catalog degree requirements and maintain continuous enrollment and progress.

Should UCSC find it necessary to discontinue a specific major, every effort will be made to allow currently enrolled majors to complete their degrees within a reasonable period of time. This

may include (1) movement to a similar or related degree track; (2) substitution of requirements; (3) development of an individual major proposal; or (4) completion of courses at another University of California campus through the Intercampus Visitor Program. Students with questions concerning this policy should contact their major and college advising offices.

In all cases, any financial obligations are the responsibility of the individual student involved.

Evaluating Academic Performance

UC Santa Cruz has one of the more comprehensive systems for evaluating students' academic performance of any research university in the United States. The evaluation system consists of two major components: the assignment of a final grade in the course and an accompanying evaluation of your performance.

Evaluations

Beginning fall 2010, undergraduate evaluations are at the option of the faculty. In each course for which you receive a grade of D or better (or P) an evaluation of your academic performance may be submitted. An evaluation may:

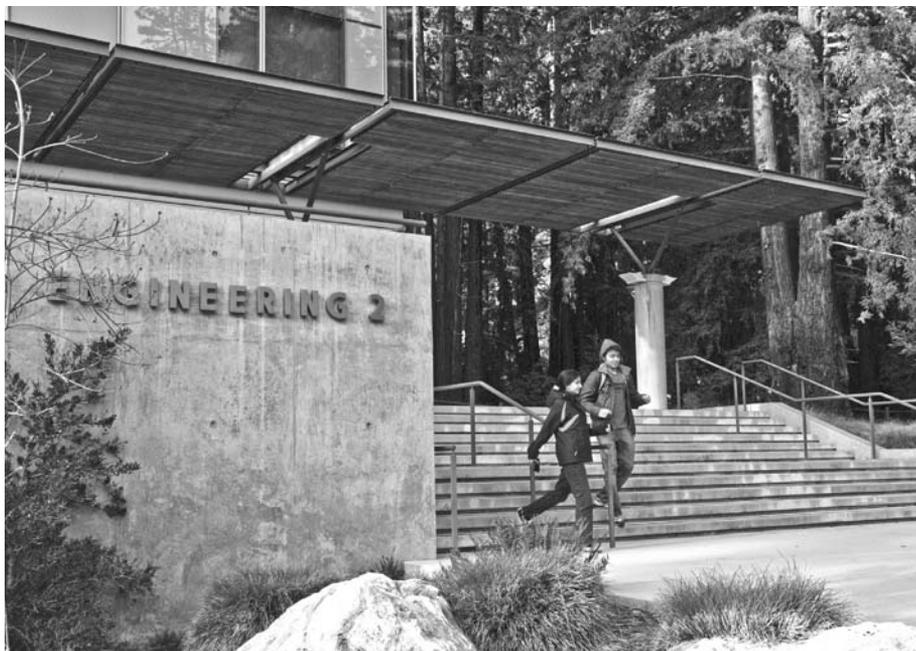
- Describe the strengths and weaknesses of your performance in the various areas of class activity (discussion, laboratory work, term papers, examinations)
- Assess your general understanding of the course content
- Recognize additional or particularly outstanding work

Evaluations are used at UCSC in academic advising, reviewing scholarship applications, and awarding College Honors and Honors in the major. Evaluations are a permanent part of your academic record. All students may request transcripts either with or without evaluations.

Grades

At the end of each course, you will receive one of the following grade notations:

| | |
|----|-------------|
| A | excellent |
| B | good |
| C | fair |
| D | poor |
| F | fail |
| P | passing |
| NP | not passing |



| | |
|----|-------------|
| I | incomplete |
| IP | in progress |
| W | withdrawal |

The grades of A and B may be modified by a plus (+) or a minus (-). The grade of C may be modified by a plus only. You will not receive credit for graduation in any course in which you receive a final grade of F or NP. The grades I and IP are temporary grades used in special circumstances. The final notation W indicates that you officially withdrew from the course before completing it.

Grade Points

Grade points are assigned to a letter grade as follows:

| | |
|-----|------|
| 4.0 | = A+ |
| 4.0 | = A |
| 3.7 | = A- |
| 3.3 | = B+ |
| 3.0 | = B |
| 2.7 | = B- |
| 2.3 | = C+ |
| 2.0 | = C |
| 1.0 | = D |
| 0.0 | = F |

The grades P and NP are not included in calculating your GPA and so are not assigned grade points. Courses in which the interim grades I and IP are assigned earn no grade points or credit until the interim grade is replaced by a final letter grade.

Grade-Point Average (GPA)

Undergraduates entering UCSC in fall 2001 and thereafter have a UCSC cumulative grade-point average calculated from UCSC courses, courses taken through the Education Abroad Program, and courses taken at another UC campus as part of the Intercampus Visitor Program.

A grade-point average is determined by dividing the number of grade points earned by the number of units attempted for a letter grade. In calculating your UCSC GPA, the interim grades IP and I are not included in the computation because you do not earn those credits until they are replaced with a final grade. (However, when checking for whether you have satisfied the 2.0 UC GPA requirement for graduation [see page 25], these interim grades are included and counted as courses with grade F [or NP]).

If you repeat a course in which you have received a D or F, only the last grade recorded shall be computed in your GPA for the first 15 credits of repeated work. After the 15 credit maximum is reached, the GPA will be based on all grades assigned and total credits attempted.

Undergraduates who entered UCSC for the first time in or after fall 1997 and before fall 2001 have a UCSC cumulative grade-point average only if they have elected letter grades in at least two-thirds of the cumulative credits attempted. Undergraduates who entered UCSC prior to fall 1997 cannot have an official UCSC grade-point average calculated.

Pass/No Pass Option

Students in good academic standing may request to take specific courses on a Pass/No Pass basis. Students receive a P (Pass) for work that is performed at C level or better. Work performed at below a C level receives a notation of NP on the student's transcript, and no academic credit is awarded for the course. Requests for Pass/No Pass grading must be submitted and confirmed by the Grade Option deadline printed in the Academic and Administrative Calendar (reg.ucsc.edu/calendar). If you request P/NP grading in a course and you are later placed on academic probation, your P/NP grading request will be canceled.

No more than 25 percent of the UCSC credits applied toward graduation may be graded on a Pass/No Pass basis. This includes any credits completed in the Education Abroad Program or on another UC campus in an intercampus exchange program. Students must be careful about the use of the Pass/No Pass option. Some courses may only be taken Pass/No Pass, and therefore count against the 25 percent Pass/No Pass limit. Several majors require all or most major requirements to be taken for a letter grade; read the major requirements section carefully before using the Pass/No Pass option for any course in a major you are considering.

Incomplete

The notation I may be assigned when your work for a course is of passing quality but for which some specific required work has not been completed. You must make arrangements with the instructor before the end of the course in order to receive an Incomplete. To remove the Incomplete, you must submit the remaining course work and file a petition by the deadline printed in the Academic and Administrative Calendar (generally the end of the following quarter). If you do not meet the deadline, the Incomplete lapses to a No Pass or an F, depending on the grading option selected at the beginning of the quarter.

The notation IP (In Progress) is reserved for a single course extending over two or three terms of an academic year. The grade for such a course may be awarded at the end of the course and shall then be recorded as applying to each of the terms of the course. A student satisfactorily completing only one or two terms of a course extending over two or three terms of an academic year will be given grades for those terms. The grade option selected in the first quarter of the multiple-term sequence applies to all quarters of the sequence.

Grade changes (except for I and IP, as above) are allowed only to correct clerical or calculation errors by the instructor and must be submitted to the Office of the Registrar by the instructor in charge of the course within one year of the close of the quarter for which the original grade was submitted.

Student Responsibility

Students are responsible for using the Academic Information Systems (AIS) to set and confirm choices for grading options and for ensuring timely completion of all requirements. Students view their schedule at my.ucsc.edu.

Course Loads

The usual course load for UCSC undergraduates is 15 to 19 credits, most often as three 5-credit courses and associated laboratories and sections. After instruction begins, students with a UCSC GPA of 3.0 may enroll in up to 22 credits without special approval and may seek approval for higher loads from their college advising office. Students in their first quarter or with a lower GPA must seek approval from their college advising office for enrollment in more than 19 credits.

College approval is required to carry fewer than 15 credits.

Academic Progress

Academic progress is a measure of the completion of courses with a D or better, or Pass. Colleges monitor academic progress to ensure you are progressing toward your degree, which must be earned within five years.

Minimum progress is based on length of time at UCSC. The minimum acceptable progress is completion of 36 credits for each academic year, 12 credits for each additional full-time term, and four-fifths of credits attempted for each part-time term. Progress is measured cumulatively, not term by term. For example, a full-time student must complete 48 credits by the end of the first quarter of the second year.

If you do not maintain minimum progress, your college may require you to take higher course loads, complete Summer Session courses, or make other adjustments to your study plan.

Academic Standing

Academic standing is a measure of performance in completed courses. You must maintain a 2.0 UCSC GPA in order to remain in good academic standing.

If your UCSC term or cumulative GPA falls below 2.0 at the end of any term, you will be placed on academic probation for the next term. You will need to work with your college and major advisers to determine the best way to return to good academic standing. Be sure to take full advantage of the many learning support services available at UCSC.

If your UCSC GPA for any term falls below 1.5, or if you are on academic probation and your cumulative GPA at the end of a term is below 2.0, you are also subject to disqualification. This means that your enrollment at UCSC may be barred for a specific period of time, or you may be disqualified indefinitely from attending the University of California. In many cases, a specific study plan can be developed with your college that will enable you to remain enrolled at UCSC.

For students who entered UCSC prior to fall 2001, academic standing and progress are calculated differently. Contact your college office or see *The Navigator* (reg.ucsc.edu/navigator) for more information.

Maximum Credits and Years

Students are expected to complete their degree objective(s) within at most 225 credits and five academic years (Advanced Placement and International Baccalaureate units are not counted). Students who transfer with advanced standing are expected to complete their degree objective(s) within at most 135 UCSC credits and three academic years.

Colleges may make exceptions to the credit maximum for students in certain cases. Such exceptions are conditional on maintaining academic standing, minimal progress, and progress toward the degree objective(s).

Students in danger of exceeding the credit limit or the five-year or three-year limit may be required to modify their degree objective, such as by completing a major without a minor or double major, or completing a related major with fewer course requirements.

Repeating Courses

Undergraduates may repeat courses in which they earn a D, F, or No Pass. Courses in which a D or F is earned may not be repeated on a Pass/No Pass basis. Courses in which a grade of No Pass is earned may be repeated on the same

basis or for a letter grade. For the first 15 credits of repeated courses, the original grade and corresponding grade points earned are excluded in calculating the GPA, and only the grade and grade points from the repetition are used. After the 15-credit maximum is reached, the GPA will be based on all grades assigned and grade points earned. However, credit is not awarded more than once for the same course. The grade assigned each time the course is taken will be permanently recorded on the official transcript. Repetition of a course more than once requires approval of the student's college.

Academic Integrity

The university is dedicated to the unhindered pursuit of knowledge and its free expression. It is essential that faculty and students pursue their academic work with the utmost integrity. This means that all academic work produced by an individual is the result of the sole effort of that individual and acknowledges the contributions of others explicitly. It is the responsibility of students and faculty to be absolutely clear about what constitutes plagiarism, cheating, or other violations of academic integrity. Violations of academic integrity by students result in both academic sanctions (e.g., failing the course) and disciplinary sanctions (e.g., suspension or dismissal). Consult Appendix G of the campus's *Student Policies and Regulations Handbook* (www2.ucsc.edu/judicial/) for more discussion and information.

Undergraduate Honors Program

UC Santa Cruz awards several honors for outstanding academic achievement.

Dean's List Honors

Students will be eligible for quarterly Dean's Honors if they have earned a minimum of 15 units that quarter, of which at least 10 are graded, with a term grade point average (GPA) equal or higher than that required for University Honors at graduation in their group* for the current academic year. The notation "Dean's Honors" will appear on the transcript.

**Note:* GPA thresholds for Baskin School of Engineering majors are calculated separately from those of majors in all other divisions.

Honors at Graduation

Honors at graduation are awarded by the university and by the separate majors and colleges based on a review of their graduates' academic records. In general, honors are limited to 15 percent of the graduating class. University Honors are based solely on

the cumulative UC GPA. Faculty review for major and college honors may involve additional criteria.

University Honors

To be considered for University Honors at graduation, students must have completed 70 or more units at the University of California and have attained in their group* a UC GPA that places them in the rankings as follows: Summa Cum Laude, top 2 percent; Magna Cum Laude, next 3 percent; Cum Laude, next 10 percent. Each year and for each group, the registrar will calculate the GPA thresholds required for these levels of University Honors, based on the GPAs of recent graduates. The notation "University Honors" will appear on the diploma and transcript.

* *Note:* GPA thresholds for Baskin School of Engineering majors are calculated separately from those of majors in all other divisions.

Honors in the Major

At graduation, the department sponsoring a student's major program may confer Honors or Highest Honors in the major. This notation appears on the transcript as well as on the diploma. In general, no more than 15 percent of the graduation class in a major will be awarded Honors at graduation.

College Honors

Some colleges review their graduating students for academic achievement and according to criteria set by the college faculty reviewers. In general, no more than 15 percent of the graduating class of a college will be awarded Honors at graduation.

Deadlines

To be considered for honors in the major or college honors, students must apply to graduate by the Registrar's deadline.

Any Student who has a reportable disciplinary sanction for a violation of academic integrity policies may be ineligible for any honors designation, at the discretion of the agency that awards the designation.

Honor Societies

Many UC Santa Cruz students are members of departmental, professional, local, and national honor societies whose goals are to recognize and improve scholastic standing in an area of interest. Among these are Phi Beta Kappa, the oldest national society that advances scholarship and recognizes excellence in the liberal arts and sciences; Tau Beta Pi, the engineering honor society that

recognizes students of distinguished scholarship, exemplary character, and dedication to service; and Psi Chi, which encourages, stimulates, and maintains excellence in scholarship, and advances the science of psychology.

Awards and Scholarships

UC Santa Cruz has a variety of scholarship and award opportunities that are designed to reward, encourage, and assist students in pursuing academic excellence and leadership roles. Students can find such opportunities through their colleges, departments, divisions, and various external agencies.

The Office of Undergraduate Education provides administrative support to a variety of prestigious scholarships and awards such as the Karl S. Pister Leadership Opportunity Award, Dean's and Chancellor's Award, Steck Foundation Award, Donald A. Strauss Scholarship, Fulbright Scholarship, Marshall Scholarship, and Jack Kent Cooke Scholarship. Acknowledgment of scholarship and award recipients are given at the Undergraduate Academic Achievement Award Ceremony at the end of each academic year.

Transcripts

Academic records are maintained by the Office of the Registrar, which will issue an official transcript only on your authorized request.

For information on ordering transcripts, please refer to the following URL: reg.ucsc.edu.

If you have outstanding financial obligations to the university, a hold may be placed on your transcript. Students may access their unofficial transcript on MyUCSC.

Transcripts for UCSC Extension courses should be requested from UCSC Extension Records, 2505 Augustine Drive, Suite 100, Santa Clara, CA 95054-3003, (408) 861-3700.

Privacy of Records

UCSC students are informed annually of the federal Family Educational Rights and Privacy Act (FERPA) and its provisions. This act, which the institution follows, was designed to protect the privacy of education records and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the Family Educational Rights and Privacy Act Office concerning alleged failures by the institution to comply with the act.

UCSC policy explains in detail the procedures to be used by the institution for compliance with the provisions of the act. FERPA guidelines are available in *The Navigator*, the student handbook. The full text of the University of California policies applying to the Disclosure of Information from Student Records is online: reg.ucsc.edu/guidelines.html.

Questions concerning the Family Educational Rights and Privacy Act may be referred to the Office of the Registrar, 190 Hahn Student Services Building.

Advising: From Course Selection to Careers

Orientation is an indispensable resource for all students. Students who attend Orientation feel better prepared, encounter fewer problems, and receive priority registration before other students who do not attend Orientation. Attending Orientation is one of the most important steps a new student takes in preparing for the transition to university life, providing the academic advising needed to make informed decisions about classes and majors, and the opportunity to get questions answered, and learn more about the university.

Orientation begins the process of academic advising and provides a comprehensive introduction to all aspects of UCSC. While at Orientation, students enroll in classes, learn to access campus resources, meet with college and department advisers, meet new and continuing students, learn about the many student organizations on campus, attend a resource fair, take pictures for their student ID card, attend breakout sessions, and gain valuable student life information. We urge students to attend Orientation to help facilitate their academic and personal success at the university.

Summer Orientation is held several times over the course of the summer and includes separate programs for first-year and transfer students, as well as a concurrent program for family members.

Fall Welcome Week, scheduled approximately five days prior to the beginning of fall quarter, is the next step in the orientation and advising process for new students entering fall quarter. It provides students with an opportunity to settle into life at UCSC, take advantage of important services, and continue their academic advising.

Winter Orientation is a one-day event focused on transfer students, entering in the winter quarter. It includes a concurrent program for family members.

Students make their reservations for Summer or Winter Orientation online through the UC Santa Cruz portal at my.ucsc.edu.

Questions can be directed to the Office of Campus Orientation Programs at (831) 459-5468, or via e-mail to orientation@ucsc.edu. Web: orientation.ucsc.edu

Important information on particular majors may be viewed on individual departmental web sites. The sites will give you contact information and office hours. Advisers provide detailed information regarding requirements for the major and assist you in planning a program of study. The department adviser can also assign you to an appropriate faculty adviser who may serve as a mentor in your field, recommending courses and helping you refine your educational goals.

It is also important to seek departmental advising for assistance in planning your overall academic program. For transfer students and for students in many majors (such as those in the physical and biological sciences, engineering, arts, and environmental studies), it is necessary to obtain departmental advising prior to or at the start of the first quarter on campus.

For more general academic questions, make an appointment with a college adviser. Each college has specialized staff members, called academic preceptors, who advise students on everything from general education requirements to choosing a major.

For help in assessing career interests and exploring and choosing career options, contact the Career Center. The staff also will assist with choosing a major, résumé preparation, interviewing skills, applying for an internship, and job-search strategies. Many students find that participation in internships and field programs, described on pages 46–48, gives them a practical basis for making career decisions. The Career Center offers workshops, an online database, and publications on many internship opportunities. The office's Career Advice Network (CAN) will connect you with UCSC alumni professionals who help students achieve their career goals.

If you plan to go on to graduate school, consult with faculty in your major. Faculty advisers are the best people to ask about the quality of graduate programs in your field of interest. In addition, the Career Center offers advising and workshops on applying to graduate school. A letter-of-reference service enables

you to maintain your recommendation letters at the Career Center.

If you intend to pursue graduate study in a field not offered as a major at Santa Cruz, you can prepare for your intended program through one of the campus's regular majors. You must plan your studies carefully, however, and advising will be especially important. The Career Center library has information that will help prepare you for graduate and professional programs. The following are some fields in which UCSC alumni have pursued graduate study and successful careers:

- Architecture
- Business
- Conservation
- Film
- Finance
- Guidance and counseling
- Health Fields
- High-tech industry
- Human resources
- Industrial and labor relations
- International relations
- Law
- Marketing
- Museum administration
- Public administration
- Urban planning

If you plan to pursue a career in medicine or another health-related field (including dentistry, nursing, nutrition, occupational therapy, optometry, osteopathic medicine, pharmacology, physical therapy, public health, and veterinary medicine), contact the Health Sciences Career Adviser in the Career Center at (831) 459-5705. Ethnic-minority students may also be eligible for the MARC/MBRS Programs, described below.

If you are interested in the field of law, the prelaw adviser for UCSC is at the Career Center, (831) 459-2957.

A number of programs provide additional academic advising and comprehensive support services to students with specific needs. Educational Opportunity Programs (EOP), Services for Transfer and Re-Entry Students (STARS), the Disability Resource Center, and International Programs are described below. If you need assistance in another area, check to see if it is listed in the Index, pages 507–511. For additional information, check with your college office or consult *The Navigator* or *Schedule of Classes* (reg.ucsc.edu).

Counseling on personal and family issues is available through Counseling and Psychological Services, described on page 111.

Career Center

UC Santa Cruz graduates find success in many different career fields, and their superior education is the foundation for this success. The staff at the Career Center will help you link your educational experience to the world of work. The center provides a variety of employment and career-development services to help students obtain rewarding and successful careers.

Students are encouraged to visit the Career Center early during their first year on campus. The first step is to meet with a career adviser to begin developing a focused career plan. Simply sign up online for an advising appointment. Your career adviser will show you how to research and discover the many opportunities that are available to UC Santa Cruz students and graduates. Workshops offered by the Career Center include Selecting an Internship, Résumé and Cover Letter Writing, the Graduate and Professional School Information Workshop, Applying to Law School, and special workshops on specific majors or career fields.

Your college experience is likely to include a part-time job or internship in your area of interest. The Career Center has hundreds of opportunities available. Off-campus and on-campus employment opportunities (both work-study and non-work-study) are posted on the Career Center's web site. For your convenience, you may apply for on-campus jobs online.

An internship is one of the best ways to gain practical work experience in your area of interest. The Career Center has a database with hundreds of opportunities in a wide variety of career fields. While visiting the center, be sure to check out the **Chancellor's Undergraduate Internship Program** (CUIP). This unique internship program is designed to give participants a professionally enriching work experience on campus in one of the university's colleges, administrative units, or academic departments. For information, visit the web: intern.ucsc.edu.

Another interesting and challenging position is the UC Student Regent, with an annual recruitment process. For information, e-mail larojas@ucsc.edu or visit the web: careers.ucsc.edu/jobs/regent.html.

The Career Center's resource library contains material organized in the following manner: Career Exploration, Graduate and Professional Schools, Job Search, Career Fields, Internships, and Employer Information. A computer lab links you to the top career-development sites on the web. However, the most exciting online resource is the Career Advice Network database. The Career Advice Network (CAN) contains

career profiles of UCSC alumni. The members of the network have volunteered to answer questions and give career advice pertaining to their particular career field. You may contact CAN members to obtain information on educational preparation, job responsibilities, résumé preparation, and tips on how to conduct your job search.

UC Santa Cruz students and alumni looking for full-time career opportunities need look no further than SlugQuest—an online site that lists job openings targeted to UCSC graduates. You may connect to SlugQuest on the Career Center web site. Another way to obtain a career position is to participate in the On-Campus Interview Program. Corporate recruiters visit campus every fall, winter, and spring to interview and hire students. The Career Center web site has a list of participating companies.

The Career Center sponsors several major events every academic year. The Graduate and Professional School Fair brings graduate and professional school representatives from the nation's top universities to campus to share information about their advanced-degree programs. Job fairs, which bring hiring companies to campus, take place several times a year. Students looking for a job or internship will want to come prepared with a great résumé. Other events include the Student Employment Recognition Awards Program Ceremony, where outstanding student employees are recognized and rewarded for their hard work and dedication, and the Multicultural Career Conference, which brings students and alumni together to develop mentor relationships and explore careers.

The Career Center—located at the Bay Tree Building, Room 305, in Quarry Plaza—can be reached at (831) 459-4420. Office hours are 8 A.M. to 5 P.M. Visit the center's web site at careers.ucsc.edu.

Educational Opportunity Programs (EOP)

The Educational Opportunity Programs (EOP) provide a variety of academic and personal support programs designed to promote the retention, academic success, and graduation rates of California residents who are first-generation college students from low-income and educationally disadvantaged backgrounds. EOP programs and services are designed to ensure that students successfully complete their undergraduate education and acquire the skills that will prepare them for leadership roles and graduate or professional school opportunities.

Advising Programs and Services

EOP advising programs work to enhance student academic and personal success. These programs and services include academic and personal counseling; time-management and study-skills strategies; academic workshops; referrals to resources, programs, and opportunities; peer advising; and community events. Students have access to three EOP academic counselors who provide academic advising and personal counseling to facilitate the students' academic, social, and personal transition/adjustment to the university. The counselors also work closely with the college, department, and financial aid advisers to ensure that students access and utilize all available resources to become "B or Better Scholars." EOP also organizes programs and events to promote and support the students' achievement and advancement. The events include Academic Success Workshops, a Holiday Event, and an Academic Excellence Reception. Other academic programs include the EOP Bridge Program for a select group of entering first-year students. Bridge is an academic-year program to help frosh make a smooth transition from high school to the university. The program includes a summer orientation and instruction, academic advising, learning support, and community-building activities throughout the academic year.

Pregraduate Programs

The pregraduate programs are designed to increase the placement of EOP students in doctoral programs in preparation for the pursuit of academic careers. The two pregraduate programs are the Faculty Mentor Program (FMP) and the Graduate Information Program (GIP).

GIP offers general graduate and professional school advising. GIP activities focus on informing and preparing students for educational opportunities beyond the baccalaureate degree. Through workshops and individual sessions, GIP outlines the process of how to apply to graduate school and helps students make important faculty, staff, and resource connections. The GIP web site offers a comprehensive step-by-step guide to all aspects of the process of preparing for and applying to graduate school, including identifying research interests, searching for graduate schools, securing letters of recommendation, and identifying internships. GIP also maintains a graduate school resource library and sponsors field trips to conferences and forums within the local area to connect to UC-wide resources. Students can visit the GIP web site at www2.ucsc.edu/eop/gip.

The Faculty Mentor Program is a two-quarter undergraduate research program designed to encourage and prepare students to undertake future graduate study within the arts, humanities, and social sciences. FMP includes research writing, workshops on applying to graduate school, and hands-on research experience under the guidance of a UCSC faculty sponsor. Students receive academic credit for participation in a weekly seminar along with a 10–15-hour commitment to faculty-sponsored research.

For more information about the Educational Opportunity Programs, drop by the Academic Resources Center, call (831) 459-2296, or visit the web site: www2.ucsc.edu/eop

MARC/MBRS Programs

The Division of Physical and Biological Sciences sponsors two National Institutes of Health grant programs: the Minority Access to Research Careers (MARC) Program and the Minority Biomedical Research Support (MBRS) Program. Though separately funded, the projects share a similar mandate: to increase the number of well-prepared ethnic-minority students who are admitted to graduate or professional schools in biomedical sciences. The program seeks students from groups that have traditionally been denied equal access to educational opportunities in the science professions.

Continuing students who have successfully completed specific introductory courses in biology, chemistry, and mathematics are invited to apply for the MARC/MBRS Programs, which begin in the summer and introduce students to program faculty, their research, and research techniques. After students successfully complete the summer program, they have the opportunity to work in a faculty lab for the following academic year. Financial compensation is available for laboratory placements and participation in the summer program.

The MARC/MBRS Office also works with other campus offices to help make the most of campus resources and provide practical assistance with the graduate and professional school admission process. In addition, the staff maintains an information file on summer enrichment programs, which can provide you with vital research or clinical experience or help you prepare for the Graduate Record Examination.

The program's well-equipped student office provides additional academic support and a convenient place for students to meet. The staff encourages students to make use of this

study space and assists them in learning to use the office's personal computers.

For further information, contact the MARC/MBRS Office, 377 Thimann Laboratories, (831) 459-4770, or e-mail malika@biology.ucsc.edu. Web: marcmbrs.ucsc.edu.

Academic Excellence Program (ACE)

ACE is supported by the Division of Physical and Biological Sciences and has as its goal to increase diversity among students receiving bachelor's degrees in science, technology, engineering, and mathematics (STEM) by offering discussion sections for selected mathematics and science courses. These discussion sections replace registrar-scheduled secondary discussion sections for ACE students.

The program received the 1999 Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. This award, presented by the White House and administered by the National Science Foundation, is given to individuals or programs that have demonstrated outstanding and sustained mentoring efforts for students underrepresented in science, mathematics, and engineering.

Helping students excel in gateway mathematics and science courses is ACE's focus. The ACE sections provide a structured, workshop setting where students learn by teaching each other. This collaborative method reinforces critical thinking and problem-solving skills. Enrollment in ACE is limited. A professional section leader with an academic background in the subject facilitates these workshops. In addition, undergraduate coleaders/peer mentors who have excelled in the course assist the section leader. This brings the student to teacher ratio to approximately 12:1. Students also meet with a peer mentor, who shares study tips and techniques, as well as opportunities for undergraduate teaching and research internships. Other opportunities available through ACE include office hours, study groups, and career counseling. ACE scholars join a community of scholars dedicated to academic excellence and success.

Applications are accepted quarterly for the upcoming term. Priority is given to students who are studying STEM disciplines and who are first generation to attend college. For more information, visit the web site: ace.ucsc.edu.

Multicultural Engineering Program (MEP)

The Baskin School of Engineering's Multicultural Engineering Program (MEP) promotes diversity and facilitates the success of engineering students.

MEP provides academic and personal support for engineering students who are first-generation college students, are the first in the family to pursue engineering or computer science studies, or are from a low-income (limited financial resources) or educationally disadvantaged background. MEP's academic learning community supplements students' undergraduate experience and encourages students to continue their education into graduate school. MEP has a strong support system and engages students' full participation in a variety of services and activities. These include academic advising, personal counseling, tutorial services, drop-in assistance, individual and small-group study, study-skills workshops, peer-support networks, community-building activities, scholarships, and an engineering Summer Bridge program for a select group of entering first-year and transfer students.

MEP's well-equipped study center and computer lab provides 24-hour access to computer workstations and printer, textbooks, individual lockers, and a place for students to gather and study. Students who have participated in pre-university service programs (e.g., Early Academic Outreach, Upward Bound, MESA, Talent Search, Puente, DEEP, Smith Scholastic Society) are encouraged to apply to MEP.

For further information, call (831) 459-2868, visit the web site mep.soe.ucsc.edu, or drop by the School of Engineering Undergraduate Affairs Office, 225 Baskin Engineering Building.

Services for Transfer and Re-Entry Students (STARS)

Services for Transfer and Re-Entry Students (STARS) offers a broad range of personal and academic support services for all transfer and re-entry students (undergraduates 25 years and older, graduate students 29 years and older), students who are parents regardless of age, and military veterans. These services include admissions information; orientations for new students; academic seminars courses; study-skills workshops; tutorial services; informal academic advising; drop-in assistance; social, recreational, and cultural programs; scholarships; newsletters; and study centers with computer workstations. STARS also acts as a clearinghouse for information about campus and community resources

for UCSC's large transfer and re-entry student populations.

STARS oversees two resource centers housed in different locations on campus. All current and prospective re-entry and transfer students are invited to visit. Hours are 8 A.M. to 5 P.M., Monday through Friday. STARS main offices are in the Academic Resources Center, Rooms 206 and 216. STARS at Kresge is located at the entrance to Kresge College.

Veterans Education Team Support (VETS) is a STARS program for veterans returning to school. In this peer mentor program, veterans meet each other and receive assistance as they navigate admission and transition into university life. Ongoing personal and academic support and outreach to prospective students are also offered.

The Smith Renaissance Scholars Program, which helps foster and former foster youths pursue their educational goals, is affiliated with STARS.

STARS also coordinates the Lifelong Learners program, a UC/community organization dedicated to continuing education. The organization hosts monthly meetings with university faculty and offers a wide variety of interest groups. Some members take campus courses for a minimal fee through UCSC Extension's Concurrent Enrollment.

For further information regarding all the STARS programs, call (831) 459-2552. For current programs and activities, view the STARS web site: stars.ucsc.edu.

Part-Time Program

If you are unable to attend the university full-time because of family obligations, employment responsibilities, or a medical condition, or you are in your final quarter before graduation, you may qualify for the Part-Time Program. This program enables students to pursue a bachelor's degree part-time in any major offered at UC Santa Cruz. To participate, undergraduate students must file a Part-Time Program application by the appropriate deadline. Full-time students normally take three 5-credit courses per quarter; part-time students may enroll in a maximum of 10 credits.

Students approved for enrollment on a part-time basis pay the same fees as full-time students but pay only one-half of the educational fee. Part-time nonresidents pay one-half of nonresident tuition. Financial aid awards may be affected by enrolling part-time. Students who use the part-time fee reduction may not also use the UC employee reduction.

Applications for undergraduates are available from the Office of the Registrar, 190 Hahn Student Services Building. For more information, call (831) 459-4412 or e-mail registrar@ucsc.edu. Web: reg.ucsc.edu/students/part-time.html.

Disability Resource Center (DRC)

The campus accommodates students with documented disabilities and welcomes their attendance at UCSC. The Disability Resource Center (DRC) provides the following to help meet the needs of students with disabilities: counseling and advising; assistance with enrollment; testing accommodations; alternative media such as audiobooks; adaptive equipment loans; notetaker and interpreter services; and liaison and referrals to appropriate resources, services, and agencies.

The Disability Resource Center is located at 146 Hahn Student Services Building and can be reached by telephone at (831) 459-2089 (voice) or (831) 459-4806 (TTY), or by e-mail at drc@ucsc.edu. Web: drc.ucsc.edu/.

Campus access for people with mobility impairments. Transportation and Parking Services, in coordination with the DRC and Cowell Student Health Center, provides accessibility maps, vans equipped with wheelchair lifts that can transport students throughout campus, and authorization to use disabled or medical parking spaces for the disabled, which are adjacent to all campus buildings. Most buildings on campus have wheelchair-accessible ramps, modified rest rooms, and other facilities. If necessary, classes are rescheduled to meet accessibility needs.

Questions and concerns about

- program accessibility should be addressed to the director of the Disability Resource Center, at (831) 459-2089 (voice); (831) 459-4806 (TTY)
- transportation, physical, or computing access to the campus should be directed to (831) 459-3759 (voice/TTY)
- accommodating job applicants or current employees with disabilities should be directed to (831) 459-4602 (voice)

ROTC and Military Affairs

Reserve Officer Training Corps (ROTC) is not available on the UC Santa Cruz campus. However, interested UCSC students have the option of attending programs at Santa Clara

University, San Jose State University, and UC Berkeley.

To find out about the Army ROTC program, contact the Department of Military Science, Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053-0631 or (408) 554-4034, e-mail Captain Vince Mucker at vmucker@scu.edu, or visit <http://scurrotc.com>.

For information on the Air Force ROTC program, contact the Department of Aerospace Studies, AFROTC Det 045, One Washington Square, Industrial Studies Building, Room 214, San Jose State University, San Jose, CA 95192-0051 (408) 924-2960, e-mail Det045@maxwell.af.mil or visit the web: www.sjsu.edu/depts/AFROTC/homepage.html. Students may call or inquire about program prerequisites, scholarship availability, and class schedules at the Department of Aerospace Studies.

UC Berkeley offers a variety of courses in military affairs, including those offered by the Departments of Naval Science, Military Science, and Aerospace Studies, subject to departmental approval. (See UC Berkeley General Catalog, Military Officers' Education Program, sis.berkeley.edu/gc/curricula.html.) These courses are offered to cadets and non-cadets. Arrangements for all ROTC programs are made on an individual basis with the appropriate sponsoring campus.

Undergraduate Research

At the best research universities, professors bring knowledge and creativity from their cutting-edge research into the classroom, integrating the canon of the discipline with its future directions. UC Santa Cruz takes this further with a special tradition of undergraduate research outside the classroom. UC Santa Cruz, its departments, and faculty offer undergraduates many ways to get involved in research and creative activities. These opportunities develop advanced skills and insights and an early introduction to the nature of graduate studies. Research projects can help students launch careers, secure admissions to top graduate schools, and truly impact society.

Many majors incorporate research in their senior comprehensive requirement, with options or requirements of a senior thesis, capstone project, or other creative endeavor based on students' individual research. Other

opportunities for undergraduates exist through structured internships or research programs, by joining ongoing faculty research or creative projects, or by developing their own projects under faculty supervision. The next sections discuss a sampling of UCSC's international education, field-study, and exchange programs, which enable students to deeply enrich their undergraduate experience and education as they learn by doing.

UC LEADS

After being selected as UC LEADS scholars, students begin a two-year program of scientific research and graduate school preparation guided by individual faculty mentors. Scholars are provided with an excellent opportunity to explore their discipline, experience a research environment, and improve their opportunities for future study in their chosen field. Each scholar is mentored by a member of the UC faculty, who assists the student in designing a plan of research and enrichment activities tailored to his or her individual interests and academic goals. To learn more about eligibility requirements and the UC LEADS program, visit graddiv.ucsc.edu/ucleads or stem.ucsc.edu.

National Science Foundation Research Experiences

UC Santa Cruz faculty host four National Science Foundation Research Experiences for Undergraduates (NSF REU) sites. These events typically are 9–10 week summer programs and provide housing and a stipend. The UCSC programs include chemistry's SURF (Summer Undergraduate Research Fellowship) program and a separate international REU in Thailand (www.chemistry.ucsc.edu/Projects/SURF), as well as the School of Engineering's SURF-IT (Information Technology, surf-it.soe.ucsc.edu). There are hundreds of other NSF REU programs nationwide (www.nsf.gov/crssprgm/reu), and faculty and advisers can help you apply.

MARC/MBRS

The MARC/MBRS programs, funded by the National Institutes of Health and discussed elsewhere (see page 42), seek to increase the number of well-prepared ethnic-minority students who are admitted to graduate and professional schools in the biomedical sciences (marcmbrs.ucsc.edu).



The MARC/MBRS programs, sponsored by the Division of Physical and Biological Sciences and funded by the National Institutes of Health, seek to increase the number of well-prepared ethnic-minority students who are admitted to graduate and professional schools in the biomedical sciences (marcmbrs.ucsc.edu).

International Education

The International Education Office (IEO) oversees UCSC Programs Abroad and International Scholar and Student Services (ISSS).

For further information, contact the International Education Office, 104 Classroom Units Building, (831) 459-2858, e-mail: ioe@ucsc.edu, Web: ioe.ucsc.edu.

Programs Abroad

Programs Abroad offers undergraduate and graduate students the opportunity to study through the University of California, Education Abroad Program (EAP) at 115 host universities and colleges in 34 countries as part of their regular UCSC academic program. The program serves students at all UC campuses and is administered by the University Office of the Education Abroad Program in Santa Barbara: eap.ucop.edu.

Additionally, UCSC Programs Abroad assists students participating in study-abroad opportunities through UCSC directly, other UC campuses, and privately sponsored organizations.

UCSC seeks to bring these programs within reach of all students. Extension of studies up to 15 quarters is possible when participating in a program overseas. Students receiving financial aid can apply their award to most programs abroad.

International Scholars and Students

The International Scholar and Student Services (ISSS) office serves as the official campus liaison to the U.S. government agencies that have jurisdiction over immigration matters. ISSS assists international faculty, scholars, and students with visa and immigration issues while they are at UCSC. In addition to preparing the necessary documents to apply for a U.S. visa, ISSS assists students, scholars, and faculty in maintaining their legal status while in the United States. ISSS also provides orientations, travel, and employment workshops, and information and referrals regarding finan-

cial, personal, cultural, and academic concerns. ISSS serves more than 1,000 international clients and their accompanying family members who come to the campus each year.

Fulbright Grants for Graduate Study and Research Abroad

The Division of Undergraduate Education facilitates the Fulbright annual awards competition for the Graduate Study and Research Abroad Program for currently enrolled UCSC students. Web: <http://honors.ucsc.edu/scholarships.htm>

Field and Exchange Programs

UCDC Program at the UC Washington Center

The UCDC Program at the UC Washington Center in Washington, D.C., supervises and supports students who pursue internships and academic study in the nation's capital. The program is open through a competitive application process to students in all majors who will have upper-division status by the quarter in which they participate. (Physical and biological sciences and engineering majors are eligible to participate in their sophomore year with department approval.) Students enroll for fall, winter, or spring quarter, earn 12 to 17 course credits, and continue to be registered as full-time students. (In addition, see Residence, page 26.) Applicant selection is based on academic record, a written statement, letters of recommendation, and in some cases a personal interview.

Financial-aid eligibility is maintained, and students who are eligible for financial aid may qualify for a President's Washington Scholarship to help cover supplemental costs.

Students live in the UC Washington Center with students from all the participating UC campuses. This provides a social and intellectual community throughout the quarter.

Interested students with strong academic records are encouraged to apply. For further information, contact the UCDC coordinator, 5 Merrill College, (831) 459-2855.

Web: <http://politics.ucsc.edu/ucdc>.

Intercampus Visitor Program

UCSC students may take advantage of educational opportunities at other campuses of the University of California through the Intercampus Visitor Program. This program enables you to take courses not available at Santa Cruz, to participate in special programs, or to study with distinguished faculty at other campuses.

To qualify for participation in this program, you must be in good standing after completing at least three quarters in residence at Santa Cruz. Each host campus establishes its own criteria for accepting students from other campuses as visitors. You must also have the approval of your college. Consult with your department about how courses taken at the host campus may apply to your major requirements.

Applications are available at the Office of the Registrar (Web: <http://reg.ucsc.edu/students/>

[intercampus.html](#)). The application form contains a great deal of useful information about the program and how and when to file; please read it carefully. A nonrefundable application fee of \$60 is due when the application is filed. For further information, contact the special programs assistant in the Office of the Registrar, 190 Hahn Student Services Building, (831) 459-3459, or by e-mail at registrar@ucsc.edu.

Domestic Exchange Programs

UCSC has exchange programs with the University of New Hampshire (UNH) and the University of New Mexico (UNM). UNH is located near the New Hampshire seacoast in the picturesque colonial town of Durham, a little more than an hour from Boston, Massachusetts. UNM is located in Albuquerque, a city of approximately half a million population, situated on the banks of the Rio Grande. Both schools give students the opportunity for an educational experience in an entirely different environment.

While enrolled in the exchange program, students maintain their status at UCSC, and they are expected to return to complete their studies following enrollment at UNH or UNM. Both universities are on the semester system, so students usually participate in the exchange program for the entire academic year. But the option exists for students to participate during fall quarter only, or during winter and spring quarters.

Participants are selected from among students who are in good academic standing. Selection for 2011–12 will take place during winter quarter 2011. Selection for 2012–13 will take place during winter quarter 2012. Each department of study determines the applicability of UNH and UNM courses toward requirements for the major. Letter grades earned while at UNH and UNM will not be calculated into the UCSC GPA or the UC GPA. Further information is available from the exchange program coordinator in the Office of the Registrar, (831) 459-4412. Web: reg.ucsc.edu/students/exchange.html.

Field Programs

Many UCSC students complement their major programs with field experience or off-campus internships, which also provide opportunities for students to become involved in public service activities in the local community and throughout the world. Most of the field programs described below are open to students in a range of majors, although some are restricted

to students pursuing a designated area of study. Students in all majors may apply for internships sponsored by the Career Center (see page 41).

In addition to the off-campus placements provided by the programs described below, independent field study is available through some colleges and departments. Public service activities can be arranged through field programs.

Community Studies Field-Study Program

Community studies is an interdisciplinary undergraduate major that examines social change in the context of community. Each student in the program designs his or her curriculum around a six-month field study or internship with a community organization or agency.

The core curriculum for the major includes courses in field-study preparation as well as theory and analysis. Students complete the major by preparing a senior project integrating field study, classroom work, and research. The major has no lower-division prerequisites and usually takes about two years to complete.

With the guidance of a faculty adviser, community studies students choose field placements related to one of the areas of the department's focus. (See the listings of *Theory and Practice Seminars*, Community Studies 100A–Z, for descriptions of these areas of focus.) Most field placements are in California, although students may do their field placements throughout the U.S. and the world. Students have been placed with health centers, radio and television stations, newspapers, city planning departments, political parties, neighborhood organizations, civil rights groups, battered women's shelters, legal clinics, child care centers, programs for seniors, tenants' unions, government agencies, the offices of elected officials, trade unions, and other organizations working for social change in communities.

The practical experience gained from the six-month field study provides graduates with many choices. About half go on to graduate work in urban studies, public administration, social work, planning, law, policy studies, medicine, or academic disciplines like sociology, anthropology, and politics. Others enter the work world directly, in many cases continuing with agencies such as those in which they did their field study.

Community studies graduates are also doctors, community organizers, program directors, public officials, lawyers, university teachers, therapists, nurses, librarians, social workers, news directors, forest management consultants, reporters, day care teachers, union officials, and labor organizers.

One-quarter, 2- to 10-credit field studies are also available to all UCSC students through

community studies. For more detailed information, see page 166, or contact the Community Studies Department Office, 231 Oakes College, (831) 459-2371, or the community studies field-study coordinator, 218 Oaks College, (831) 459-4601. E-mail: openup@ucsc.edu. Web: communitystudies.ucsc.edu.

Economics Field-Study Program

The Economics Department offers its majors the opportunity to integrate their academic knowledge with career-related work. The field-study program places students in internships under the supervision of a faculty sponsor and a professional in the workplace. Students can select from a wide variety of field placements such as accounting firms, community nonprofits, government agencies, brokerage firms, marketing agencies, banks, and businesses in Santa Cruz and beyond. Students apply and prepare for field study a quarter in advance. Acceptance into the field-study program is determined by academic standing, class level, and successful completion of Economics 100A, 100B, and 113 (see page 206). Students may earn a maximum of 10 credits and complete up to two quarters in a field placement.

Along with the training and supervision by a professional in the workplace, students receive guidance from a faculty sponsor who directs their academic project. Completion of this project and the job supervisor's evaluation of performance earn the student credit. *Economics Field Study* (course 193 or 198, see page 209) does not satisfy an upper-division requirement for the major and is available on a passing/not passing (P/NP) basis only.

Interested students should make an appointment or stop by the Economics Field-Study Office: 401 Engineering 2 Bldg.; call (831) 459-2028; or e-mail econintern@ucsc.edu. Web: econ.ucsc.edu

Environmental Studies Field and Internship Program

Open to all UCSC students, the Environmental Studies Field and Internship Program is an integral academic component of the environmental studies major, and it augments the research and professional development of undergraduate students (see page 279). Interns are placed, individually and in groups, in both on-campus and off-campus agencies, where their work results in publications and resource documents and in many cases serves as the primary basis for policy formation. Placements have included research with small businesses and farms, state agencies, nongovernmental organizations, and planning departments; assignments as natural history

interpretive guides for state and national parks; and apprentice positions with consultants, architects, solar-energy designers, agroecologists, resource specialists, and teachers. Student interns also have been sent to work with coffee growers in Costa Rica, Nicaragua, El Salvador, and Mexico.

Part- and full-time placements are available, and students may receive 2 to 15 course credits for their work. Each student's placement is supervised by a faculty adviser, a field sponsor, and the internship coordinator. Students spend 12 to 15 hours each week on their assignments for every 5 credits they receive.

Internships and fieldwork are designed to complement a student's course work and are available for both lower- and upper-division credit. Often, the internship leads to employment after graduation. Qualified environmental studies majors may undertake a senior internship to fulfill the department's comprehensive requirement. In addition, internships provide a fieldwork component for some environmental studies courses. Undergraduates are also afforded ample opportunities to intern on faculty and graduate-student research projects.

Further information is available from the Environmental Studies Field and Internship Program Office, 491 Interdisciplinary Sciences Building, (831) 459-2104, e-mail: ckrohn@ucsc.edu. Web: envs.ucsc.edu/internships.

Global Information Internship Program

The Global Information Internship Program (GIIP) is an instructional program at UCSC sponsored by the Center for Global, International and Regional Studies (CGIRS, see page 70). Guided by administrative and technical support from staff and faculty, GIIP is organized as a student-managed service-learning program that transfers the benefits of information technology to the world's excluded majority. The program places highly motivated interns—trained in social science and information technology—with nongovernmental organizations and civic groups in the U.S. and abroad. GIIP's mission is twofold: to upgrade the informational capacity of excluded communities while nurturing a new generation of information-savvy student leaders committed to advancing the public good.

GIIP interns acquire their skills by enrolling in 140 hours of instruction in Sociology 30A-B-C (see page 446) over a nine-month period. Sixty hours of technical training consists of computer-based instruction. The other 80 hours are devoted to working on projects involving one of GIIP's six themes: Global Justice, Women's Empowerment, Sustainable Environments, Human Rights, Peace and

Conflict Resolution, and Education and Social Enterprise.

For more information, visit: giip.ucsc.edu or call (831) 459-1572.

Health Sciences Internship Program

A requirement of the major, the Health Sciences Internship Program offers students a unique opportunity for personal growth and professional development. Paired with a professional mentor, students spend one quarter interning in a community health care setting. Placement opportunities cover a broad range, from individual physicians to community clinics and hospitals, hospices, and public health agencies. The Health Sciences Internship Coordinator works with students to prepare them for their internship and maintains a database of appropriate placements. Junior and senior health sciences majors only are eligible to apply. Applications are due at least one quarter in advance. For further information, contact the Health Sciences Internship Coordinator, Caroline Berger, at (831) 459-5647 or cemberger@ucsc.edu.

Latin American and Latino Studies Field-Study and Internship Opportunities

All majors are strongly encouraged to undertake either a field study in Latin America, the Caribbean, a Latino/a community in the U.S., or formal academic study abroad through the Education Abroad Program (EAP). These paths are the best ways to improve language skills, explore the nature and direction of specific academic and career interests in relation to Latin American and Latino studies, and deepen cross-cultural understanding and relationships based on personal experience.

Field studies comprise independent, community-based study projects for academic credit, done under faculty sponsorship and arranged on an individual basis. Students can do full-time field study for one quarter for full academic credit, part-time field study scheduled in conjunction with formal course work at UCSC, or field study as an extension of the Education Abroad Program (EAP). Projects vary widely, but students who want to develop a field-study proposal are expected to prepare for it by acquiring fluency in the appropriate language, prior cross-cultural experience, and upper-division course work on the region and/or topic that is to be the focus of the study.

Students who wish to pursue a full-time field study are recommended to take the *Field Study Seminar* (LALS 196) and concurrent lab (LALS 196L). The seminar focuses on prepar-

ing to conduct fieldwork in Latin American and Latino communities drawing on readings and mini-case studies by the LALS faculty and affiliated faculty.

The lab develops the skills to document respective field study successfully through hands-on lab exercises, examples, and work with the field-study coordinators. Many of the students who have done full-time field study have developed a senior thesis. Students who pursue a part-time field study are highly encouraged, but not required, to take the Field Study Seminar and lab.

Local opportunities for internships and field study in Latino/a communities on California's Central Coast are numerous. Credit for up to three upper-division courses may be applied toward the major from field study; however, course credit from field study and study abroad combined may not exceed three upper-division courses. Students should check the Latin American and Latino Studies Department web site for further information regarding the field-study process and course credit. A listing of local field-study programs and petition forms are available at the LALS Department office, 32 Merrill Academic Building.

For more information, contact the LALS office at (831) 459-2119 (aalvares@ucsc.edu).

Psychology Field-Study Program

The Psychology Field-Study Program provides qualified students an opportunity to integrate what they have learned in the classroom with direct service to a community agency. Each year, more than 200 students develop new skills and clarify personal and professional goals by working as interns in schools, criminal justice programs, and mental-health and other social-service agencies, where they are supervised by a professional within that organization. Psychology faculty members sponsor field-study students, helping them to synthesize their intern experience with psychology course work and guiding them through an academic project.

Junior and senior psychology majors in good academic standing are eligible to apply for this competitive program (see page 429). Applications can be obtained from the Field-Study Office, 273 Social Sciences 2 Building, and are due one quarter in advance. There is a minimum commitment of two quarters. Information can be viewed on the web at psych.ucsc.edu/field_study, or phone (831) 459-4410.

Education Field Programs

The M.A. in Education/California SB 2042 Preliminary Teacher Credential program provides students with necessary credential preparation for K–12 teaching in the California public schools. Preparation is offered for the Multiple Subject Preliminary credential (grades K–6), and the Single Subject credential (grades 7–12), in the following subject areas: English, math, social science, and science. Students may also pursue a Bilingual Cross-cultural (BCLAD) emphasis in Spanish.

Students pursuing the Education M.A./Credential Preliminary Credential must complete an extensive student teaching course sequence. Student teaching placements are restricted to enrolled students.

The student-teaching sequence consists of five courses: Education 200, 201, 201A (single subject only), 202A, B and C. The first and second quarters of the sequence involve part-time placements in public schools in Santa Cruz County. The third quarter of student teaching is a full-time experience in which students gradually take over full responsibility for the daily instructional program of the classroom in which they are placed. Substantial fieldwork is also incorporated in other courses required for the teaching credential.

The minor in education is an undergraduate program in which students explore the history of educational thought and philosophy, the politics and economics of education, learning theory and pedagogy, and issues of cultural and linguistic diversity. As a part of the six-course minor sequence, students engage in field study in schools through Education 180, *Introduction to Teaching*.

For more information, see Education, page 198, or contact the Education Department, 202 Social Sciences 1 Building, (831) 459-2997. E-mail address: education@ucsc.edu; web: education.ucsc.edu.

M.S. in Computer Engineering (Network Engineering)

The Department of Computer Engineering offers a distance-learning version of its M.S. in computer engineering, with a concentration in network engineering, in collaboration with UCSC Extension. Required and elective courses are presented in Silicon Valley using real-time video technology and faculty in person. This part-time University of California M.S. degree program can be completed in three years. For further information, contact msce@soe.ucsc.edu.

Summer Programs

Summer Session at UC Santa Cruz is offered from mid-June through the end of August. Registration fees are the same for California residents and nonresidents. Please contact the Summer Session Office, UC Santa Cruz, 1156 High Street, Santa Cruz, CA 95064, for further information about Summer Session programs listed below. To request a Summer Session catalog, telephone (831) 459-2524 or fax (831) 459-3070. For additional information, telephone (831) 459-2524 or e-mail summers@ucsc.edu. Visit our home page: summer.ucsc.edu.

Summer Session Courses

Undergraduate credit courses are offered in the arts, engineering, humanities, physical and biological sciences, and social sciences during two five-week Summer Sessions. The sessions run from mid-June through July, and late July through late August. Students may enroll in several classes, with a recommended maximum of 15 credits per session.

Shakespeare Santa Cruz Internship

Shakespeare Santa Cruz (SSC), a professional theater company in residence at the Theater Arts Center at UCSC, offers internships in acting, design, directing, dramaturgy, stage management, and production. Interns attend classes and work closely with artistic, technical, and stage-management staff in support of the summer season productions backstage in rehearsal and in performance. Acting interns are part of the ensemble and/or understudies in the professional productions and perform in an intern production during the summer season. The 5-credit classes, which are part of the SSC Internship Program and offered through UCSC Summer Session, include acting and voice for the actor. These classes are taught by SSC company members. Interns thus have a direct link with top theater professionals, exposure to the latest skills and techniques, professional theater experience to list on their résumé, and an inside advantage for marketing new skills. For more information on internships, contact SSC's administration and education coordinator at (831) 459-5810 or visit the web: shakespearesantacruz.org.

UCSC Extension in Silicon Valley

University of California Extension is the year-round continuing-education service linking the University of California with the people, corporations and communities of the state.

UCSC Extension is located in Santa Clara and primarily serves adults who live and work in the south bay, peninsula, and east bay communities, as well as on the central coast. Programs are open enrollment and vary in length and format, but are mostly multiweek classroom-based or online courses, scheduled workday evenings and on weekends. Certificate programs focus on advanced professional education and are oriented toward immediate application in the workplace. While most certificates can be completed within one year, course work is graded and substantial, typically involving lectures, readings, presentations, and final projects or examinations. The key program areas at UCSC Extension in Silicon Valley are:

- Business and Management
- Engineering and Technology
- Applied and Natural Sciences
- Education

Extension programs are open to any adult but cater to those who hold undergraduate and graduate degrees and who would benefit from additional university-level professional study. The instructors are degreed working professionals with decades of expertise in the fields that match the subject areas they teach. In some cases, they are faculty from UC and other educational institutions.

Lab-based and classroom sessions are held at UCSC Extension's Santa Clara facility or online.

UCSC Extension also offers professional education programs on a contract basis to local corporations and agencies through its academic departments, which also deliver management, engineering, bioscience, and education courses and certificates on site.

Regularly enrolled UCSC students may obtain degree credit for Extension courses numbered 1–199. Upon submission of the Extension transcript to the Office of Admissions, the course credit may be applied toward a bachelor's degree at UCSC. Extension courses numbered other than 1–199 are *not* applicable to a UCSC degree. However, many Extension courses are recognized for graduate

degree credit by other universities. Check the extension catalog for details. Comprehensive program descriptions and course offerings are listed on the web at ucsc-extension.edu.

To be placed on the mailing list for a catalog, call (408) 861-3700. The mailing address for UCSC Extension in Silicon Valley is 2505 Augustine Drive, Suite 100, Santa Clara, California 95054-3303.

Open Campus/Concurrent Enrollment

Concurrent Enrollment through Extension is a cooperative arrangement between UC Santa Cruz and UCSC Extension that enables members of the public to enroll in one or two regular UCSC undergraduate or graduate courses per quarter for credit. The program is administered by UCSC Extension, and course credit granted appears on a UCSC Extension transcript. Participants must meet certain criteria outlined in the Concurrent Enrollment application. An application fee is charged for each quarter of enrollment in addition to course fees. A first-time application filed at least one week prior to the first day of instruction for the quarter has a \$55 fee; subsequent applications filed at least one week prior to the first day of instruction for the quarter have a \$10 fee. Applications filed later than one week prior to the first day of instruction for the quarter have a \$100 fee.

Concurrent Enrollment through Extension may be used as a path toward a part-time or full-time degree program or as a way of studying subjects of personal or occupational interest. Credit earned through this program may be used toward degree requirements, when applicable, if participants subsequently seek admission to the university and are accepted.

Seniors 62 and older pay reduced fees and do not pay the application fee.

Financial aid is not available to participants in the Concurrent Enrollment program.

For further information and to obtain the application packet, contact UCSC Extension, 2505 Augustine Drive, Suite 100, Santa Clara, CA 95054-3003, (831) 861-3700 or go to www.ucsc.edu-extension.edu/open-campus.

High School Scholars Program

The High School Scholars Program, offered through University Extension, provides an opportunity for qualified seniors who attend Santa Cruz County high schools to take UC Santa Cruz academic courses. The program is administered through University Extension in cooperation with Cowell College. Program advisers help the participants select appropriate courses from those available.

Intersegmental Cross-Enrollment

This program permits a student who is currently enrolled in a California community college or a California State University campus and who meets certain eligibility criteria to enroll in one undergraduate course at UCSC each term, on a space-available basis. A student is qualified to participate in this program if he or she meets the following requirements:

- has completed at least one term at the home campus as a matriculated student and is enrolled in at least 6 credits at the home campus during the term in which he or she seeks to cross-enroll;
- has a grade-point average of 2.0 for work completed;
- has paid tuition or fees required by the home campus for the academic term in which he or she seeks to cross-enroll;
- has appropriate academic preparation as determined by the host campus, consistent with the standard applied to currently enrolled students;
- is a California resident for tuition purposes at the home campus; and
- has not previously been admitted to and registered at UCSC.

Interested students may obtain additional information and an application from the registrar at their home campus.

MC HENRY LIBRARY



Graduate Studies

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Graduate Education

UC Santa Cruz offers graduate study in more than 30 academic fields. About 1,500 graduate students are enrolled at the certificate, master's, and doctoral levels. The small size of the UCSC graduate programs encourages close working relations between students and faculty in an informal atmosphere conducive to rapid learning and professional growth. Many graduate programs have interdisciplinary components, and students are encouraged to explore the conceptual connections between related fields as they acquire mastery in their areas of specialization.

Research facilities at UCSC are excellent, and there are extensive opportunities for graduate students to engage in significant independent study and research (see Resources for Learning and Research, pages 63–85). Graduate students are also encouraged to obtain teaching experience, primarily as supervised teaching assistants. They are highly valued members of the UCSC community, contributing substantially to the research and teaching conducted on the campus.

Degrees and Programs

The University of California, Santa Cruz, offers graduate programs leading to advanced degrees or certificates in the following areas:

| | |
|---|------------|
| Anthropology | Ph.D. |
| Astronomy and astrophysics | Ph.D. |
| Bioinformatics | M.S./Ph.D. |
| Biology | |
| ecology and evolutionary | M.A./Ph.D. |
| molecular, cell, and developmental | M.A./Ph.D. |
| Chemistry and biochemistry | M.S./Ph.D. |
| Computer engineering | M.S./Ph.D. |
| Computer science | M.S./Ph.D. |
| Digital arts/new media | M.F.A. |
| Earth and planetary sciences | M.S./Ph.D. |
| Economics | |
| applied | M.S. |
| international | Ph.D. |
| Education | |
| teaching | M.A. |
| research | Ph.D. |
| collaborative leadership | Ed.D. |
| Environmental studies | Ph.D. |
| Film and digital media | Ph.D. |
| Electrical engineering | M.S./Ph.D. |
| History | M.A./Ph.D. |
| History of consciousness | Ph.D. |
| Linguistics | M.A./Ph.D. |
| Literature | M.A./Ph.D. |
| Mathematics | M.A./Ph.D. |

| | |
|--|-------------------|
| Microbiology and environmental toxicology | M.S./Ph.D. |
| Music | M.A./D.M.A./Ph.D. |
| Ocean sciences | M.S./Ph.D. |
| Philosophy | M.A./Ph.D. |
| Physics | M.S./Ph.D. |
| Politics | Ph.D. |
| Psychology (with emphasis in social, developmental, or cognitive) | Ph.D. |
| Science communication (writing) | Certificate |
| Social documentation | M.A. |
| Sociology | Ph.D. |
| Statistics and applied mathematics | M.S./Ph.D. |
| Technology and information management | M.S./Ph.D. |
| Theater arts | Certificate |
| Visual studies | Ph.D. |

Program Descriptions

Descriptions of individual programs appear under the specific disciplines in the programs and courses section, which begins on page 119. Application materials for all programs are available online at graddiv.ucsc.edu.

All of our graduate programs have information on the web at www.ucsc.edu/academics. Inquiries about part-time study should be directed to the individual departments. If there are any problems with the online application process, please e-mail gradadm@ucsc.edu.

Administration

At UCSC, the individual graduate programs are directed by departments. Overall policy is determined by the Graduate Council, and coordination and record keeping for matters common to all graduate students—such as admission applications, fellowships, and advancement to candidacy—are the responsibility of the Division of Graduate Studies. The dean of graduate studies is the chief administrative officer. The *Graduate Student Handbook*—containing graduate policies and other information—can be found online at <http://graddiv.ucsc.edu/regulations/handbook/index.php>.

Catalog Rights

Students matriculating in a given graduate program will select the *UCSC General Catalog* they will follow to meet their requirements to be either the one published the year they enter the program, or any subsequent catalog published prior to the year they are awarded the degree sought. Students who seek readmission after a break in attendance of greater than two years (six regular quarters) must adhere to the graduation requirements in effect at the time of read-

mission or to those subsequently established for all portions of the degree requirements not already fulfilled. The readmitting program will determine which degree requirements remain to be fulfilled, and will communicate this information in the letter offering readmission. This determination constitutes a formal requirement for readmission to the program, and the student's acceptance of readmission implies acceptance of the program's written stipulation of remaining degree requirements. Should any student choose to follow catalog requirements for a year in which the catalog is not printed in hard copy, the requirements will include any online catalog update for that year. A student must follow the chosen catalog in its entirety, including both the individual degree program and general university requirements. General university requirements may be found in the Graduate Student Handbook, <http://www.graddiv.ucsc.edu/regulations/handbook.php>.

Evaluation of Performance

Graduate students are graded Satisfactory/Unsatisfactory (S/U) or, at student option, A, B, C, D, F. The grade A, B, or S is awarded for satisfactory work. A graduate student receiving a grade of C, D, or U will not be able to use the credit for that course to satisfy any course requirement for a graduate degree. Courses in which a graduate student receives a grade of C, D, F, or U may be repeated. Credits will be counted once, and the most recently earned grade will determine whether a degree requirement has been met. Repeating a course more than once requires the prior written approval of the dean of graduate studies.

Graduate student performance in all courses taken for credit at UC Santa Cruz is also evaluated according to the Narrative Evaluation System. A narrative evaluation usually runs from one to four paragraphs in length and describes (1) the nature and requirements of the course, (2) the student's strengths and weaknesses in the various aspects of the course (e.g., discussion, laboratory work, term papers, and examinations), and (3) the student's general understanding of the course content. Evaluations may be used by academic advisers and become part of the student's official academic record.

Please also refer to the statement on Academic Integrity, page 39; Appendix F, Graduate Student–Faculty Adviser Relationship Guidelines, page 506; and Appendix O, Official University Policy on Academic Integrity for Graduate Students, published in the *Student Policies and Regulations Handbook* at www2.ucsc.edu/judicial/handbook.shtml.

Graduate Opportunity Program

Applicants assisted by the Graduate Opportunity Program must be U.S. citizens or permanent residents. During the application process, the Graduate Opportunity Program can help students by requesting an application fee waiver for cases of hardship, by providing insight into the application process, and by distributing information about the various graduate academic and fellowship programs. The primary goals of the program are to increase the number of applicants through extensive outreach and to increase the number of enrolled students from diverse backgrounds through effective recruitment. Applicants who feel that their acceptance into the academic community at UC Santa Cruz will contribute to the diversity of the institution should call (831) 459-4108 early in the application process.

Diversity-Enhancement Programs

The Eugene Cota-Robles Fellowship is a merit-based diversity-enhancement program that provides financial support for students from diverse backgrounds to pursue and successfully complete a graduate degree. This fellowship is awarded to entering doctoral students who have overcome significant obstacles to achieve a baccalaureate-level degree, and whose economic, educational, or social background contributes to intellectual diversity of the graduate student population. Applicants should refer to the information under Financial Support in the application to gain a better understanding of this fellowship. Fellowship recipients must be U.S. citizens or permanent residents.

The Eugene Cota-Robles Fellowship and the Dissertation-Year Fellowship are part of the University of California's Academic Career Development Program. The Dissertation-Year Fellowship is available to continuing students. Enrolled students are assisted through formal and informal group orientations, individual advice about academic matters, financial aid, postdoctoral opportunities, and the provision of information about career planning, health care, and housing.

If you have questions, call the Division of Graduate Studies, (831) 459-4108.

Intercampus Exchange Program

A graduate student in good standing at Santa Cruz who wishes to take advantage of educational opportunities available only at another campus of the university may become an inter-campus exchange graduate student for a quarter

or more. This program also permits students to take courses on more than one campus of the university during the same quarter.

To participate in the program, a student must have the approval of his or her faculty adviser, the dean of the Division of Graduate Studies at UC Santa Cruz, and the graduate dean on the campus to be visited. Application forms may be obtained from the Division of Graduate Studies and should be submitted three weeks before the quarter in which the exchange begins.

Student Life

The campus offers a variety of programs to enhance the quality of student life, all available to graduate students. These include child care, sports and recreation, health services, cultural events, transportation services, and the UCSC Women's Center. See pages 108–117 for information on these services and a description of the local community. See page 44 for services available to students with disabilities.

College Affiliation

Graduate students at Santa Cruz have the opportunity to affiliate with one of the 10 colleges on campus (college descriptions begin on page 89). Participation in the activities of a college may include taking an occasional meal there, living at the college, or participating in the college's educational and preceptorial programs or in its extracurricular activities.

Graduate Student Association

The Graduate Student Association (GSA) is an organization of all graduate students at UCSC. It seeks to advance the general welfare of the graduate student body and is responsible for promoting extracurricular activities on campus.

Graduate students elect a GSA steering committee, which coordinates activities and their funding. In past years, the steering committee has sponsored student social gatherings, musical events, poetry readings, lectures by visiting scholars, and other activities of special interest to graduate students. A portion of the college student government fee, paid by all students, is available to the association for this purpose. The steering committee also recommends graduate students for appointment to university committees.

Housing

As at all other UC campuses, finding housing is a challenge. Students who wish to reside on campus should submit their application as soon as possible, to secure housing in a timely manner. Likewise, students who wish to live off campus will find this task challenging. Often, single students share housing as a means of lowering expenses. However, married students or students with dependent children do not always have the option of sharing housing with other students.

Twenty apartments for single graduate students are located on the west side of campus between Kresge College and the Baskin Engineering Building. Metro and campus bus stops are nearby. On-site parking is available.

The apartments were designed with privacy, energy conservation, and aesthetics in mind. The wood-frame units have cedar exteriors and are bordered by redwood forest on two sides.

Four students share each apartment, which has a living and dining room, a kitchen, two bathrooms, four single bedrooms, an outdoor deck, and abundant closet and cabinet space. The units contain solid oak and maple furniture, although residents must supply their own linens, cooking utensils, and household supplies. Common facilities include a laundry room and lounges with computer terminals and a large-screen television.

The apartment rental rate is \$9,430 per single room for the 2010–11 academic year. Students may stay for the summer at additional cost. First-year graduate students are usually given priority.

Graduate students may also apply to the individual colleges for a limited number of resident preceptorships. These positions offer an on-campus apartment as a stipend and the opportunity to participate in a college community.

Married students and students with dependent children may live in Family Student Housing, a complex of two-bedroom unfurnished apartments located on the west side of campus. These apartments are in great demand, and students often wait up to a year for a vacancy. Interested students should apply as soon as possible.

Another on-campus option is UCSC's 42-space camper park, available to students who own appropriate recreational vehicles.

To assist students in locating living accommodations in the surrounding communities, the Community Rentals Office maintains a list of available rentals. Students intending to live off campus should begin their search at least four weeks before classes begin.

See pages 108–110 for more detailed information about on- and off-campus housing.

Application and Admission

Application Deadlines

Students may apply for *only one* UCSC graduate program at a time. The list below shows the date set by each program as the final deadline for submission of all documents. Applications are limited to programs of study beginning in fall quarter (except the M.A. program in education). Please visit our web site at graddiv.ucsc.edu for the most current information on applying to UCSC graduate programs and for application deadlines for 2011–12.

| | |
|--|--------------------|
| Anthropology | December 15, 2010 |
| Astronomy and astrophysics | January 5, 2011 |
| Bioinformatics | January 4, 2011 |
| Biology | |
| ecology and evolutionary .. | December 15, 2010 |
| molecular, cell, and developmental | December 10, 2010 |
| Chemistry and biochemistry | January 15, 2011 |
| Computer engineering | January 4, 2011 |
| Computer science | January 4, 2011 |
| Digital arts/new media | February 15, 2011 |
| Earth and planetary sciences | January 5, 2011 |
| Economics | |
| applied | February 1, 2011 |
| international | January 15, 2011 |
| Education | |
| teaching (M.A.) | January 15, 2011 |
| research (Ph.D.) | December 15, 2010 |
| collaborative leadership (Ed.D.) | December 15, 2010 |
| Electrical engineering | January 4, 2011 |
| Environmental studies .. | December 15, 2010 |
| Film and digital media | January 15, 2011 |
| History | December 15, 2010 |
| History of | |
| consciousness | application closed |
| Linguistics | December 15, 2010 |
| Literature | December 1, 2010 |
| Mathematics | January 15, 2011 |
| Microbiology and environmental toxicology | January 2, 2011 |
| Music | January 5, 2011 |
| Ocean sciences | January 15, 2011 |
| Philosophy | application closed |
| Physics | January 15, 2011 |
| Politics | January 4, 2011 |

| | |
|--|-------------------|
| Psychology | December 15, 2010 |
| Science communication (writing) | April 1, 2011 |
| Social documentation | January 15, 2011 |
| Sociology | December 15, 2010 |
| Statistics and applied mathematics | January 4, 2011 |
| Technology and information management | January 4, 2011 |
| Theater arts | March 1, 2011 |
| Visual studies | January 11, 2011 |

The dates listed here are the official deadlines, but students are strongly advised to submit applications in October or November. If an application deadline falls on a weekend or holiday, materials should arrive **before** the deadline. To be considered for fellowship support for fall quarter, the admission application and all supporting materials must arrive at the Division of Graduate Studies by the program's deadline or by February 1, 2011, **whichever is earlier**.

Admission Requirements

To be admitted with graduate status at UCSC, **a student must have completed a bachelor's degree or its equivalent from an accredited undergraduate institution of acceptable standing** and demonstrate ability to pursue a program of study leading toward an advanced degree. Preparation must provide an adequate foundation for advanced study, as determined by the department for the program in which the student intends to enroll. If the bachelor's degree is not in the same discipline as the graduate program, the student must have sufficient preparation in the intended area of study to undertake graduate-level work.

To apply for admission, the items described below must be submitted before the deadline date to the Division of Graduate Studies. UC Santa Cruz requires that applicants complete an online application to be considered for admission to a graduate program. The Graduate Studies Division will provide access to a printed version for those who qualify under the Americans with Disabilities Act. The application and the accompanying materials should be complete and accurate.

1. Admission application form. Application materials for all programs are available online at graddiv.ucsc.edu. The completed application is paid for online with either a credit card or e-check. This application fee is not refundable. Application fee waivers are available for cases of hardship. International applicants are not eligible for fee waivers.

Applicants to the programs in anthropology, computer engineering, computer science, and electrical engineering also need to conform to the admission guidelines posted on the web pages for these departments. These pages can be accessed from the graduate studies home page: graddiv.ucsc.edu.

2. Statement of purpose. This should be a concise, well-written account of the applicant's background and reasons for pursuing graduate study in the field chosen. Selection committees place particular importance on the statement of purpose. It exhibits the applicant's ability to present ideas in clear, coherent language. The statement of purpose should indicate all of the following:

- How knowledgeable the applicant is in the desired field of study
- How undergraduate studies and other experiences (work, community involvement, and so forth) serve as a foundation for graduate study
- How and why the applicant intends to build on this foundation of knowledge and apply the training to social or theoretical problems

3. Official transcripts. Official transcripts of all previous course work since high school, including certification of degrees received or documentation of status upon leaving each institution, should be obtained. UC Santa Cruz requires only one transcript from each institution. **Official evidence that the applicant has received a bachelor's degree from an accredited institution of higher education must be presented. All of the official transcripts and documentation should be requested well in advance of the program deadline to be sent to Graduate Application Processing.** Only official transcripts bearing the signature of the registrar and the seal of the issuing institution will be accepted. If work is in progress at the time of application, a final transcript of such work must be submitted before the student can be officially enrolled at UC Santa Cruz. If the bachelor's degree is in a field other than that in which the student intends to apply, evidence of course work sufficient to prepare for graduate study in the intended field must be shown.

4. Letters of recommendation. Three letters of recommendation should be included in the online application packet, or the applicant should have them forwarded to Graduate Application Processing. These letters should be prepared by professors or others who are in a position to analyze the applicant's abilities and academic promise in the chosen field of graduate study.

5. Graduate Record Examination scores.

Individual departmental requirements for the Graduate Record Examination (GRE) follow:

Anthropology: GRE General Test

Astronomy and astrophysics: GRE General Test; GRE Subject Test in Physics or Mathematics strongly recommended

Bioinformatics: GRE General Test; Computer Science Test or Subject Test in major strongly recommended

Biology

ecology and evolutionary: GRE General Test

molecular, cell, and developmental: GRE General Test; Biology Test or Biochemistry, Cell and Molecular Biology Test recommended

Chemistry and biochemistry: GRE General Test; GRE Subject Test in any of the following strongly recommended:

Biochemistry, Cell, and Molecular Biology; Chemistry; Computer Science; Physics

Computer engineering: GRE General Test; GRE Engineering Test or Subject Test in major strongly recommended

Computer science: GRE General Test; GRE Computer Science Test or Subject Test in major strongly recommended

Digital arts/new media: No GRE required

Earth sciences: GRE General Test

Economics

applied: GRE General Test

international: GRE General Test

Education:

teaching (M.A.): No GRE required

research (Ph.D.): GRE General Test

Electrical engineering: GRE General Test; GRE Subject Test in major strongly recommended

Environmental studies: GRE General Test; GRE Subject Test in disciplinary field of student's choice strongly recommended

Film and digital media: GRE General Test

History: GRE General Test

History of consciousness: GRE General Test

Linguistics: GRE General Test

Literature: GRE General Test

Mathematics: GRE General Test and GRE Mathematics Test

Microbiology and environmental toxicology: GRE General Test; GRE Subject Test in major strongly recommended

Music: GRE General Test and UCSC's Music Graduate Entrance Examination for M.A., D.M.A., and Ph.D. applicants with a bachelor's degree; GRE General Test for Ph.D. applicants with a master's degree

Ocean sciences: GRE General Test and GRE Subject Test in major

Philosophy: GRE General Test

Physics: GRE General Test and GRE Physics Test

Politics: GRE General Test

Psychology: GRE General Test

Science communication (writing): GRE General Test and GRE Subject Test in Biochemistry, Cell, and Molecular Biology; Biology; Chemistry; Computer Science; Geology; Mathematics; or Physics

Social documentation: No GRE required

Sociology: GRE General Test

Statistics and applied mathematics: See Computer Science for details

Theater arts: No GRE required

Visual studies: GRE General Test

If the applicant is applying for admission to a program that requires the GRE, *the scores must be received by UC Santa Cruz Graduate Application Processing before the application deadline.* It is strongly recommended that all applicants complete testing by November, since December test scores will not reach the division prior to application deadlines.

The Educational Testing Service should be asked to forward the test scores directly to the division. UC Santa Cruz's school code is 4860. *Test results are electronically submitted to UC Santa Cruz Division of Graduate Studies four to six weeks after the exam has been taken.*

6. Additional required material. Many of the graduate programs have special application requirements, such as writing samples, portfolios, auditions, or personal interviews.

- *Education* requires a supplemental application.
- *Environmental studies* requires that a substantial writing project (undergraduate or master's level) be submitted with the application materials. Also, as part of the application process, applicants are required to contact faculty regarding sponsorship.
- *History of consciousness* requires a writing sample of not more than 10 pages.
- *Literature* requires a writing sample of 10 to 20 pages.
- *Ocean sciences* requires that applicants contact faculty directly about sponsorship as part of the application process.
- *Music*
 - ▶ **M.A.:** writing or composition sample (e.g., term paper or senior thesis, scores, or other projects) and a CD, DVD, or audio- or videocassette of one or more recent performances as instrumentalist, vocalist, conductor, or performances of original compositions.
 - ▶ **D.M.A.:** writing or composition sample (e.g., term paper or senior thesis, scores, or other projects) and three composition scores with recordings (if available) on CD, DVD, or VHS. For works involving improvisation, digital audio, or other approaches, one of the three compositions may be submitted in the form of a recording with brief notes on the media and/or performance conditions. Applicants interested in the computer-assisted composition track should include an example of a computer program they have written (a source code for the program plus documentation describing its use) or other evidence of technical competence with computers.
 - ▶ **Ph.D.:** *applicants with a bachelor's degree:* writing sample (e.g., term paper, senior thesis, or other class paper) and optional materials demonstrating musical skills (e.g., compositions, a performance or lecture-recital on CD, DVD, or VHS, etc.); *applicants with a master's degree:* writing sample of substantial length (e.g., an excerpt from a master's thesis or a set of class research papers) and optional materials demonstrating musical skills (e.g., compositions, a performance or lecture-recital on CD, DVD, or VHS, etc.)
- *Philosophy* requires a 10- to 15-page writing sample
- *Politics* requests that the writing sample (ideally not to exceed 20 pages) be a term paper, thesis, article, conference paper, or problem solution; it need not be in politics
- *Social documentation* requires an analytical writing sample (e.g., research paper, professional report, or substantial essay). Sample documentary production work is recommended but not required (e.g., a video or audio recording, photographic essay, web page). Preferred format for submission of production work is web, DVD, or CD-ROM (provide URLs to publications and documentary productions where possible).
- *Sociology* requests a writing sample, preferably in sociology or a related field
- *Theater arts* requires a portfolio of projects along with the application. The brochure or web site for the program to which the student is applying should be consulted and all of the requirements specified should be fulfilled.

Duplication of Higher Degrees

It is the policy of the Santa Cruz campus to prohibit the pursuit of duplicate advanced degrees. However, applicants may petition the graduate dean for an exception to this policy if the degree sought is in a field of study distinctly different from the field in which the original advanced degree was attained.

In order for a student who already holds the doctorate to be admitted or readmitted to work toward a second Ph.D.—or toward an academic master's degree—all of the following conditions must be met:

1. The applicant must petition the graduate dean in writing prior to the application deadline for the program in question.
2. The department sponsoring the program to which admission is sought must support the applicant's petition.
3. The department must present the graduate dean with a clear and complete outline of the program required for the degree sought, and must explain the intellectual separateness of the proposed program from that completed by the applicant in attaining the earlier degree.

The graduate dean will review all materials submitted and decide whether or not to admit the applicant, consulting with the Graduate Council when appropriate.

Admission to a professional master's program after a Ph.D.—or to an academic master's program after a professional doctorate—is not subject to these restrictions.

Transfer of Credit

UC Santa Cruz does not automatically grant credit for graduate-level work undertaken at other universities. Each department determines credit transferability on an individual basis.

International Applicants

Applicants from other countries must meet standard admission requirements and provide satisfactory evidence of financial support before they may obtain the necessary visa documents. Because it normally takes much longer to process international applications, such students are urged to apply as early as possible. A Certificate of Eligibility (I-20) will not be issued by the UC Santa Cruz Office of International Education until all requirements are satisfied and the student has been formally admitted.

Please note that international students are eligible for neither need-based financial aid nor application fee waivers.

Applicants from countries where English is not the primary language must take the Test of English as a Foreign Language (TOEFL). A minimum score of 550 on the paper-based TOEFL or 220 on the computer-based test is required. Chemistry and biochemistry, computer engineering, computer science, and electrical engineering require 570 on the paper-based test or 230 on the computer-based test.

All official academic records must be issued in the original language and be accompanied by English translations prepared by the issuing institution. If translations are not available from the institution itself, translations may be prepared by government or official translators. In order for translations to be acceptable, they must bear the stamp or seal of the issuing institution or governmental agency and the original signature of the translator. They must be complete and exact word-for-word translations of the original documents, not interpretations. Grades must not be converted to the American scale. Specially prepared English versions are not acceptable in place of documents issued in the original language. Records submitted to the Division of Graduate Studies may not be borrowed, returned, or sent elsewhere.

Application Processing

The Division of Graduate Studies receives most application materials and sets up a file for each applicant. Once the application is submitted online, it will be available to the appropriate department for review and recommendation. Applicants are admitted by the graduate dean following recommendations by the departments. Applicants will be notified by e-mail whether or not they have been admitted for graduate study at UCSC after all reviews are complete. Under no circumstances will UCSC give out this information over the phone, in person, or by proxy. E-mail notifications are sent throughout the month of March. By a general agreement to which UC Santa Cruz and most graduate schools in the U.S. are signatories, applicants admitted to graduate schools have until April 15 to reply with their acceptance of fellowship offers. Any information about the completeness of the file can be found at apply.graddiv.ucsc.edu. Specific questions about the evaluation of the application should be directed to the graduate representative of the department.

Fees and Expenses

Fees and expenses for graduate students are shown below. *Tuition, fees, and other charges are subject to change without notice by the Regents of the University of California. For current fee information, check reg.ucsc.edu.*

Graduate Student Fees, 2010–11^a

| | One Quarter | F-W-S Quarters |
|---|--------------------|--------------------|
| Student Services Fee | \$300.00 | \$900.00 |
| Educational Fee ^b | 3,134.00 | 9,402.00 |
| Santa Cruz campus fees | 362.36 | 1,081.88 |
| Health Insurance (waivable) | 872.00 | 2,616.00 |
| Total for California Residents | \$4,668.36 | \$13,999.88 |
| Nonresident Tuition ^c | 4,898.00 | 14,694.00 |
| Educational Fee Differential ^b | 136.00 | 408.00 |
| Total for Nonresidents of California | \$ 9,702.36 | \$29,101.88 |

^a The 2010–11 Graduate Student Fees was posted in the online catalog at reg.ucsc.edu in July 2011.

^b California residents pay an annual Educational Fee (EF) of \$9,402.00 (three quarters at \$3,134.00 per quarter). For nonresidents of California, the annual EF is \$9,810.00 (three quarters at \$3,270.00). Graduate students who have been approved to enroll in part-time study may be eligible for 50-percent EF reduction.

^c A limited number of Nonresident Tuition Fellowships are available. Please refer to the Financial Support section.

For information on fee refunds, see page 20.

Minimum annual expenses, including registration fees, for a single graduate student living on campus are estimated to be \$35,706 per academic year. Students should not plan to undertake graduate study without assured funding, since outside employment in the Santa Cruz community can be difficult to obtain. Here is an estimated sample student budget for the 2010–11 academic year. Non-California residents should add \$15,102 in nonresident tuition and fees to the total. Living expenses and fees are likely to increase for 2011–12.

Graduate Student Budget, 2010–11^a

| | |
|-----------------------------------|-----------------|
| Fees | \$ 14,247 |
| Books and supplies | 1,479 |
| Room and board (on or off campus) | 15,579 |
| Transportation ^b | 1,809 |
| Personal | 2,592 |
| Total | \$35,706 |

^a The 2010–11 Graduate Student Budget was posted in the online catalog at reg.ucsc.edu in July 2010.

^b Estimated room and board for graduate students living with their parents is \$4,449.

Required Fees

Required fees are due and payable before the start of each quarter. At the beginning of each quarter, sufficient funds will be needed to cover housing charges and book costs. For many financial aid recipients, however, fees and on-campus housing charges are paid automatically from approved student aid funds. Financial aid recipients should note that fellowship, grant, and loan checks or bank deposits in excess of university charges are not available until after registration each quarter.

The Student Services Fee supports student services that provide a supportive and enriching learning environment and that are complementary to, but not part of, the instructional program. Programs include, but are not limited to, services related to the physical and psychological health and well-being of students, social and cultural activities and programs, services related to campus life, and educational and career support.

The Educational Fee helps support student financial aid and related programs; admissions; registration; administration; libraries; operation and maintenance of plant; the university's operating budget; and all costs related to instruction, including faculty salaries.

Santa Cruz campus fees help support a wide range of student services, including extracurricular programs, campus child care, community and public service projects, and free-fare use of the local transit systems.

In addition, all students, including foreign students, are assessed a mandatory fee for health insurance. The Cowell Student Health Center provides the primary care services for the plan while a contracted insurance company provides major medical and hospitalization insurance. There is an annual deductible, with most expenses covered at 75 or 95 percent of the customary and usual charge, depending on whether the preferred provider network is used. Coverage includes hospital stays, surgical services, physician visits, emergency treatment, outpatient care, and pregnancy. Dependent coverage is also available. For information, call the Student Health Center, (831) 459-2389.

Waivers from the mandatory insurance fee are available for students who can show that their outside plan provides coverage equal to or better than the student health insurance plan. Deadlines for applying for a waiver are listed in the *Schedule of Classes*—on the web at reg.ucsc.edu/soc—and the *Graduate Student Handbook* at <http://graddiv.ucsc.edu/regulations/handbook/index.php>.

Nonresident Tuition

A resident of a state other than California or of another country must pay nonresident tuition. General criteria for residency are in Appendix A.

Non-U.S. citizens note: Regardless of how long you live in California, only U.S. citizens and holders of immigrant visas may become qualified for resident classification.

Late Fees

Late fees may be assessed if a student fails to make university payments or enroll by the specified deadlines. *Late fees are assessed on a graduated basis for each month there is an unpaid balance on your university account*, and at \$50 each for a late registration payment and/or late enrollment and \$25 for a late housing payment. Deadlines are published online in the *Graduate Student Handbook* at <http://graddiv.ucsc.edu/regulations/handbook/index.php> and the *Schedule of Classes* at reg.ucsc.edu/soc, and they appear on the Statement of Account.

Deferred Payment Plan

See page 21.

Financial Support

The University of California, Santa Cruz, makes a strong effort to provide financial support to all graduate students who make normal progress in their program of studies. Certain kinds of support are awarded on the basis of academic merit, and others are granted on the basis of need. Students are encouraged to apply for both kinds of assistance by submitting the Free Application for Federal Student Aid (FAFSA). This form must be submitted after January 1 prior to the academic year for which you are requesting aid. The FAFSA may be filled out online and filed electronically at www.fafsa.gov. To receive need-based support for the fall quarter, the FAFSA should be submitted no later than three weeks prior to the end of spring quarter. Applications for student loans for each academic year will be accepted until April of that academic year. More detailed information about the application process and loans appears on pages 21–22. Students may also contact the Financial Aid and Scholarships Office, 205 Hahn Student Services Building, (831) 459-2963. Web: financialaid.ucsc.edu.

Fellowships, Assistantships, Grants

Cal Grant A and B Programs. Students who received one of these awards as undergraduates may request a one-year extension from the California Student Aid Commission to attend a teacher credential program. The Cal Grant A program is expected to pay a maximum of \$10,302, and the Cal Grant B program is expected to pay a maximum of \$11,853 per year for study at the University of California in 2010–11. Renewal of these awards requires the student to submit the FAFSA by March 2.

Federal TEACH Grant/Loan Program. The Teacher Education Assistance for College and Higher Education (TEACH) Grant Program provides grants of up to \$4,000 per year to students who intend to teach in a high-need field in a public or private elementary or secondary school that serves students from low-income families. The program at UCSC is for M.A. Education students. In exchange for receiving this grant, you must sign an Agreement to Serve and complete online counseling. This grant converts to a loan with retroactive interest if the Service Agreement is not fulfilled. More information and a Fact Sheet can be found at <https://teach-ats.ed.gov/ats/index.action>.

Teaching Assistantships. For the 2010–11 academic year, half-time teaching assistantships provided a salary of \$5,463 per quarter.

Graduate Student Researchships. For the 2010–11 academic year, half-time researchships provided a salary ranging from \$1,351 to \$2,102 per month, depending on the student's academic level and department.

The application for fellowships, assistantships, and researchships is Part C of the admission application, which may be obtained from the Division of Graduate Studies. It should be filed by the program's deadline or by the February 1 preceding admission, **whichever is earlier**.

The division and the UCSC Career Center (see page 41) can provide information about external graduate fellowships and grants.

Student Loans

Graduate students may apply for student loans through the Financial Aid Office. Students who apply using the FAFSA are eligible for loans funded by the federal government. Students who demonstrate financial need qualify for the William D. Ford Federal Direct Subsidized Student Loan, and students who do not demonstrate need or who want an additional loan qualify for the William D. Ford Federal Direct Unsubsidized Student Loan. Subsidized loans are interest-free while the student is enrolled; interest accrues on unsubsidized loans during enrollment. Graduate students may also be eligible to borrow through the Federal Direct Graduate PLUS loan program. See page 22 for additional information.

Loan Forgiveness Programs

The federal government will forgive all or part of a student loan under certain circumstances. Examples of these include (1) performing volunteer work or military service and (2) practicing medicine in certain communities. For a summary of such exemptions, visit <http://www.finaid.org/loans/forgiveness.phtml>.

The Assumption Program of Loans for Education (APLE) is offered by the California Student Aid Commission. This program serves students who plan to become public schoolteachers.

Students must be nominated by the UCSC Education Department. Under the program, the commission may assume up to \$11,000 in educational loan balances in

return for service as a public schoolteacher in California, in either a designated subject-shortage area or at a school serving large populations of students from low-income families. In addition, participants who teach mathematics, science, or special education in the lowest-performing schools may have a total of \$19,000 in debt assumed. To receive full benefits, you must provide four consecutive years of teaching at a California public school. Additional eligibility criteria include California residence, U.S. citizenship or eligible noncitizenship, academic ability, and financial need. Contact the Education Department at (831) 459-3249 for more information. More information is also available from the California Student Aid Commission at www.csac.ca.gov.



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University Library

The handsome McHenry and Science & Engineering libraries house the impressive holdings of UCSC's University Library—the largest library collection between Santa Barbara and San Jose. In more than four decades, the collection has grown from a few shelves of books and a substantial dependence on the libraries of UC Berkeley to more than 2 million volumes, over 27,500 periodical titles (including online journals), in excess of 650,000 microforms, and more than 430,000 non-print items including films, slides, and audio- and video recordings.

As part of the statewide University of California library system, the University Library also serves as gateway to millions of other books and periodicals at other campuses throughout the state. The library's efficient Interlibrary Loan service is heavily used, especially the online request service of the California Digital Library.

The University Library collection is divided into two parts. Resources in the humanities, arts, and social sciences are contained in McHenry Library at the heart of the campus, while the engineering, mathematics, and natural sciences collections are housed in the award-winning Science & Engineering Library, conveniently located on "Science Hill."

Subject bibliographers manage the growth and development of UCSC's collection and provide in-depth research assistance.

Most of the holdings of the University Library are shelved in open stacks. Students and faculty are encouraged to help themselves, using information found via the local Cruzcat online library catalog, the systemwide Melvyl® catalog, and the library web site. The library home page provides a convenient gateway to the Cruzcat and Melvyl catalogs, the California Digital Library, and a host of other electronic information resources, such as article databases and online journals. The library staff is also eager to offer its assistance at any of several service points.

FACING PAGE: UCSC's McHenry Library recently added an 81,600-square-foot, light-filled addition. Fully renovated, McHenry Library will include a greatly expanded Information Commons, featuring computer stations throughout the library; an Internet café providing social gathering space and online access; wireless access throughout; and more than 20 group-study rooms to foster collaborative learning.

At the reference desks in both libraries, reference librarians give individual guidance: general orientation for the newcomer and specialized help for the researcher. Librarians assist in the use of a wide range of resources—in print and online—including more than 200 online article databases to which the library subscribes. Librarians also offer group instruction: orientation sessions at the beginning of each quarter, library research workshops, and upon request, specialized instruction to classes in all disciplines.

The Reserve service, located at the respective circulation desks, lends copies of assigned class readings on a short-term basis, operates a web-based electronic reserve system, and provides protection for vulnerable circulating materials and heavily used periodicals. In addition, the Science & Engineering Library Reserve Unit provides access to recent newspapers.

Special Collections at McHenry Library contains rare, valuable, and often fragile materials that do not circulate. Holdings focus on local history and 20th-century literature and book arts. Special Collections also houses the official campus archive, as well as the archives of George Barati, Gregory Bateson, Thomas Carlyle, Lou Harrison, Kenneth Patchen, Edward Weston, the Grateful Dead, and the Shameless Hussy, Trianon, and Turtle Island presses.

Other important collections and services include:

- Government Publications, a selective depository for documents published by U.S., California, and Santa Cruz government agencies
- The Media Center, which provides access to audio and video in all formats; CD-ROMs; support for music study, including music scores and music reserves via iTunes and electronic reserves (ERes); and language-related audio and video recordings
- The Map Collection, with maps and aerial photographs of Santa Cruz and adjoining counties, and topographic, nautical, and aeronautical maps from all over the world
- The Mary Lea Shane Archives of the Lick Observatory, a national resource for the history of astronomy
- The Regional History Project's documentation of Central California history
- The Visual Resource Collection, which emphasizes art history but also includes slides on science, history, and the UCSC campus and offers the web-based SlideCat slide catalog

For more information, see the library's home page, library.ucsc.edu.

Center for Teaching and Learning (CTL)

The CTL is a professional resource dedicated to promoting, sustaining, and recognizing teaching excellence at UCSC. CTL programs and services support instructors in their efforts to develop as teachers, to enhance the quality of instruction, and to improve students' learning.

Regular programs and services include Instructional Improvement Grants, Excellence in Teaching Awards, Symposia, a library of instructional resources, Electronic Mid-quarter Analysis of Teaching, and UCSC Instructor Evaluations.

CTL is located in 133 Kerr Hall. For more information, visit the web: <http://ctl.ucsc.edu>.

Computing and Technology Services

Information Technology Services (ITS)

ITS at UCSC provides a broad spectrum of IT-related resources, services, and support to students, faculty, and staff in the areas of computing, network, telephones, media services, information systems security, web, e-mail, and instructional technology. See its.ucsc.edu. ITS operates the campus network, which connects computers, workstations, instructional computing labs, and computer-equipped classrooms with each other and the Internet. In addition, wireless access called CruzNet is available across campus. See http://its.ucsc.edu/service_catalog/cruznet. ITS also provides the campus with technical services and computer support through the ITS Support Center. See http://its.ucsc.edu/support_center/.

Purchasing a Computer?

If you are planning on buying a new computer, UCSC recommends purchasing a laptop with both wired and wireless network capability. The campus supports both PC and Mac computers. An excellent source for purchasing computers and computer products is the campus Bay Tree Bookstore, *slugstore.ucsc.edu*, (831) 459-2082. Through university-negotiated contracts, the bookstore offers a full line of Apple and Dell computers, as well as software and peripheral equipment. Pricing is

almost always below outside market prices. And the bookstore works closely with ITS to be certain the equipment you buy will meet campus specifications, both wired and wireless.

Computer Standards

The campus supports both PC and Mac computers. For general campus support standards, see its.ucsc.edu/service_catalog/standards. For standards specific to residential living on campus, see resnet.ucsc.edu/CSD/computer.php.

UCSC Account (CruzID) and E-Mail

All students, faculty, and staff have a CruzID and UCSC e-mail account, such as cruzid@ucsc.edu. In addition to e-mail, CruzID gives individuals access to many campus systems and applications. Every UCSC student is preassigned a CruzID account upon enrollment. They can activate and change the initial password via the campus "MyUCSC" Portal at my.ucsc.edu. All official UC and UCSC communication is e-mailed to the @ucsc.edu address. More information is available at http://its.ucsc.edu/service_catalog/cruzmail/ (for faculty and staff) and http://its.ucsc.edu/service_catalog/slugmail/ (for students).

Residential Network and Telephones

ITS provides in-room Internet access (called ResNet) and a university-owned and operated telephone system to students living on campus. Network services are available to undergraduate and graduate students living in university housing (except for the Camper Park). For assistance with network connections, contact ResNet at resnet@ucsc.edu or call (831) 459-HELP (4357). See resnet.ucsc.edu. Local telephone service is provided in every student room (except for the Camper Park and Family Student Housing). There is one telephone line for each single and double room, and two telephone lines in each room with three or more residents. Each telephone line also includes a voicemail box. Call (831) 459-4357 or e-mail help@ucsc.edu for more information on telephone services.

Computing Labs for Drop-in Use and Academic Classes

ITS manages 12 computer labs throughout the campus. These labs have more than 360 computers available for individuals to use that include PC, Mac, and Sun workstations. Wireless access is available in most labs. The computing labs are used like classrooms; they can be reserved by faculty or teaching assistants for instruction. When not reserved for instruction, the labs are available to UCSC employees

and students on a walk-in basis. Even if they are not teaching in the labs, many faculty request that academic software be installed in the labs so that students may complete homework assignments. Faculty or teaching assistants can request ITS staff to conduct training sessions as part of an academic course. Contact the Faculty Instructional Technology Center at fitc@ucsc.edu for more information. More extensive lab information, including hardware and software specifications and hours of operation, is available at ic.ucsc.edu.

Academic Course Materials on the Web

The WebCT course management system is a tool to create sophisticated web-based course materials to supplement, but not replace, classroom instruction. WebCT uses a web browser as the interface for the course. Faculty using WebCT can incorporate a wide variety of tools in their course site such as a course calendar, student conferencing system, electronic mail, group projects with student-created web pages, and quizzes. Outside of class time, you can use WebCT to view course materials, participate in web-based class discussions, collaborate on student group projects, and take quizzes. Faculty can use WebCT to see what materials students have viewed before they arrive in class. When faculty administer pre-class quizzes on WebCT, they can see what concepts students understand before class and then tailor the lecture accordingly. See ic.ucsc.edu/services/learning_management_system/.

Disability Accommodations for Computing

If you have a disability and require adaptive or assistive technology to use lab computers, library facilities, or other campus services, please contact the Disability Resource Center (DRC) right away so that they can coordinate services for you. Instructional Computing labs have common adaptive technologies—such as enlarged type for students with low vision and Dvorak keyboards for students with repetitive strain injuries. If you need accommodations, please call the DRC at (831) 459-2089 (voice), or (831) 459-4806 (TTY).

Research Programs and Facilities

Research at UC Santa Cruz is thriving, facilities are excellent, and the amount of external funding received for research continues to grow. In addition to their indi-

vidual research projects, faculty are involved in organized research on various scales, from small focused activities within academic divisions, to large research units, some with campuswide scope and others with wider connections to the whole 10-campus University of California system.

Specialized research facilities in addition to those listed below are described in the programs and courses section, pages 120–466.

Arboretum

The Arboretum at UCSC is a research and teaching facility committed to plant conservation and serves both the campus and the public. Its rich and diverse collection, containing representatives of more than 300 plant families, provides beginning students with a broad survey of the plant kingdom. Facilities for growing plants offer students and research faculty opportunities to experiment with living plants. The Arboretum maintains collections of rare and threatened plants of unusual scientific interest. Particular specialties are world conifers, primitive angiosperms, and bulb-forming plant families. Large assemblages of plants from Australia, New Zealand, and South Africa, and California natives are displayed on the grounds. Many of the species in these collections are not otherwise available for study in American botanical gardens and arboreta.

Arboretum events educate and engage the public about plant diversity and conservation. Of service to the public and the nursery industry are the Arboretum's activities in importing, selecting, and breeding choice ornamental plants, especially those that are drought tolerant and pest resistant. To date, the Arboretum is the original importer of more than 1,500 different selections of choice ornamentals. Many of these have been and will continue to be the plants of future California gardens.

Norrie's, the Arboretum's volunteer-run gift shop, supports the Arboretum and is open every day, 10 A.M. to 4 P.M. Admission is free to UCSC students.

Arboretum: (831) 427-2998; Norrie's gift shop: (831) 423-4977; e-mail: arboretum@ucsc.edu; web: arboretum.ucsc.edu

Arts Instructional Computing (IC) Labs

IC has two labs that primarily serve the Arts Division: the IC Arts Mac Lab and the IC Music Lab. The IC Arts Mac Lab at Porter is equipped with Arts-specific software, including high-end video-editing, graphics, web-develop-

ment and sound-editing software. The Music Lab includes hardware and software for music editing, notation and working with MIDI. See hardware and software details at ic.ucsc.edu/labs.

These Instructional Computing labs are open to all UCSC students. In addition, the Arts Division manages computer labs with specialized equipment and software for the exclusive use of students taking classes in the Art, Film and Digital Media, and Theater Arts Departments, and the Digital Arts and New Media M.F.A. program.

Arts Research Institute (ARI)

ARI funds and facilitates the research and creative work of individual arts faculty, as well as collaborative research, symposia and other creative activities and events. Grants and awards from the ARI have helped to support performances, exhibitions, software design, manuscript preparation, digital recordings, international field research, collaborative colloquia, on-site installations, operas, and electronic productions. These and other innovative projects in arts practice and theory are among the research areas and interests supported by the institute. For complete details, see the ARI web site at arts.ucsc.edu/ARI or contact the ARI administrator, Christina Waters, Ph.D., at xtina@ucsc.edu or (831) 459-2256.

Baskin School of Engineering (BSOE) Facilities

BSOE occupies principally the Jack Baskin Engineering and Engineering 2 Buildings. Some laboratories and offices are also in the new Biomedical Sciences and Engineering Building (estimated to be completed in 2012), the Physical and Biological Sciences Building and the Sinsheimer Laboratory Building. Outside of the main campus and on the west side of Santa Cruz, BSOE is building a series of advanced material sciences laboratories at 2300 Delaware Ave (formally a Texas Instruments semiconductor fabrication plant). Several BSOE faculty also work closely with colleagues at the adjacent UCSC Long Marine Laboratory and future site of the 98 acre Marine Sciences Campus. "Over the hill," BSOE maintains a strong presence at the UCSC Silicon Valley Center (SVC) located on the grounds of NASA Ames Research Center in Mountain View, California. Many BSOE faculty members maintain offices and research labs and teach classes at the SVC and have joint research agreements with NASA and the University Affiliated Research Center (UARC). Many



Open to the public, UCSC's Seymour Marine Discovery Center at Long Marine Laboratory houses an aquarium and exhibits that interpret the vast spectrum of research taking place within the Institute of Marine Sciences.

BSOE faculty are also members of the joint NASA/UCSC Advanced Studies Laboratories (ASL), which is located at NASA Ames Research Center. Web <http://asl.ucsc.edu/>

BSOE is working to develop additional locations off the main campus often in interdisciplinary partnerships. Web: www.soe.ucsc.edu

BSOE Computing Infrastructure

BSOE operates a computing network of several hundred Unix, Windows and Macintosh computers and several computer laboratories. These labs support research and graduate instruction in applied mathematics and statistics, biomolecular engineering, computer engineering, computer science, electrical engineering and technology and information management. Undergraduate computing is supported by a combination of BSOE Undergraduate Laboratories (also known as the BELS Labs) and the campus's Instructional Computing Laboratories (IC Labs).

For graduate and research computing, the ITS/BSOE computing support team operates a high-speed 100/1000 megabit-per-second network with 1/10 gigabit-per-second fiber optic backbones and redundant core routers and paths. Most areas of BSOE buildings are covered by wireless networking of various types (802.11b/g/n). The BSOE computing network

has multiple connections to the main campus network.

UCSC and BSOE have connections to the Corporation for Education Network Initiatives in California (CENIC) via CENIC-managed "dark-fiber," which provides direct connections to CENIC High Performance Research Network, to activities at NASA Ames, and to the BSOE research labs located at 2300 Delaware Ave. Web: <http://www.cenic.org/pressroom/releases/2010/FibertotheFuture.pdf>

BSOE Computing also operates four separate Tier 1+ data centers, all with UPS and air-conditioning support. Two of the data centers have backup power generation and the other two use a campus cogeneration facility for backup power. In addition, BSOE uses the main UCSC data center (Tier 2) for some redundancy and for web sites and copies and/or mirrors data distant Universities (such as the San Diego Supercomputer Center).

For graduate and research computing, BSOE supports the following:

- Central file servers for core services such as mail, name service, file sharing, and backup
- Several general-access Unix systems
- Multiple compute servers
- Research computing clusters

BSOE maintains several general-use research computing clusters, in addition to the clusters used by individual research groups. These clusters are available to all faculty and graduate students for general-purpose computations:

- Several graduate student computer labs with a mix of Windows, Linux, and Solaris workstations and network printers
- A variety of software purchased in cooperation with UCSC central computing, BSOE computing, and individual faculty members
- A variety of computer-aided-design software, including Altera, Agilent Advanced Design System, AutoCAD, Cadence, Maple, Matlab, Mentor Graphics, National Instruments Labview, Qualnet, Synopsys, and Xilinx

Baskin Engineering Wireless Networking.

BSOE has an installed wireless computer network that covers nearly all interior building spaces of the Baskin Engineering, Engineering 2, and portions of the Physical Sciences Buildings. This service (SOENET) is separate from the UCSC campus wireless network (CruzNet). SOENET allows for much greater flexibility in operations and for greater performance as required by SOE's faculty and researchers. To gain access to SOENET, BSOE faculty or staff members register their computers for use on SOENET. In addition to SOENET, the campus's wireless computing service, CruzNet, is also installed in parallel in several of the undergraduate laboratory spaces of the Baskin Engineering Building. Wireless networking is also at the Silicon Valley Center (SVC) via the CruzNet system. Details of BSOE computing services can be found at www.soe.ucsc.edu/administration/computer.

Undergraduate Engineering Laboratories

(Baskin Engineering Lab Support–BELS). BSOE operates the following special instructional laboratories for the exclusive use of engineering students. These laboratories are typically open 24 hours a day, seven days a week, during instructional quarters. The instructional labs available in 2010 are listed below. Please check the web site for updates as new instructional laboratories are being added:

- Digital Logic Design Laboratory
- Controls, Signals, and Instrumentation Laboratory
- Analog Circuits Laboratory
- Electrical Engineering Senior Projects Laboratory
- Optics and Laser Laboratory
- Computer Engineering Projects Laboratory

- Electromagnetic and Radio Frequency Laboratory
- Physical Electronics Laboratory
- Computer Networking Laboratory
- Computer Game Design Laboratory
- Engineering Honor Society Hardware Laboratory
- Biomolecular Engineering Instructional Laboratory

Detailed information about these labs can be found at the following web site: www.soe.ucsc.edu/bels.

UCSC Instructional Computing

Laboratories. In addition to the facilities provided by the Jack Baskin School of Engineering, students have access to the computing facilities of the UCSC Instructional Computing (IC) Labs. These include several labs located around the campus consisting of Unix, Mac, and Windows workstations. There are two large IC Labs located in the Baskin Engineering Building. Check the UCSC Instructional Computing web site for details on these labs and hours of operation: ic.ucsc.edu.

Research Laboratories

BSOE operates and supports the following research laboratories. Current information about BSOE Research Labs can be found at www.soe.ucsc.edu/research/labs.

Applied and Nano-optics Group.

The Applied and Nano-optics group covers a wide range of optical research with an emphasis on experimental nanoscale optics. New methods and devices are developed for optical studies of single particles such as molecules, photons, or nanomagnets. A variety of optical and nanoscale characterization techniques such as time-correlated single-photon counting, ultrafast laser spectroscopy, or scanning-probe microscopy are used and investigated. Applications include integrated biomedical sensors, high-density magnetic memory, single-photon light sources and detectors. Web: <http://photon.soe.ucsc.edu/>

Biomolecular Engineering Research Facilities

BSOE supports a broad range of biomolecular-engineering (BME) research activities through the use of more than seven state-of-the-art research labs in the department. Areas of research include systems biology, comparative genomics, HIV vaccine development, stem-cell research, nano-device fabrication and DNA-sequencing-device development. BME depart-

mental laboratory facilities include a variety of equipment used for molecular biology, cell biology, protein chemistry, immunology, virology and computational biology. Specific equipment includes high- and low-speed centrifuges, PCR machines, CO₂ incubators, bacterial shakers, microtiter plate readers, microtiter plate washers, microscopes (inverted, upright, fluorescence), spectrophotometers, protein-chromatography equipment, a variety of gel electrophoresis equipment including power supplies, gel dryers, gel-imaging equipment, vacuum concentrators, and cryopreservation equipment. Recently acquired and planned equipment purchases to be shared with other investigators include a Fluorescence Activated Cell Sorter (FACS), and next-generation DNA sequencing devices. Shared equipment rooms contain a variety of common equipment including freezers, glass-washing equipment, autoclaves, and refrigerators. Most labs are supplied with basic utilities such as air, gas, vacuum and reverse-osmosis de-ionized (RODI) water. The BME research groups have several computer clusters, one with more than 1,000 CPUs. There is additional access to BSOE laboratories and facilities within other departments. Many of the BME research groups cooperate closely with the Electrical Engineering Department, which operates a clean room, a scanning electron microscope and semiconductor fabrication facilities. Collaborative research with faculty from the Physical and Biological Sciences Division is frequent with routine access to a wide range of biology and chemistry laboratory facilities. Web: www.soe.ucsc.edu/research/labs/

Clean Room. The Electrical Engineering Department operates a shared Class 1,000 clean room for use by researchers in Electrical Engineering. The Biomolecular Engineering Department also uses this facility. Web: www.soe.ucsc.edu/research/labs/

Computer Communication Research Group

(CCRG). This group is dedicated to basic and applied research in computer communication. CCRG research focuses on new algorithms, protocols, and architectures for wireless networks based on packet switching (packet-radio networks), Internetworking, multipoint communication, and the control of resources by multiple administrative authorities. Web: www.cse.ucsc.edu/labs/ccrg

Design and Verification Laboratory. This lab facilitates research in software and system design methods, embedded software design,

software and system verification, game theory, formal methods. Web: dvlab.cse.ucsc.edu/

Geospatial Visualization Laboratory. This lab creates a consistent four-dimensional space-time visualization of geospatial data and intelligence associated with the environment. This task requires intelligent collection of data using various sensors, including a variety of cameras, LIDAR data, and multispectral imagery in all kinds of frequency bands. The spatiotemporal GIS (geographic information systems) visualization will bring together several layers of information including terrain data, street maps, buildings, environment data, aerial images, and mobile-objects data. Web: www.cse.ucsc.edu/lodhagisviz/index2.html

Group Researching Advances in Software Engineering (GRASE). This laboratory performs research in the areas of software evolution and reengineering, and software-configuration management. Current research includes identifying unstable areas of evolving software, automatic generation of software configuration-management repositories, and development of web-based versioning and configuration-management infrastructure. Web: <http://www.soe.ucsc.edu/labs/grase>

High-Speed Network Laboratory. Members of this lab explore and expand the field of high-speed computer networking and communication. Current areas of research include high-speed switching, traffic-scheduling algorithms for providing quality-of-service (QoS) guarantees in packet networks, ATM congestion control, and optical networks. Projects are funded by NSF, ARPA, and private industry.

Image Processing and Multimedia Laboratory (IPMML). This lab is the central venue for ongoing research into topics in image processing and multimedia. Areas of interest include wireless digital video; virtual scene and panorama generation; natural and machine-generated image compression; video capture, processing, and editing techniques; color printing technology; image libraries; and combinations of the above.

Information Retrieval and Knowledge Management Lab (IRKM). This lab conducts basic and applied research in information retrieval and data mining. Projects include developing a proactive personalized information-retrieval system (funded by NSF), adaptive information filtering (funded by AFOSR), and collaborative personalized search, recom-

mendation and advertising (with industry funding from Yahoo, Microsoft, Google, NEC, Nokia, Bosch).

Internetworking Research Group (i-NRG). This group conducts research in the design, experimental evaluation, and implementation of network protocols for both wired and wireless internetworks. Research activities include a number of areas in computer networks and distributed systems. Web: inrg.cse.ucsc.edu

Materials Characterization Research Lab. This laboratory is under construction at our 2300 Delaware Ave location. Formally a Texas Instruments Semiconductor Fabrication plant, the building has infrastructure to support very large clean rooms. We expect the laboratory to be operational around December 2010. The Materials Characterization Research Laboratory studies properties of materials at very low temperatures, nearly zero degrees Kelvin. At these temperatures, some materials behave very differently; a notable example is superconductors. Web: www.soe.ucsc.edu/research/labs/index.html

Micro-Architecture at Santa Cruz (MASC). MASC's focus is on computer-architecture research, with emphasis on energy/performance trade-offs, thread-level speculation, simulation tools, FPGAs, and design complexity. Web: masc.soe.ucsc.edu

Multidimensional Signal Processing Research Group (MDSP). This group's interests are in the area of inverse problems in imaging, statistical detection and estimation, and associated numerical methods. Current projects include image-resolution enhancement and superresolution, computationally efficient image-motion estimation, shape reconstruction from local and global geometric data, multiscale modeling and analysis of signals and images, radon transform-based algorithms for deformation analysis and dynamic imaging, image processing and inverse problems in remote sensing, and automatic target detection and recognition. The group is also associated with the Image Processing and Multimedia Lab. Web: www.cse.ucsc.edu/~milanfj/MDSP

Network Management and Operations Lab. BSOE, in partnership with Cisco Systems, has established this lab to serve as a "network-systems teaching hospital" where real-world problems and projects are addressed by students and faculty. Projects range from the routine (e.g., quality-assurance and release testing of new products) to the advanced (e.g., research

into new architectures for network systems). Students employed as interns work with faculty researchers on these projects in BSOE facilities equipped for the specific needs of the projects. Web: soe.ucsc.edu/labs/nmolab

Quantum Electronics Group. This group's interests are in the mutual interaction of heat, light and electricity in nano- and microscale materials and devices. Studies and experiments are done in which this mutual interaction is used to improve device or circuit performance for communication, computing or energy-conversion applications. Examples include microrefrigerators on a chip that could be used to remove hot spots in microprocessor chips and internally cooled semiconductor lasers. The group has developed novel thermal-imaging techniques that can provide transient temperature maps of active devices with sub-micron spatial resolution. The group is also investigating optoelectronic and thermoelectric properties of quantum-wire and quantum-dot materials and the design of low chirp, narrow line-width and widely tunable micro-ring-coupled lasers. The group maintains several electrooptics labs with femtosecond lasers, cryogenic and high-temperature setups, confocal and Raman microscopy and houses an on-site molecular beam epitaxy thin-film growth facility. Web: quantum.soe.ucsc.edu

Santa Cruz Laboratory for Visualization and Graphics. Recent research at this lab includes animal modeling and animation, environmental visualization, isosurfaces, d.v.r., hierarchies, irregular grids, massively parallel volume rendering through the net, uncertainty visualization, virtual reality in scientific visualization, nomadic collaborative visualization, tensor visualization, and flow visualization. Web: <http://slvg.soe.ucsc.edu>

Storage Systems Research Center (SSRC). This center is composed of faculty from the Computer Science, Computer Engineering, and Electrical Engineering Departments and the Technology and Information Management Program, and is funded by the NSF, Department of Energy, and companies such as NetApp, Symantec, HP, LSI, Data Domain, and Agami. Current research topics include long-term archival storage, scalable indexing and metadata, petabyte-scale storage systems, and file systems for next-generation storage technologies such as non-volatile memories and probe-based storage. Issues of particular concern include performance and scalability, reliability, and security. The SSRC's resources include several computing clusters, the largest



At UCSC's Center for Agroecology & Sustainable Food Systems, researchers investigate the ecological basis for sustainable agriculture, with the goal of designing farming systems that conserve energy and water, recycle nutrients, and manage weeds and pests with minimal environmental and economic costs.

with more than 80 processor-disk nodes, as well as over 10 terabytes of dedicated storage. In addition, there are several hardware-software testbeds for projects such as self-managing archival storage and large-scale distributed file systems. The SSRC also maintains a PlanetLab site at UC Santa Cruz, allowing researchers to run experiments on the PlanetLab global-scale distributed testbed. Web: www.ssrc.ucsc.edu

Thin Films Research Lab. This laboratory is under construction at our 2300 Delaware Ave location. Formally a Texas Instruments semiconductor fabrication plant, the building has infrastructure to support very large clean rooms. We expect the laboratory to be operational around December 2010. The Thin Films laboratory will operate several advanced metal organic chemical vapor deposition (MOCVD) systems to fabricate and study thin film semiconductors. Applications include advanced solar cells, memory systems and biosensors. The Thin Films laboratory in April 2010 received an in-kind donation from Phillips LumiLEDs of Santa Clara of an AIXTRON Nitride MOCVD Reactor (AIX 200RF).

UCSC Broadband Communications Research Group. The members of this group investigate the fundamental limits and performance analysis of protocols in wireless ad hoc

networks, space-time signal processing, and development of signal processing and coding techniques for wireless communication systems. Web: <http://www.soe.ucsc.edu/%7Ehamid/ucbc/index2.html>

UCSC Genome Sequencing Center. The center features state-of-the-art equipment including the GS FLX Titanium Series sequencing platform from 454 Life Sciences and the SOLiD sequencing platform from Applied Biosystems. Applications include whole-genome and targeted sequencing; resequencing; RNA sequencing; micro-RNA and small-RNA sequencing; chromatin immunoprecipitation (ChIP) sequencing (to identify binding sites of DNA-associated proteins); and metagenomics (also called environmental genomics, involving the analysis of genetic material recovered directly from environmental samples). Web: <http://sequencing.soe.ucsc.edu/>

UCSC Scientific Visualization Laboratory. This lab provides the means for creating visualizations from scientific data. Projects include a simulation of an "extensive air shower" striking the Milagro detector at Los Alamos National Lab, representing a subsonic flow over a delta-wing aircraft, a demonstration of direct volume rendering on a multiple-gridded space-shuttle launch vehicle, an N-body simulation of large-

scale structure in the universe, and a representation of a diving whale based on location data from a Monterey Bay tagging experiment. Web: vizwww.cse.ucsc.edu

UCSC Visual Computing Laboratory. This lab explores visual tracking, stereo and sparse IBR, facial modeling and analysis, and image and video processing. Web: soe.ucsc.edu/research/labs

W. M. Keck Center for Nanoscale Optofluidics. The mission of this multidisciplinary center is the development of optofluidic devices and their application to single-particle studies in molecular biology and biomedical diagnostics. Facilities include a dedicated nanofabrication facility housing a FEI Quanta 3D FEG dual beam SEM/FIB nanofabrication instrument for fabrication, imaging, and characterization of nanoscale devices. Web: <http://cfno.soe.ucsc.edu/index.htm>

For additional information regarding BSOE, please check the web site: www.soe.ucsc.edu.

California Carlyle Edition

The splendid Norman and Charlotte Strouse Collection of Thomas Carlyle in Special Collections at McHenry Library is the focus of an exciting and innovative effort by an international group of scholars to publish an eight-volume critical edition of Carlyle's major works. Headquartered at UCSC, it is the first "scientific" edition of Carlyle, using computer technology to compare all the lifetime editions of each work in order to establish an accurate text, as well as providing explanatory notes for the modern reader. The edition promises to set the agenda for work on Carlyle and the Victorian era for the next generation. In addition to producing a much needed critical edition of the works of Carlyle, the project is using the campus's computer facilities to develop and demonstrate many state-of-the-art applications of data-processing technology in the humanities, from optical scanning of some editions and machine-assisted collation and proofreading, to desktop typesetting and the creation of an online Carlyle textual archive. The first volume, *On Heroes, Hero Worship, and the Heroic in History*, was published in 1993 by the University of California Press. The second volume, *Sartor Resartus*, was published in 2000. *Historical Essays*, in 2003, and *Past and Present*, in 2006. *The French Revolution* is forthcoming. Web: www.nd.edu/~carlyle/strouse.html

California Institute for Quantitative Biosciences (QB3)

UCSC is one of three UC campuses sponsoring the QB3, a California Institute for Science and Innovation (CISI). This cooperative effort among three campuses of the University of California, Santa Cruz, Berkeley, and San Francisco, and private industry harnesses the quantitative sciences to integrate our understanding of biological systems at all levels of complexity—from atoms and protein molecules to cells, tissues, organs, and the entire organism. This long-sought integration allows scientists to attack problems that have been unapproachable before, setting the stage for fundamental new discoveries, new products, and new technologies for the benefit of human health.

The institute involves more than 180 scientists, including 50 from UCSC. It builds on strong biology programs at the three campuses as well as individual campus strengths in biomolecular and computer engineering and mathematical sciences at UC Santa Cruz, biomedical engineering and physical sciences at UC Berkeley, and medical sciences at UC San Francisco. Harnessing these strengths, QB3 is developing effective new solutions to the world's most urgent biomedical problems through multidisciplinary research, innovative educational programs, and industrial and venture capital partnerships.

The institute facilitates access to state-of-the-art resources to enable scientists and engineers to develop devices, drugs, and therapies that save human lives, as well as technologies to prevent or mitigate environmental damage and improve energy production and use. Research areas include biological imaging, synthetic biology, biomolecular structure and mechanism, chemical biology, precision measurement, theoretical modeling of biological systems, and cellular dynamics. Through QB3, researchers in all of these fields come together to develop interdisciplinary collaborations.

In addition to the creation of fundamental new knowledge and potent new technologies, a major goal of the institute is to train a new generation of students able to fully integrate the quantitative sciences with biomedical research.

QB3 fosters industry and venture capital partnerships by identifying potential opportunities for research collaborations and support, and by assisting faculty with intellectual property and technology transfer issues.

QB3 is administered at UCSC through the Center for Biomolecular Science & Engineering and involves faculty from the

Departments of Biomolecular Engineering; Molecular, Cell, and Developmental Biology; Chemistry and Biochemistry; Electrical Engineering; Applied Mathematics and Statistics; Computer Science; and Computer Engineering.

Find more information at www.qb3.org.

Center for Agroecology and Sustainable Food Systems (CASFS)

CASFS is a research, education, and public service unit of the Division of Social Sciences, dedicated to increasing ecological sustainability and social justice in the food and agriculture system. CASFS researchers investigate the ecological basis for sustainable agriculture and the cultural, political, and economic aspects of developing sustainable food and agricultural systems. The work of CASFS is multifaceted, and includes research (theoretical and applied), education (practical and academic), and public service (with audiences ranging from local schoolchildren to international agencies). Much of the farming-systems research takes place on organic and conventional farms throughout the region, including a number of projects in the Santa Cruz/Monterey area and the Elkhorn Slough watershed. CASFS social-issues staff organize and participate in the Agrifood Working Group for UCSC faculty, researchers, and graduate students, which meets regularly to discuss topics related to food systems.

CASFS facilities and resources are available to all UC Santa Cruz undergraduate and graduate students. Students can take part in ongoing research and education efforts, or design their own projects and internships in collaboration with affiliated faculty and staff. Many undergraduate students participate in the CASFS as part of the environmental studies major (see page 279) and as participants in the Apprenticeship in Ecological Horticulture (see below). The graduate program in environmental studies includes a focus on agroecology and sustainable food systems (see page 280); graduate students have access to CASFS facilities and staff assistance for field based work. Students have also pursued undergraduate and graduate studies with the center by working through the Departments of Biology, Education, Anthropology, and Sociology.

In addition, about 35 people complete a six-month apprenticeship organized and taught by CASFS staff each year, earning a Certificate in Ecological Horticulture through UCSC Extension. Through workshops, lectures, and hands-on instruction, apprentices master basic organic farming and gardening techniques.

CASFS gives high priority to forging links with, and serving as a resource for, researchers on and off campus, government agencies at many levels, nongovernmental organizations, producers, consumers, students, gardeners, and other individuals interested in multiple aspects of sustainable agriculture and food systems. Staff coordinate major agricultural conferences, teach short courses, and make presentations at agricultural and ecological events. In addition, CASFS hosts international researchers interested in working with faculty and staff.

CASFS manages two facilities: the 25-acre Farm on a lower meadow of campus and the three-acre Alan Chadwick Garden on the upper part of campus. As the primary on-campus research facility, the CASFS Farm includes research plots, raised-bed gardens, row crops, and orchards, as well as staff offices, a laboratory, greenhouses, and a visitor center. The Chadwick Garden showcases small-scale intensive horticulture and supports a diverse collection of ornamentals, food crops, and native California plants.

The CASFS Farm & Chadwick Garden are open to the public daily from 8 A.M. to 6 P.M. In conjunction with the Friends of the UCSC Farm & Garden, the center sponsors a variety of public education events for the community. For further information, contact the center at (831) 459-3240; or casfs@ucsc.edu for directions to the Farm & Garden, call (831) 459-4140. Web: casfs.ucsc.edu

Center for Biomolecular Science and Engineering (CBSE)

CBSE fosters new approaches to discovery in human health. An umbrella organization of the Jack Baskin School of Engineering and the Division of Physical and Biological Sciences at UCSC, the center supports a vast array of biological and engineering research that fuels biomedical advances and the biotechnology explosion. The center pursues the following goals:

- Promote interdisciplinary research in areas that encompass the study of genomic information and structural biology
- Support the UCSC Genome Browser, a crucial resource for the international scientific community
- Support core facilities, such as the computational cluster used for the UCSC Genome Browser and genomic research, the microarray facility, the embryonic stem cell laboratory, and the transgenic mouse facility

- Help meet the need for trained professionals in industry and academia by developing training programs in the areas of bioinformatics and biomolecular engineering
- Attract research funding for the center, for affiliated faculty, and for students from federal, state, and private agencies
- Cultivate and maintain mutually beneficial relationships with industry through research collaborations, internship opportunities, and gifting programs

CBSE brings researchers together to blend cutting-edge approaches for exploring essential scientific questions affecting health and environment and furthering basic understanding. Areas of interest to CBSE affiliates include bioinformatics, applied mathematics, biostatistics, experimental genomics and proteomics, molecular and cellular biology, stem cell biology, health and environmental science, bioengineering and biotechnology, structural and chemical biology, computational chemistry, biochemistry and biophysics, computer engineering, and scientific visualization.

CBSE's roots go back to 1985, when UCSC scientists met with a group of international visionaries at a conference hosted by former chancellor Sinsheimer, a meeting that triggered the inception of the Human Genome Project. Fifteen years later, UCSC scientists helped the Human Genome Project reach a stunning milestone by providing the computational solution that produced the first assembly of the human genome, the map of our genetic make-up. Out of these accomplishments and a growing interest in cross-disciplinary science grew the Center for Biomolecular Science and Engineering. The center fosters interdisciplinary research and academic programs that address the scientific questions of the post-genomic era.

For more information about CBSE, visit the web site: www.cbse.ucsc.edu.

Center for Collaborative Research for an Equitable California (CCREC)

A University of California multicampus research program and initiative, CCREC coordinates, seeds, and supports multi- and transdisciplinary efforts to address the state's interconnected crises in education, employment, health, nutrition, housing, and the environment. CCREC shapes research-based responses directly geared into policy and community contexts, employing innovative collaborative methodologies and partnerships that draw together university researchers, policy makers,

governmental agencies, and community-based entities. CCREC's emergent modes of scholarship and practice reposition the university to confront complex interrelated problems whose resolution entails working outside traditional institutional and intellectual boundaries. CCREC aims to establish epistemological and ethical standards for this innovative work, and to prepare a new generation of scholars skilled in connecting and communicating with policy-makers and local communities, and skilled in utilizing a broad range of databases and digital media in the conduct and dissemination of collaborative research.

For additional information, please contact the center's director, Ronald David Glass, associate professor of philosophy of education, at rfglass@ucsc.edu or (831) 459-5188.

Center for Educational Research in the Interest of Underserved Students (ERIU)

ERIU develops, conducts, and disseminates educational research to improve the teaching and learning of the nation's increasingly diverse student population and the teachers who serve them. The center is transdisciplinary, drawing on studies of education from multiple theoretical perspectives. ERIUS serves as a hub to integrate the work of scholars who are organized in research groups focusing on three research domains:

1. Teachers and Teacher Development
2. Literacy Education
3. Science, Technology, Engineering, and Mathematics (STEM) Education

Taken together, the research conducted by faculty, graduate students, and academic researchers under the auspices of ERIUS aims to reinvent the institutional and organizational settings for education in order to meet the educational needs of students from underserved communities. ERIUS pursues extramural sources of funding to support its research and other scholarly activities.

Center for Global, International and Regional Studies (CGIRS)

CGIRS is the primary center for the study of international affairs at UC Santa Cruz. CGIRS seeks to better understand the complex issues surrounding the new economic, social, and political structures of the 21st century. Its programs and activities recognize that contemporary societies are anchored in specific regions and locales even as they are also linked to other

places and levels by complex political, economic, social, and cultural networks of communication and action. CGIRS draws on the expertise of a broad range of university faculty and the participation of students to focus on four core areas of research: innovation, security, identity, and sustainability. CGIRS was established within the Division of Social Sciences in 1996, bringing under one umbrella the Center for the Study of Global Transformations, the Institute on Global Conflict and Cooperation (IGCC)—UCSC Campus Program, the UC Pacific Rim Research Program, the Global Information Internship Program (see page 47), the Global Studies Honors Program initiative, and related research, teaching, conferences, workshops, and public-education activities. CGIRS is funded by the Division of Social Sciences, multicampus research units, private donors, and foundations. For further information, e-mail global@ucsc.edu or visit cgirs.ucsc.edu.

Center for Information Technology Research in the Interest of Society (CITRIS)

CITRIS is one of four California Institutes for Science and Innovation created in 2000. Supported by state, federal, and private funds, the centers concentrate on areas of science and innovation that are of special importance to California's high-tech economy and to emerging renewable energy technologies.

CITRIS applies results from research in information technology to solve important problems facing California and the world. Areas of emphasis include energy and the environment, health care, and intelligent infrastructure. CITRIS fosters multidisciplinary applied research where IT is a central component, and promotes partnerships in research across the CITRIS campuses: UC Berkeley, Davis, Merced, and Santa Cruz. Strong industry support led to the creation of CITRIS, and industry partnership and sponsorship is a significant ingredient in the success of CITRIS. Web: www.citris-uc.org

Information Technologies Institute

The Information Technologies Institute (ITI) is a focused research activity (FRA) founded in 2001 and housed at the Baskin School of Engineering. ITI's objective is to provide an environment in which its members can attract large-scale projects that bridge technology research from concept to prototype and solve problems in social and commercial sectors nationally.

In ITI, advanced Internet applications provide the impetus and focus that bring together the components of research related to the rapidly expanding world of networks, distributed computing, “smart” sensors, and Internet appliances. As electronics and packaging developments lead to powerful low-cost sensors, resulting in a broad array of instruments, these become Internet devices, bringing a significant increase in the data captured, transmitted, stored, managed, and displayed.

Through its research centers, ITI focuses on interrelated areas in computer science, computer engineering, and electrical engineering as well as physics, chemistry, and applied mathematics. Areas of emphasis follow:

- Internet and information systems: architecture, performance, and applications
- Multimedia systems and applications in education, telecommuting, and distance learning
- Design and development of complex networked systems and software technologies
- Storage systems and databases
- Communications
- Optoelectronics (including nanotechnology devices)
- VLSI design, packaging, testing
- Sensors and Internet appliances
- Visualization and computer graphics

ITI manages the participation with other research partnerships of its faculty, including the activities of the Baskin School of Engineering in the Center for Information Technology Research in the Interest of Society (CITRIS), with UC Berkeley, UC Davis, and UC Merced; the High Dependability Computing Consortium (with NASA Ames, Carnegie Mellon, and other universities); the National Partnership for Advanced Computing Infrastructure (NPACI) and the San Diego Supercomputer Center; and local universities and organizations with mutual research interests, including the Naval Postgraduate School; San Jose State University; California State University, Monterey Bay; and the Monterey Bay Aquarium Research Institute (MBARI). Web: www.iti.ucsc.edu

Center for Integrated Spatial Research (CISR)

One of the most exciting developments in research over the past decade has been the increasing sophistication of spatial technology, along with a dramatic increase in the availability of spatially referenced data. Spatial technology is an information technology field that acquires,

manages, interprets, integrates, displays, analyzes, or otherwise uses data focusing on the geographic, temporal, and spatial context. Today, spatial technology is recognized as the primary means of dealing with information referenced to a specific location and is being integrated across a broad range of disciplines.

CISR, formerly the GIS/ISC Laboratory, is located in the Department of Environmental Studies, Division of Social Sciences, and serves as a central facility for spatially focused research and training at UCSC. CISR (pronounced “scissor”) is focused on integrating advanced spatial technology, methods, and data (geographic information systems—GIS, global positioning systems—GPS, remote sensing, spatial modeling and statistics) with interdisciplinary research challenges in terrestrial, marine, and urban environments. The central goal of the center is to foster cross-domain cooperation in the application of these tools and to promote a diversity of research by increasing campus and community literacy in spatial methods.

CISR manages both a research and teaching facility specializing in state-of-the-art spatial technology, software applications, and data, as well as, an expanded training program. Training options include three academic courses focused on spatial theory and methods (see Environmental Studies course listing); short courses through a professional development certificate program in GIS; and regular workshops and symposia. Access to CISR facilities is limited to current UCSC students, faculty, researchers or staff involved in spatial research and/or courses through the CISR. For more information, visit <http://spatial.cisr.ucsc.edu>.

Center for Integrated Water Research

The Center for Integrated Water Research at UC Santa Cruz undertakes research to help provide safe and reliable supplies of fresh water. Fresh water is critical to our health and quality of life, to providing ample food supplies, to maintaining a vibrant economy, and to supporting the environmental systems we depend on and enjoy. The center studies fresh water through ingenious combinations of natural and engineered systems, which require vast amounts of financial, human, and natural resources to develop and maintain. Billions of dollars and millions of skilled workers are employed in the water sector. Policies on fresh-water management have profound impacts that can last for decades.

Influences on fresh water supply in the early 21st century include growing demand from all categories of water users, replacing and upgrading aging infrastructure, declining water quality,

and changing climate and groundcover that affect water availability and quality.

To meet these challenges, society has developed an array of new water-treatment and supply technologies, as well as new approaches to managing when and how water is gathered and used. Many technologies are so innovative they do not fit in well with our existing laws, regulations, and division of responsibilities for water. The roles of water agencies are in flux as water treatment agencies take on water supply roles.

The center provides research expertise in policy, economics, management, and communication related to fresh water. Current projects study the treatment of impaired waters (desalination and water reclamation and reuse), communications between water agencies and the public, design of regional water supply and treatment strategies, and measuring the reliability of alternative water supplies.

The center builds research teams that bring other needed areas of expertise to our projects; collaborates with other universities, government agencies, national laboratories, nonprofit organizations, and the private sector; focuses on applied problems, building theory out of specific cases; and sponsors a Fellows Program that includes nationally and internationally respected scholars.

The center serves the UCSC campus by providing internship opportunities and supporting conference attendance by students, and it develops and maintains relations with individuals in the business, finance, and regulatory sectors, who often lecture at UCSC, thereby helping students learn the cutting-edge issues.

The center works to resolve major debates on water supply, quality, and reliability in the United States; and hopes to refine and develop concepts and methods of studying water that will help regions, states, and nations make good choices regarding water in the 21st century.

Further information is available on the web at <http://ciwr.ucsc.edu>, by e-mail at ciwr@ucsc.edu or kkoeppe@ucsc.edu, or by phone at (831) 459-3114.

Center for Justice, Tolerance, and Community (CJTC)

CJTC, which was established in 2000 as part of the Division of Social Sciences, is an interdisciplinary applied research center tackling issues of social justice, diversity and tolerance, and the building of collaborative communities. Current research projects include studies of educational equity, public attitudes toward social and economic policies, the digital divide, environmental justice, homelessness and the impact of welfare reform on low-income families and others.

While the mix of work includes considerations of fundamental issues of discrimination, power, and oppression, the center actively seeks to play a public role in providing research that can inform policy and programs to improve equity. To ensure a public presence, the center sponsors an annual lecture series as well as smaller events bringing together community leaders and academic researchers. The center draws researchers from various divisions and includes opportunities for postdoctoral and affiliated researchers as well as graduate students. For more information, contact CJTC at cjtc@ucsc.edu or (831) 459-5743. Web: cjtc.ucsc.edu

Center for Molecular Biology of RNA

The center, established in 1992, brings together an interdisciplinary group of researchers, from the Departments of Molecular, Cell and Developmental Biology; Chemistry and Biochemistry; and Biomolecular Engineering, whose common interest is to understand the structure, function, and biological roles of DNA's intriguing cousin, RNA. The center promotes interaction between structural biologists, molecular geneticists, biochemists, and computational biologists. Major funding for the center has been provided by the Lucille P. Markey Charitable Trust, the W. M. Keck Foundation and individual research grants from the National Institutes of Health, the National Science Foundation, and other extramural sources. Creation of the center was prompted by exciting developments in the molecular biology of RNA in recent years. Unlike DNA, RNA has the ability to fold into complex and unusual three-dimensional structures that confer its biological functions. RNA, like protein, may possess enzymatic activity and can catalyze specific biochemical reactions. Therefore, RNA may have preceded both protein and DNA in the early molecular evolution of life. Studies on the human genome have shown that, while only a small fraction of the genome codes for protein, the majority of it is transcribed into RNA. Although several new classes of functional RNAs have been discovered recently, including those that regulate development of higher organisms, the roles of most noncoding RNAs are still unknown. New insights into the fundamental properties of RNA will benefit a wide range of medical research projects. For example, a rigorous molecular understanding of RNA viruses—such as HIV, SARS and avian influenza—has become a national priority; knowledge of the molecular structure of the ribosome is leading to the development of new antibiotics. The center's facilities are located in Sinsheimer Laboratories, a state-of-the-art research center.

Among the areas currently under investigation by members of the center are RNA splicing, protein synthesis, ribonucleoprotein assembly, RNA-protein recognition, the x-ray crystal structures of RNA and RNA-protein complexes (including the ribosome), the structure and mechanism of action of catalytic RNAs and micro-RNAs, in vitro evolution of novel catalytic and other functional RNAs, and RNA genomics, using diverse approaches including cryo-EM reconstruction, DNA microarrays and high-throughput sequencing. Members of the center participate in the research training of postdoctoral scientists and doctoral students in graduate programs offered by the Department of Molecular, Cell, and Developmental Biology, the Department of Chemistry and Biochemistry, and the Department of Biomolecular Engineering. Web: rna.ucsc.edu/rnacenter

Chicano/Latino Research Center (CLRC)

The CLRC is an internationally recognized, cutting-edge research institution dedicated to fostering interdisciplinary, comparative, multilingual, and cross-border scholarship on the Americas. Research focuses on the politics, cultures, migrations, economics, histories, and societies of Latin America broadly conceived, including Chicana/o and Latina/o communities in the United States, the Caribbean, and wider global linkages to the Americas. The CLRC supports a range of thematic and topical research clusters, sponsors conferences, workshops, colloquia, and publications. Affiliated faculty, graduate students, and undergraduates make up a lively, active intellectual community. Programs include faculty research support, graduate student research grants, an undergraduate research apprenticeship program (URAP), a working paper series, and publishing of research reports. The center provides opportunities to critically engage and reflect on issues of contemporary importance such as globalization, immigration, and social justice as well as questions of identification including gender, sexuality, race, and nationality. For further information, e-mail clrc@ucsc.edu or visit the web page: <http://clrc.ucsc.edu/>.

Educational Partnership Center (EPC)

Established in 1999, the EPC coordinates UCSC's new and long-standing student academic preparation efforts with the goal of increasing access and opportunity to postsec-

ondary education for students in the Monterey Bay and Silicon Valley/San Jose regions. EPC is a research- and data-driven umbrella organization for a variety of complementary, integrated academic preparation and educational partnership programs serving students, teachers, and families from kindergarten through college. To build a college-going culture, EPC partners with K–12 middle and high schools and districts and the 13 regional community colleges in San Benito, Santa Clara, Santa Cruz, San Mateo, and Monterey Counties to help students and families navigate the college-going pathway and achieve their higher-education goals.

EPC's mission is to build college-bound communities that improve student learning and increase college-going rates among students from low-income and traditionally non-college-going families in collaboration with school, college, business, and community partners. An array of direct services and programs support students on the college-going pathway through tutoring, mentoring, academic planning and counseling, leadership training, test preparation, college awareness and enrichment, family involvement initiatives, transfer-student support, and teacher professional development.

EPC's key to success is providing an integrated facility that brings all of the student academic preparation programs together and creates synergy across programs that are each grounded in measurable goals and research-based best practices. Coordinating services across the middle school, high school, and community college programs has been essential to providing students and families with vital information on the various pathways to college. In addition, the Business Office; Partnerships, Policy, Research, and Evaluation Department; Student Employment Office; and Development and Communication Department provide essential support for the following direct services and programs:

California Reading and Literature Project (CRLP) is one of nine California subject-matter projects; it supports professional development opportunities for teachers of reading and literature in K–12 and university classrooms. Governed by the UC Office of the President, CRLP helps ensure that pre-K–12 students in the Monterey Bay region achieve the highest standards of academic performance through developing teachers' content knowledge and expanding their teaching strategies; focusing on academic English language development to prepare all students to meet or exceed academic content standards; creating a statewide pool of expert teacher leaders to train other teach-

ers on sound classroom practices; and linking universities, schools, and districts together in collaborative partnerships to improve teaching and learning through teacher professional development.

California State Summer School for Mathematics and Science (COSMOS) is a four-week summer residential program at four UC campuses that provides students with an unparalleled opportunity to work side-by-side with outstanding researchers and university faculty, covering topics that extend beyond the typical high school curriculum. The academic experience includes nine clusters taught by UCSC faculty, special discovery lectures, academic field trips, and enrichment sessions. Students' residential life includes weekend events and fun-filled peer activities, and COSMOS alumni have opportunities to attend the California Nobel Laureate event, receive research awards and college scholarships, and participate in an industry internship program.

California Student Opportunity and Access Program (Cal-SOAP). The San Jose Cal-SOAP program supports and sustains a college-going culture by providing academic support and advising services and helping students explore and clarify career interests and make the connection between postsecondary education and future career aspirations. Cal-SOAP also provides transfer student support through "Transfer: Making it Happen" and helps students and parents access important financial-aid information through the annual Cash for College Campaign workshops and events. In addition, the San Jose Cal-SOAP Consortium convenes key stakeholders from higher education institutions, K–12 districts, county offices of education, City of San Jose, and community agencies and businesses to collaboratively develop and implement academic preparation activities to maximize resources and avoid duplication of efforts.

Early Academic Outreach Program (EAOP). The University of California's largest academic preparation program, EAOP works with students at underserved schools to prepare for postsecondary educational opportunities, complete all UC/CSU eligibility requirements, and apply for college and financial aid. EAOP partners with families, schools, and communities to make college dreams a reality and provides a variety of year-round services designed to increase the academic preparation, awareness, and motivation of middle and high school students toward higher education and

to inform parents about available education opportunities.

Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) is a federally funded discretionary grant program designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education. Through the collaborative efforts of school and district partners along with additional business and community partners, GEAR UP provides critical academic preparation and support for students and families to help them navigate the college-going pathway. GEAR UP partnerships supplement existing school reform efforts and use research-proven practices to promote academic rigor and student achievement. The program brings much-needed resources to increase student academic performance and preparation for college, increase student and family college awareness, increase teachers' capacity to prepare students for college, and create a college-going culture within the broader community. EPC provides a variety of school-based academic services in its three GEAR UP partnerships in Watsonville/Pajaro Valley and north and south Monterey County.

Girls in Engineering. Inspiring students to envision themselves as future engineers and scientists, Girls in Engineering brings middle school girls with an interest in mathematics together for a unique, two-week introduction to engineering at the Jack Baskin School of Engineering during the summer. Designed to broaden the STEM pipeline, students participate in hands-on STEM projects, such as building and programming robots; exposure to STEM college and career pathways through guest speakers, industry panels, and special lectures from faculty; research lab tours and visits to engineering and manufacturing firms and museums; early college experiences through UCSC campus tours and college-prep presentations; and other academic enrichment opportunities.

Mathematics, Engineering, Science Achievement (MESA) Schools Program provides academic development for middle and high school students to prepare for baccalaureate degree programs in mathematics and science and careers in engineering and other mathematics-based scientific fields. The program's primary goal is to support students from underserved communities through fun-filled, hands-on projects and other college awareness activities to promote STEM college and career

pathways. The UCSC MESA program provides academic support, enrichment opportunities, parent leadership, and college awareness to students, families, and partner schools in Santa Cruz and Monterey counties. The annual MESA Day Preliminary Competition brings hundreds of students to campus to compete against their peers in a variety of science, math, and engineering events.

Transfer Partnerships Program (TPP) identifies and supports prospective community college transfer students through academic planning and guidance services to strengthen the transfer process and help students make the successful transition to a four-year institution. Transfer outreach representatives visit the 13 community colleges in the immediate region around UCSC on an ongoing basis and meet with students and support their transfer goals. TPP helps students advance on the college-going pathway through academic planning and guidance; financial aid workshops and information about scholarships; transfer and UC application workshops; referrals to campuses of interest; course, major, and general articulation; UC Transfer Admission Guarantee referrals; transfer survival-skills workshops; UC campus tours; and invitations to UCSC-sponsored events.

Two policy groups advise and inform EPC and its partnerships, programs, and services.

The Monterey Bay Educational Consortium (MBEC) is a strategic alliance among the public educational institutions in the Monterey Bay area dedicated to increasing the levels of educational attainment of all students in the region by focusing on collaborative activities. MBEC convenes the top administrative officers of the three county offices of education, school districts, regional community colleges, and public higher education institutions on a quarterly basis. The MBEC Teacher Workforce Initiative addresses teacher recruitment, retention, and preparation issues in the region; its purpose is to develop an effective data-driven process that begins with the collection of accurate yearly information about the teacher workforce.

The Chancellor's Educational Partnership Advisory Council (CEPAC) engages deans, vice chancellors, and other key campus administrators from all UCSC divisions in discussions about educational partnerships and collaborations throughout the academic pipeline, from K–12 to postsecondary education. This leadership group leverages resources and expertise across the campus to address P-20 issues and

advises the chancellor on education outreach and access programs and informs policy related to student academic preparation.

EPC is located at 2901 Mission Street Extension, Suite A. For more information, call (831) 459-3500 or visit online at <http://epc.ucsc.edu>.

Center for Visual and Performance Studies (VPS)

Housed at Porter College and affiliated with Cowell College, VPS develops multidisciplinary and integrated approaches to performance, visual studies, and the arts. Faculty and graduate students come from three divisions: Arts, Humanities, and Social Sciences. Major grants received include UCHRI conference grant, France-Berkeley Fund, ARI collaborative research grants, and UC Presidential Chair funds. VPS supports graduate research assistantships, Fulbright Fellows, and visiting scholars.

Emphasizing historical and socially aware approaches, VPS explores how working across disciplinary boundaries of dance, theater, music, art, literary theory, anthropology, and history can uncover and foster new methodological approaches to the study of performance and visual culture. The intersections of new media, aesthetics and anthropology, of literature and dance, of performance and ethnography, and of all of these with the visual dimensions of representation have become ever more intensive areas of interdisciplinary research since the 1980s. Today, performative and visual media interact and redefine our understanding of culture, causing critical approaches to be of paramount importance to future academic study. Our work generates new theories of interpretation and meanings through conferences, seminars, publications, and classes.

The center sponsors an annual seminar series and special events. Recent seminar series include Visual Histories; Performance Histories (2007–08); Voices for Visualities and Performativities (2008–09); Difficult Dialogues: Sites/Sights of Trauma in Visual Culture (2009–10). Recent conferences include The Ends of Interdisciplinary (2006) and Unfolding the Baroque: Extensions of a Concept (2009). In 2010–11, VPS will focus on the work of Pier Paolo Pasolini, culminating in an international interdisciplinary conference, April 29–30, entitled Pasolini's Body. The center welcomes the participation of all interested graduate students and faculty. For further information, contact the center's director, Mark Franko, mfranko@ucsc.edu, or Trevor Sangrey VPSucsc@gmail.com.



UCSC's Center for Integrated Spatial Research enables students and faculty to overlay various spatial data sets—ranging from local field data to satellite imagery to the U.S. Census. GIS and GPS technology enables scientists and policy makers to analyze, simulate, and visualize alternatives when formulating policy—especially policy related to environmental issues.

Institute for Humanities Research (IHR)

IHR was established in the fall of 1999 with funding from the Campus Provost/Executive Vice Chancellor's Office and the Humanities Dean's Office. IHR provides infrastructure in support of all manner of research activities, including assistance with grant proposal preparation, administration of grants, hosting of workshops and conferences, and dissemination of information about research opportunities and activities. Recognizing that humanities research is an important component of a first-rate research university and is crucial to excellent teaching and scholarship, IHR provides time, space, and support for the maintenance of a lively, active research community. IHR offers fellowships and grants to faculty, graduate, and undergraduate students in the humanities to pursue their research, and provides seed funds to faculty and students from across the campus to work together on common problems and concerns.

In addition, IHR administers a variety of research centers and initiatives including Center for Cultural Studies, Center for Jewish Studies, Center for Labor Studies, Center for Mediterranean Studies, Center for the Study

of Pacific War Memories, Center for World History, Institute for Advanced Feminist Research, Bruce Initiative for Rethinking Capitalism, and Digital Humanities Initiative. Supported activities include research clusters, conferences, seminars, visiting scholars, publications, film series, and NEH summer seminars for university and high-school teachers. IHR also plays a central role in administration of multicampus projects, and is part of the University of California's Humanities Initiative. For more information, please visit us at ibr.ucsc.edu or e-mail us at ibr@ucsc.edu.

Bruce Initiative for Rethinking Capitalism

Three decades of profound advances in financial economics have transformed global markets, but have had relatively little impact on the social sciences and humanities. As a result, scholars face a dearth of intellectual resources that interpret, critique, defend, transform and explain the political phenomenon of derivatives. The crisis of 2008 set many of these issues in stark relief, but marked neither the end nor the beginning of the end. The initiative focuses on the intellectual and policy issues that will haunt us long after the initial reactions to the crisis fade.

Particular attention is paid to the evolution and regulation of derivatives. The model for valuing derivatives has become a new way of understanding capitalism as a production of new property (a commodity) by means of contract alone. Scholars in the social sciences and humanities are seeking to understand the difference that this new shape of capital has made to their fields. Within the minutiae of esoteric financial instruments lie social, political, and religious assumptions that remain largely unexamined to this day. The role of derivatives in the economy is currently being publicly questioned, criticized, and legislated. Economists are seeking to better understand the cultural, institutional, and moral dimensions of their work.

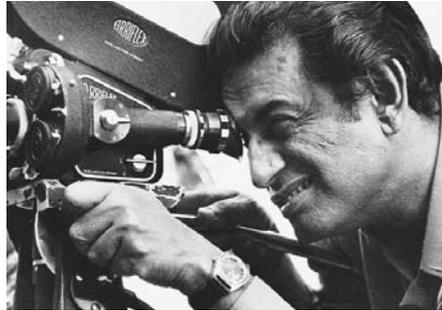
“Rethinking Capitalism” aims to connect those who are technically adept at the new financial technologies with scholars of culture, institutions, ethics, and theology. We support original research in political economy and the social study of finance. Visit us at rc.ucsc.edu.

Center for Cultural Studies

The Center for Cultural Studies at UC Santa Cruz was founded in the spring of 1988 as a part of the University of California’s President’s Humanities Initiative. Through an ensemble of research clusters, conferences, workshops, visiting scholars, publications, film series, and a Resident Scholars Program, the Center encourages a broad range of research in the rapidly evolving field of cultural studies.

The international field of cultural studies emerged from the challenges posed to traditional humanistic and social scientific agendas by new research strategies in visual studies; anthropology, ethnography and folklore; feminist studies; comparative sociology and politics; semiotics; social, cultural, literary, and political theory; science studies; colonial discourse analysis; ethnic studies; and the histories of sexualities. These challenges, and the areas of scholarly activity they stimulate, compose the heart of cultural studies at UC Santa Cruz. Thus, the Center for Cultural Studies’ concern is to foster research across divisional and disciplinary boundaries.

While based in the humanities, the Center engages with the “interpretive” or “historical” social sciences, science studies, and theoretically informed work in the arts. The membership of the Center’s Advisory Board and faculty/graduate student participation in its events clearly reflect this cross-divisional agenda. Visit us at culturalstudies.ucsc.edu.



The Ray Film and Study Collection preserves the films, drawings, and documents of Satyajit Ray, one of the greatest filmmakers of our time.

Center for Jewish Studies

Jewish Studies is one of the most intellectually compelling and broadly relevant fields in the university. We design research projects and host public events that conceptually redraw the boundaries of Jewish studies, while encouraging people who may have previously been uninvolved in Jewish studies to engage with it.

Our primary constituents are the thousands of students at UC Santa Cruz, including the 1,200 who take Jewish Studies courses every year, making it one of the most popular programs in the entire university. We are also committed to creating programs that attract faculty and staff members as well as people from the broader Santa Cruz community. The content of our programming organically integrates the contemporary issues that are most important to our constituents, with a range of perspectives and methods unique to Jewish Studies. In so doing, we place Jewish Studies squarely at the center of the intellectual and cultural life of the campus and illuminate the central role that Jewish creativity has played in helping to shape human civilization for over three thousand years. Visit us at cjs.ucsc.edu.

Center for Labor Studies

The Center for Labor Studies, founded in 2007, is dedicated to the study of working people, the labor movement, and the challenge of the broader global economy as it impacts the working people of California and beyond. Through conferences, workshops, public lectures, and a range of guest speakers, we focus, in particular, on the relationship between the labor movement (broadly defined), social movements, and democratic practices; on gender, race, and ethnic dynamics; and on labor activism in international context. We also address a wide spectrum of questions related to the nature of work, employment, and working people’s lives in the U.S. and beyond. Our goal

is to serve UCSC students, staff, and faculty while reaching out to the broader community of the Central Coast of California and beyond. Visit us at ibr.ucsc.edu.

Center for Mediterranean Studies

The Center for Mediterranean Studies is dedicated to the study of the nature of premodern Mediterranean societies and cultures and their role in world history and the history of “the West.” Located at the intersection of three continents, the premodern Mediterranean was a shared environment characterized by tremendous ethnic and religious diversity and by the particular intensity of its cultural, economic, and political exchange. Among Africans, Asians and Europeans, Christians, Muslims, and Jews, and others, both conflict and peaceful communication encouraged acculturation and spurred innovations that transformed the societies of the Mediterranean and their continental neighbors. It is affiliated with the independent scholarly forum the Mediterranean Seminar.

Because of the dominance of modern national paradigms, the weight of teleological historical traditions, and assumptions about the rigidity of ecumenical divisions, the premodern Mediterranean is frequently regarded as an anomaly. Sponsoring a diverse range of scholarly activities, including a reading group, colloquia, seminars, and publications, the Mediterranean Seminar provides a forum for scholarly exchange and dialogue across the humanities and social sciences. Our aim is to facilitate investigation into the premodern Mediterranean and to promote the incorporation of Mediterranean studies into university curricula. Visit us at mediterraneanseminar.org.

Center for the Study of Pacific War Memories

The Center for the Study of Pacific War Memories was established in the fall of 2006 to promote transnational, collaborative teaching and research projects across the Asia-Pacific region related to memories of the Pacific theater of World War II (1937–1945). Memories of the war are articulated and sustained in a wide range of media and practices at individual and collective levels. At the same time, memory changes over time, with changing contexts and changing agents of memory. Finally, while memory is at the core of identity-formation, memory-making in the modern world always operates at a global level. Thus, memories of the past in one place do not exist in isolation within single national or ethnic boundaries, but are always in formation through engage-

ment with other memories from other places and other groups.

The foundational project of the center is the construction of a web site for a multilingual and multinational research community built around a user-generated digital archive called *Eternal Flames: Living Memories of the Asia Pacific War*. The site will enable the formation of collaborative research projects among both students and researchers from countries throughout the Pacific region, particularly promoting translanguaging work. Other center projects include a documentary film about a former Japanese soldier now living in California, an exhibit of photographs of Okinawa taken by an American serviceman in the early 1950s, and a data-rich virtual re-creation of a massive memorial complex in Okinawa. Visit us at cspwm.ucsc.edu.

Center for World History (CWH)

As a part of a collective effort at imagining the development of world history as a research field, the CWH sponsors occasional lectures and conferences, including periodic conferences of the all-UC Multi-Campus Research Group, the World History Workshop. CWH is also active in encouraging the development of world history as a teaching field. To this end, it develops world history teaching materials available online. In summer 2009, the Center hosted an NEH Summer Seminar for classroom teachers on the theme "Production and Consumption in World History." Visit us at cwh.ucsc.edu.

Dickens Project

Through a regular program of conferences, courses, and scholarly gatherings, the Dickens Project coordinates research and instruction in the work, times, influence, and achievement of Charles Dickens. Twice a year, faculty members and graduate students from the 10 campuses of the University of California, joined by colleagues from other universities, present their research findings to conference participants, interested undergraduate and graduate students, and members of the general public. They meet on the Santa Cruz campus each summer and at another university each winter. Each year, the conference is available as a regular Summer Session undergraduate course. The project also publishes its own newsletter and curricular materials and cosponsors international conferences. Visit us at dickens.ucsc.edu.

Digital Humanities Initiative

The Digital Humanities Initiative is constituted by a group of UCSC faculty from the

Humanities, Arts, and Engineering divisions who meet regularly to discuss the impact of digital media on research in the humanities. The fundamental concern of the humanities is with the production and interpretation of culture. Focusing on the means of communication—language, inscription, visualization and materialization—and the modes of interpretation—experiential, aesthetic, metaphysical—the humanities address the ways that human beings make sense of their worlds. The emergence of digital media has the potential to dramatically expand the range and dimensions of humanities research while also returning us to a reexamination of our core principles of communication and interpretation. Digital media present opportunities for reconceiving spatiality and temporality, drastically expanding our access to and dissemination of information, and creatively reimagining new possibilities for expression. Perhaps most importantly, addressing the implications of digital media for humanities research compels us to question existing disciplinary boundaries and pursue transdisciplinary research methodologies and agendas. A primary goal for the Digital Humanities Initiative, therefore, is to explore ways that humanities research agendas can converge with and mutually advance research in digital media across the campus. Visit us at ibr.ucsc.edu.

Institute for Advanced Feminist Research (IAFR)

IAFR was established at UC Santa Cruz in 2002. It has a history of and future commitment to sponsoring projects that are historical, transnational, and interdisciplinary in their conception and collaborative and experimental in their practice. IAFR now houses and coordinates the University of California Multi-Campus Research Group (MRG) on Transnationalizing Justice. This research group includes nearly 70 faculty members from all nine UC campuses. Its annual dissertation workshop provides an innovative opportunity for close mentorship. The Group also hosts reading groups, conferences, and other public events. IAFR is also home to the Research Cluster for the Study of Women of Color in Collaboration and Conflict established at UCSC in 1991. Visit us at iafr.ucsc.edu.

Linguistics Research Center (LRC)

LRC at UC Santa Cruz facilitates research and education in the areas of theoretical linguistics—syntax, phonetics, phonology, morphology, and semantics. The members of the linguistics community at UCSC (faculty,

students, and visiting scholars) work together under the auspices of the LRC to conduct and disseminate the results of their research to the larger linguistics community. An increasingly important aspect of LRC's mission is to coordinate and administer the LRC Labs (SynLab, PhonLab and SemLab).

In addition, LRC serves as a liaison between researchers at other institutions and researchers at UC Santa Cruz. Among other efforts, the LRC hosts visiting scholars from other institutions interested in conducting research in the UCSC linguistics community, organizes workshops featuring participants from other U.S. and international institutions, engages in online publication of research conducted at UCSC, coordinates the logistics of externally funded research projects, and in general works to enhance the environment for linguistic research at UCSC.

Examples include UC Santa Cruz's hosting of the 1991 LSA Linguistic Institute, the hosting of various conferences such as Semantics and Linguistic Theory (1999), the West Coast Conference on Formal Linguistics (2002 and 2011), and the Comparative Germanic Syntax Workshop (2006). Upcoming events sponsored by the LRC include UC Santa Cruz's hosting of Formal Approaches to Japanese Linguistics (2010).

Furthermore, a collection of books and journals in linguistics, including working papers from many other linguistics departments, is maintained in the LRC Library, which is available for use by any LRC affiliate. And finally, the LRC sponsors visiting scholars for an entire academic year (or for shorter periods) through the Research Associate Program. Visit us at lrc.ucsc.edu.

Ray Film and Study Collection

The Satyajit Ray Film and Study Collection (Ray FASC) is a focused research activity concentrating on the films and other artistic works of Satyajit Ray, one of the world's greatest filmmakers. Ray FASC maintains, in addition to 35-mm films and videocassettes of Satyajit Ray's films, a collection of the Ray papers: books, articles, letters, screenplays, sketchbooks, costume designs, music tapes/recordings, posters, stills, illustrations, and other examples of Ray's multifaceted genius. Ray FASC has received the Lethbridge Collection of some 1,500 volumes/items of works on Ray and by Ray in some 10 world languages. The gift has come from Mr. and Mrs. Cuthbert Lethbridge of Melbourne, Australia. With a major grant from the Packard Humanities Institute, Ray FASC has prepared an inven-

tory, catalog, and database of the materials in the archive. Ray FASC hosts lectures, film screenings, seminars and exhibitions. It helped organize several Ray retrospectives nationally and internationally. Student internships and research projects in the archives are welcome. Visit us at satyajitray.ucsc.edu

Institute of Geophysics and Planetary Physics (IGPP)

UC's IGPP, a multicampus research unit, includes a branch at UCSC. The IGPP supports a wide range of basic research on the origin, structure, and evolution of Earth, the solar system, and the universe. One of the goals of this research is to predict future changes in global systems that may affect human life.

The UCSC branch of the institute addresses fundamental questions relating to Earth's environment, global change, and planetary sciences. The UCSC branch includes five interdisciplinary research centers: the Center for Origin, Dynamics, and Evolution of Planets (CODEP); the Center for Dynamics and Evolution of the Land-Sea Interface (CDELSI); the Center for the Study of Imaging and Dynamics of the Earth (CSIDE); the Center for Remote Sensing (CRS); and the Center for Adaptive Optics (CfAO). These interdisciplinary centers serve to build bridges between different departments and heighten the focus on collaborative research efforts. A Massive Computer Simulation Facility (MCSF) has been established with a large parallel supercomputer for conducting geophysical and astrophysical modeling.

CDELSI brings together faculty from six departments: Ecology and Evolutionary Biology, Earth and Planetary Sciences, Ocean Sciences, Environmental Toxicology, Anthropology, and Environmental Studies. Researchers in these departments are at the forefront of efforts to understand the complex processes and interactions occurring at the continental margin. A primary concern is the impact of global and regional climate change on key processes in the coastal environment, such as atmospheric circulation, ocean temperature and currents, nutrient cycling, and the geological processes that shape the continental margin.

CODEP brings together faculty from the Departments of Astronomy and Astrophysics, Applied Mathematics and Statistics, Earth and Planetary Sciences, and Physics. The interests of CODEP researchers include Earth's internal dynamics, the formation of planets, how planetary systems evolve, and the discovery of new

planets outside the solar system. This is a joint effort to understand as much as possible about planets in general, both in our own solar system and around other stars. The center encourages Earth scientists and astronomers to bring their different perspectives to bear on planetary issues.

CSIDE coordinates research in seismology, geodynamics, geomagnetism, hydrology, geomorphology, active tectonics, and mineral physics addressing structure and dynamics of the Earth's interior. Thermal, chemical, and dynamic processes are studied in six affiliated research laboratories. CSIDE hosts a major industrial consortium focused on development of new seismic-imaging technologies.

CRS coordinates research efforts of faculty in the Departments of Earth and Planetary Sciences, Ocean Sciences, Ecology and Evolutionary Biology, Electrical Engineering, and Computer Engineering for the use of satellite and airborne remote sensing in studying processes occurring on the surfaces of Earth and other planets. Specific interests include astrogeology; plant ecology; coral reef health; volcanic, geothermal, and earthquake processes; climate change; submarine and coastal geology; ocean surface processes and marine habitats; and engineering development.

The Center for Adaptive Optics (CfAO) is a new UC multicampus center within the IGPP. Adaptive optics (AO) is an enabling technology that sharpens images by removing optical aberrations. This technology is transformative for ground-based astronomical telescopes, because it removes blurring due to turbulence in the Earth's atmosphere. An exciting spin-off application is the use of AO for imaging the living human retina. The mission of the IGPP's CfAO is to develop, apply, and disseminate adaptive optics science and technology in service to scientific research, health care, and industry. To accomplish these goals it will connect the different UC campus communities, foster research collaborations across campuses and disciplines, and develop the next generation of young leaders in this new field. The UC CfAO grew out of the successful NSF Science and Technology Center of the same name.

The IGPP was established in 1946 at UCLA. Other branches are located at UC San Diego, UC Riverside, UC Irvine, UC Berkeley, Los Alamos National Laboratory, and Lawrence Livermore National Laboratory. A key objective of the IGPP is to encourage and support cooperative projects that bring together researchers from different disciplines, campuses, and institutions. The UCSC branch was established in 1999. Web: igpp.ucsc.edu

Institute of Marine Sciences (IMS)

With the dynamic combination of university marine scientists, state-of-the-art facilities and analytical equipment, collaborative research, and an overriding commitment to quality, UC Santa Cruz is at the forefront of marine sciences research, education, and outreach. Set in the biologically rich environment of Monterey Bay and the nation's largest national marine sanctuary, the campus provides students and scientists who seek to study the ocean and its life a unique opportunity to pursue their dreams.

Established in 1972, the IMS is composed of 37 affiliated faculty; 173 professional researchers, project scientists, specialists, post-doctoral researchers, and research associates; and 25 support staff. Marine scientists from the Departments of Ocean Sciences, Ecology and Evolutionary Biology, Earth and Planetary Sciences, Microbiology and Environmental Toxicology, and Chemistry and Biochemistry conduct their research within the shared focus of the institute. The institute provides facilities and administrative and technical support for faculty, researchers, and graduate and undergraduate students involved in marine sciences. Faculty and researchers work independently and collaboratively within eight clusters:

- Coastal biology
- Environmental toxicology
- Fisheries and fishery management
- Marine and coastal geology
- Marine and coastal policy
- Marine vertebrate biology
- Oceanography and ocean processes
- Paleooceanography, paleoclimatology, and global change

An undergraduate major leading to a B.S. in marine biology is described on page 151; a two-year graduate program leading to an M.S. in ocean sciences is described on page 397. Doctoral students pursue marine research through the Ph.D. programs in the Departments of Ecology and Evolutionary Biology, Earth and Planetary Sciences, Microbiology and Environmental Toxicology, or Ocean Sciences.

Facilities

The institute's on-campus complex includes the IMS administrative office; research laboratories; offices for researchers, postdocs, and visiting scientists; state-of-the-art analytical labs for marine chemistry, biology, and geology; a computer laboratory; culture rooms for invertebrates and algae; portable seagoing analytical labs; and support facilities for cruise staging.

The Joseph M. Long Marine Laboratory, an onshore site three miles from campus on the shoreline of the nation's largest national marine sanctuary, has running seawater capabilities that increase opportunities for research and instruction. Facilities include research laboratory buildings; outdoor tanks for research involving marine mammals (dolphins, seals, sea lions, and otters), seabirds, and fish; and teaching laboratories. Specialized laboratories and facilities for marine physiology, ecology, and marine mammal bioacoustics studies are available. Adjacent to the lab are 55 acres of land for which plans have been developed and approved for an expanded marine lab campus with space for future research and educational facilities. The marine sciences campus also has a protected lagoon, a sandy beach, and rocky intertidal platforms for field research. Because Long Marine Lab is close to the campus, work there is easily incorporated into daily campus activities.

Each year, over 55,000 people—including 10,000 schoolchildren—tour the Seymour Marine Discovery Center at Long Marine Lab. Trained volunteer docents welcome visitors, guide groups through the laboratory, and provide information on research in progress. The Seymour Center houses an aquarium, exhibits that interpret the research underway within the institute, two classrooms for school groups, and an auditorium. All are open to the public—including K–12 classes—for a modest fee.

In addition, the Center for Ocean Health at Long Marine Lab houses offices and labs for marine sciences faculty and their research programs, as well as two nonprofits: the Nature Conservancy's Coastal Waters Program and Island Conservation.

IMS maintains a number of small vessels equipped for nearshore coastal research, several small craft for inshore work, and a scientific diving program. In addition, IMS-associated faculty, researchers, and students work around the world aboard larger oceanographic vessels.

IMS has scientific control over use of Año Nuevo Island, the largest elephant seal rookery on the Pacific coast (see page 79).

IMS maintains active cooperative research agreements with both the Biological Resources Division and the Coastal and Marine Group of the U.S. Geological Survey that have 50 agency scientists now housed adjacent to Long Marine Laboratory.

The institute maintains a cooperative agreement with the National Marine Fisheries Service (NMFS). In 2000, this agency completed a fisheries laboratory at Long Marine Lab, which houses 55 scientists and staff

working on salmon, bottom fish, and fishery-management issues. NMFS scientists study causes of variability in abundance and health of fish populations and the economics of exploiting and protecting natural resources. The National Oceanic and Atmospheric Administration (NOAA) has also located sanctuary staff within this federal building. The California Department of Fish and Game operates a Marine Wildlife Research Center at Long Marine Lab, which provides interior lab space and outdoor pool space for research on sea otters and the effects of oil and other contaminants on marine mammals and seabirds.

Additional collaboration also takes place with scientists at the Monterey Bay Aquarium Research Institute, Moss Landing Marine Laboratories, Hopkins Marine Station, the Monterey Bay Aquarium, the Naval Postgraduate School, and the Monterey Bay National Marine Sanctuary.

IMS web sites: ims.ucsc.edu and www2.ucsc.edu/seymourcenter

Santa Cruz Predatory Bird Research Group

The Santa Cruz Predatory Bird Research Group (SCPBRG) was formed in 1975 to restore an endangered peregrine falcon population in California. Since then, more than 1,000 peregrine falcons have been released to the wild and the Pacific Coast population has recovered and been removed from State and Federal Endangered Species Lists.

SCPBRG advises students on their senior theses, directs interns in individual studies, and teaches a College 8 class, *Peregrine Falcon Recovery—A Case Study in Conservation Success*. In addition, we lead a large conservation education and outreach program that includes falcon nest cameras posted on our web site, training for volunteers who monitor peregrine falcons, and conservation education lectures for schools and community. SCPBRG is located at the Long Marine Laboratory and is affiliated with the Seymour Discovery Center. For more information, visit us at www.scpbrg.org.

Scientific Diving and Boating Safety

The university's Diving Safety Program (DSP) is housed within the Institute of Marine Sciences, with offices at Long Marine Lab. Scuba diving and small boats are tools used in science classes and by UCSC faculty, staff, and student researchers in Monterey Bay and at study sites worldwide. In order to ensure safe scuba diving and scientific boating practices, DSP provides training and oversight for all

scuba diving (scientific and recreational) and scientific boating activities conducted under UCSC auspices. The diving safety officer teaches Biology 75, *Scientific Diving Certification* (see page 155), which is a prerequisite for all UCSC courses and research using scuba diving as a tool. DSP maintains a fleet of boats and diving equipment for researchers to use. DSP assists faculty, staff, and student researchers in complying with federal OSHA standards for scientific scuba diving. Anyone who needs to use scuba diving or small boats for scientific purposes should contact the DSP Office at srclabue@ucsc.edu. Web: www2.ucsc.edu/sci-diving.

Recreational diving opportunities offered by the Office of Physical Education, Recreation, and Sports (OPERS) include numerous scuba courses and the Scuba Club. The web address is www.ucsc.edu/opers/scuba.

Institute for Scientist and Engineer Educators (ISEE)

ISEE, an innovative initiative at UC Santa Cruz, prepares science and engineering (S&E) graduate students for their educational role as future faculty members, and a wide range of other science and engineering careers requiring teaching skills. Graduate students participate in workshops and gain practical teaching experience while completing their S&E graduate studies through a flexible program that includes a certificate pathway. ISEE graduate students will be at the forefront of transforming undergraduate S&E education by leading curricular innovations, focusing on inquiry, diversity and equity issues, and assessment. In ISEE's unique "Teaching Labs," participants gain practical teaching experience in programs and courses at the college level. ISEE currently offers a certificate in teaching innovative laboratory experiences, and will be developing other types of certificates in the near future. Participants in ISEE programs are also eligible for fellowships that support their effort on revising undergraduate courses, or other related projects. Graduate students who have participated in ISEE programs come away with unique qualifications for a their future careers, which go beyond and supplement their research training. They have received prestigious postdoctoral fellowships, and moved into faculty positions across the country.

In addition to workshops on teaching and learning, ISEE offers workshops on mentoring and is expanding programs related to workforce and career development. ISEE also includes a research strand aimed at teaching,

learning and professional development, related to science and engineering in higher education through the workforce.

ISEE offers an opportunity for S&E graduate students at UCSC to become part of a dynamic and innovative community that values both research and education. Through programs, workshops, symposia, group meetings, and retreats, ISEE participants experience an environment that supports the professional development of future scientists and engineers.

ISEE is located at the Center for Adaptive Optics building on campus. Visit <http://isee.ucsc.edu/>.

Monterey Bay Education, Science, and Technology (MBEST) Center

UCSC has played a leading role in the development of a multi-institutional center for science, technology, education, and policy—the MBEST Center—as a cornerstone of the Fort Ord defense conversion redevelopment plan.

The mission of the MBEST Center is to promote collaborative interaction among private businesses, government research agencies, public and private education and research institutions, and policy makers in strategic alliances to address the environmental opportunities and challenges of the new millennium.

In 1994, about 1,100 acres at the former Fort Ord Military Reservation were conveyed to the University of California. Of that land, 479 acres are available for development, and 605 acres of adjacent natural habitat are now part of the UC Natural Reserve System. Investments in roadway and utilities infrastructure have been completed, making 55 acres of real estate ready for development. In addition, the UC MBEST Center headquarters and a high-technology business incubator were completed in 2001.

Information about the center is available from the UC MBEST Center Office, 3239 Imjin Road, Marina, CA 93933, (831) 582-1020; via e-mail: info@ucmbest.org; web: www.ucmbest.org.

Natural Reserve System (NRS)

The purpose of the NRS is to establish and maintain, for teaching and research, a system of natural areas that encompass diverse and undisturbed examples of California's terrain, both aquatic and terrestrial. The reserves are open to all qualified individuals and institutions for scholarly work concerned with the natural environment. Such work usually deals with ecological topics or experimental studies in a natural setting.

The University of California administers 37 natural reserves throughout the state. Santa Cruz has responsibility for four—the Landels-Hill Big Creek Reserve, Fort Ord Natural Reserve, Año Nuevo Island, and Younger Lagoon Natural Reserve—in addition to the campus's own reserve. Information about the system's holdings and management is available from the director, NRS, University of California, 1111 Franklin Street, Oakland, CA 94607-5200, (510) 987-0150. Web: nrs.ucop.edu. You may also contact the UCSC natural reserve director, c/o Environmental Studies Department, 467 Natural Sciences 2 Building, (831) 459-4971, ghdayton@ucsc.edu. Web: ucreserve.ucsc.edu

Campus Natural Reserve

Approximately 400 acres of campus wildlands were designated by the Regents in the 1988 *Long-Range Development Plan* as a Campus Natural Reserve. This reserve contains redwood forest, springs, a stream, vernal pools, secondary madrone/Douglas fir forest, chaparral, and many soil types and geological formations and structures. The reserve is used for research and teaching and is overseen by the UCSC natural reserve director, c/o Environmental Studies Department, 467 Natural Sciences 2 Building, (831) 459-4971, ghdayton@ucsc.edu. Web: ucreserve.ucsc.edu/. Students may join the volunteer program by contacting ghdayton@ucsc.edu.

Landels-Hill Big Creek Reserve

This 4,000-acre reserve is located in the Santa Lucia Mountains on the Big Sur coast, about two hours by car from the campus. The reserve includes the lower portions of an undisturbed and protected watershed containing numerous terrestrial and aquatic habitats and several geological formations and associated fault systems. The upper watershed is protected by the Ventana Wilderness of the Los Padres National Forest. The reserve's four miles of rocky coastline, located within the California Sea Otter Refuge area and the Monterey Bay National Marine Sanctuary, is now a California Department of Fish and Game Marine Protected Area and provides opportunities for marine research. There are campsites, a modest field-laboratory facility, a cabin for long-term researchers, and a small storage facility. The Big Creek Reserve is managed by the onsite reserve director. Access is controlled, and applications for use should be made to the resident reserve manager, Big Creek Reserve, Big Sur, CA 93920, (831) 667-2543, readdie@biology.ucsc.edu. Web: <http://ucreserve.ucsc.edu/bigcreek/>

Fort Ord Natural Reserve

This 600-acre reserve was added to the system in 1996. It contains Monterey Bay maritime chaparral, an endemic plant community, and coast live oak woodland, grassland, and coastal scrub, including nine species of plants and animals that are listed as endangered, threatened, or of special status. The reserve was part of the former Fort Ord army base and its habitats are relatively intact. The reserve specializes in studies of plant ecology and rare species conservation. It is a 45-minute drive from campus. For information, contact the UCSC natural reserve director, c/o Environmental Studies Department, 467 Natural Sciences 2 Building, (831) 459-4971, ghdayton@ucsc.edu. Web: ucreserve.ucsc.edu

Younger Lagoon Reserve

A 26-acre coastal lagoon and beach next to UCSC's Long Marine Laboratory is part of the NRS. Its waters are a haven for many species of migratory birds, and many small mammals, birds, reptiles, and invertebrates live in its marsh and bank vegetation. A 20-year restoration effort has been initiated. The site provides opportunities for student projects and hands-on involvement in restoration and monitoring. Younger Lagoon is managed by the UCSC natural reserve director and field manager, c/o Environmental Studies Department, 467 Natural Sciences 2 Building, (831) 459-4971, ghdayton@ucsc.edu. Web: ucreserve.ucsc.edu

Año Nuevo Island Reserve

This 25-acre island, part of the 4,000-acre Año Nuevo State Reserve 20 miles north of Santa Cruz, is a university research reserve of the NRS. Northern elephant seals, California sea lions, northern sea lions, and harbor seals breed and haul out at different seasons. The reserve's breeding colony of elephant seals has been the subject of a remarkable 40-year study by UCSC scientists. More than 300 species of land, shore, and sea birds reside in or migrate through the area, which also has a diversity of fish and intertidal organisms. Access to the island is restricted, and UCSC's research use is managed by the UCSC Institute of Marine Sciences (see page 77). An annual use agreement with California State Parks allows research and field work throughout Año Nuevo State Reserve. A small research facility is located on the island, and a day-use facility is available in the state reserve. For further information, call (831) 459-2883, e-mail pamorris@ucsc.edu, or visit the web: nrs.ucop.edu/ano-nuevo.htm.

Physical and Biological Sciences Division

Research Programs/Centers

Microbiology and Biomedical Research.

The Division of Physical and Biological Sciences supports a broad range of biomedical research in the Departments of Chemistry and Biochemistry; Environmental Toxicology; and Molecular, Cell, and Developmental Biology. Structural biology, the molecular biology of RNA, genetics, bioinformatics, chromatin biology, and developmental biology are areas of particular strength. Researchers work in state-of-the-art laboratories, with additional access to shared facilities, equipment, and computational tools. Collaborative research is frequent, both among investigators within the division as well as with faculty in the Baskin School of Engineering, which is internationally recognized for its expertise in computational biology. These collaborative efforts are facilitated by the university's Center for Biomolecular Science and Engineering. There are excellent training opportunities for postdoctoral fellows, and graduate and undergraduate students in areas of biomedical research and the health sciences. Web: biomedical.ucsc.edu

Scientific Discovery through Advanced Computer (SciDAC) and the Supernova Science Center.

The center consists of a partnership among UCSC, UC Berkeley, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, University of Arizona, Stanford University, State University of New York at Stony Brook, and Johns Hopkins University. This group strives for a full understanding, through numerical computation, of how supernovae of all types explode and how the elements have been created in nature. Web: www.supersci.org

Research Facilities

Chemical Screening Center (CSC). UCSC's CSC offers access to high-throughput screening technologies to speed the identification of small molecules that modulate biochemical or cellular processes and have the potential to alter disease states. The CSC maintains a suite of modern robotic instrumentation that permits high-throughput biochemical and cell-based screening of up to 50,000 compounds a day. In addition to targeted and known drug libraries purchased from commercial vendors, the CSC curates a growing collection of natural products. All libraries housed at UCSC are submit-

ted to a panel of screens in diverse organisms, paring each compound with a broad bioactivity profile. Active compounds are prioritized based on potency and phenotype, and target ID may be immediately pursued using affinity approaches. Through collaboration with UC investigators, the CSC aims to accelerate the path from new discoveries in biology to validated biological targets to provide novel small-molecule therapies for fighting diseases such as cancer, malaria, Parkinson's disease and cholera. Web: <http://chemscreen.ucsc.edu>

Climate Change and Impacts Laboratory (CCIL).

The lab is a computational facility sponsored by the National Science Foundation, the California Energy Commission, and UCSC. The facilities include a 32-processor (quad core) Dell PowerEdge M1000e supercomputer, numerous high-performance workstations, and multiterabyte data storage and backup facilities. The goals of CCIL are to calculate scenarios of likely future climate change and to investigate the possible impacts of climate change on the various dimensions of a given region, providing a multidisciplinary and multidimensional view of the possible effects of future climate change at regional scales. The current focus is concentrated on a region centered in California because of its complex topography, diverse microclimates and ecosystems, large and growing population, and vulnerability to water. CCIL members are scientists from the departments of Earth and Planetary Sciences, Ecology and Evolutionary Biology, Environmental Studies, Microbiology and Environmental Toxicology, and Ocean Sciences, and represent a wide range of expertise on aspects of California's human and natural systems. Web: ccil.ucsc.edu

Confocal Microscopy Facility. The facility houses a Zeiss LSM5 Pascal Confocal Microscope System, providing outstanding optical resolution, as well as high-speed scanning. UCSC investigators currently use this system to study neuronal receptor cellular localization, neuronal targeting, *Vibrio cholerae* biofilm formation, and immune cell interactions during immunological tolerance. Web: <http://microbiology.ucsc.edu/confocal.html>

Crustal Imaging Laboratory (CIL). The lab provides researchers with the sophisticated hardware and software resources necessary to perform high-resolution studies of the Earth's surface and outer layers. CIL facilities consist of a network of Sun, Linux, and PC workstations, a variety of input/output and mass-storage

devices, and both commercial and academic multichannel seismic-processing packages for seismic and surface imaging, and geodesy. Research is focused on remote sensing and GPS analysis, surface bathymetric and roughness mapping, and both 2D and 3D seismic-reflection imaging. Web: www.es.ucsc.edu/research/crustal.html

Earth System Modeling Laboratory. The lab is home to the Paleoclimate and Climate Change Research Group, which is presently focused on past and future climatic and environmental change, and hosts several national and international visitors each year. This research takes many forms and involves the use of various kinds of models and observations, as well as a wealth of paleoclimate proxy data from many marine and terrestrial locations. Computing facilities include a Dell PowerEdge M1000e Blade server with 16 PowerEdge M600 blades (2 quad core Xeon processors per blade), numerous high-performance workstations and servers, and multi-terabyte data storage and backup facilities. The computing resources are used for global and regional climate-modeling efforts and data analysis. Web: www.es.ucsc.edu/research/earthsys.html

Electron Microscopy and Digital Imaging Facility.

This facility, located in C230 Earth and Marine Science Building, provides instruments and equipment for light and electron microscopy and digital imaging. Two transmission electron microscopes (TEM) are available. A JEOL 1200 EX TEM equipped with a Gatan Bioscan digital camera is used for general room-temperature applications. The lab also houses a state-of-the-art JEOL 1230 TEM equipped with a Gatan cryostage and transfer device, a Gatan Ultrascan digital camera, and a Gatan 626 video camera. Scanning electron microscopy is done using the lab's Hitachi S-2700 SEM, equipped with a digital imaging system. Web: biomedical.ucsc.edu/EM.html

Electron Spin Resonance Facility. The facility is used to examine the structure and properties of metal-containing inorganic complexes, peptides, proteins, enzymes, nanoparticles, and biological membranes. The facility's Bruker ELEXSYS 580 X-band spectrometer operates in either continuous-wave or pulsed mode, with variable temperature control. A high-sensitivity Bruker EMX is especially useful for the limited sample sizes often encountered in biological studies. Web: biomedical.ucsc.edu/ESR.html

UCSC Greenhouses. Located on the rooftops of buildings on Science Hill, the UCSC Greenhouses provide core support for instructional and research programs in the Departments of Ecology and Evolutionary Biology, and Environmental Studies. The instructional facility, open to the campus community, houses an extensive collection of plants and has both indoor and outdoor classroom areas. Two high-quality research facilities provide equipment, space and staffing for prominent work by faculty, graduate, and undergraduate research. Web: greenhouse.ucsc.edu

Hydrogeology Facilities. These facilities include hardware, software, and technical expertise applied to field sampling and measurements, lab analyses, and computer modeling. Hydrologic equipment and supplies include flow meters and rain gauges, autonomous and networked conductivity, temperature, pressure, and water-content sensors; hydraulic and hand augers and other soil-sampling equipment; level tapes and staff plates; infiltrometers, lysimeters, piezometers, and tensiometers; and a borehole geophysical logging system. Lab space is dedicated to sediment analysis, including instruments for geotechnical and hydrologic testing of core samples. Outstanding analytical facilities are available throughout the Earth and Planetary Sciences and Ocean Sciences departments, the Institute of Marine Sciences, and the Institute for Geophysics and Planetary Physics. Collaborations at numerous regional institutions allow for specialized capabilities for isotopic, grain size, CNS, and other analyses of sediment, rock, and water samples. A dedicated computing lab is well equipped with fast workstations (SunOS, Linux, PC, and Mac), portable (field) computers, printers (black and white, and color), a large-format plotter, scanners, and other devices and associated software for interfacing with field and lab instruments. Web: www.es.ucsc.edu/research/hydro.html

W. M. Keck Isotope Laboratory. The laboratory comprises two mass spectrometers (a thermal-ionization mass spectrometer and a ThermoFinnigan Neptune multiple-collector inductively coupled plasma mass spectrometer) and wet chemical labs, all housed in a class 1000 suite of clean labs. The thermal ionization mass spectrometer is a fully automated, nine-Faraday collector VG Sector 54 equipped with a WARP filter and an ion counting Daly. Offering high-precision isotope measurements for almost all elements in the periodic table, the Neptune is equipped with nine Faraday

collectors and four ion counters, one of which is located behind an RPQ filter to give high-abundance sensitivity. The facilities include separate rooms for cleaning, dissolution and acid preparation, Sr-Nd-Pb-Hf separations, and U-Th-Ra-Pa separations. Single zircon analysis may also be conducted using the mineral separation lab equipped with a Leica binocular microscope. Projects covering Earth sciences, marine sciences, environmental science and archaeology frequently use the W. M. Keck Isotope Laboratory facilities for high-precision isotope measurements. Web: keckisotope.ucsc.edu

W. M. Keck Seismological Laboratory. Researchers at the seismological laboratory are investigating problems in earthquake seismology, plate tectonics, global Earth structure, seismic wave propagation, and nuclear-testing treaty monitoring. This research is conducted using a state-of-the-art computer system including access to a 1950 node cluster and multicore workstations. Field equipment includes a portable broadband seismic network for remote deployments, a terrestrial LiDAR, gravimeter, and borehole pressure and temperature sensors. An earthquake physics laboratory also maintains a TA AR2000ex industrial rheometer for granular flow studies and a Zygo Newview white-light interferometer. Web: www.es.ucsc.edu/research/seis.html

Macromolecular X-ray Crystallography Facility. The facility houses a state-of-the-art rotating-anode/imaging-plate X-ray crystallography data collection suite, a cryosystem, and a collection of Apple, SGI and Linux computer workstations and software for crystallography data collection and computation, molecular visualization, and model building. UCSC scientists have used the facility to investigate the structure of the ribosome, catalytic RNA ("ribozymes"), the spliceosome, and protein structures relevant to cell-cycle regulation. Users of the facility also collaborate with the Lawrence Berkeley National Laboratory's Advanced Light Source synchrotron radiation facility and the Stanford Synchrotron Light Source. Web: biomedical.ucsc.edu/Xray.html

Marine Analytical Laboratories. The Marine Analytical labs are a part of the Institute of Marine Sciences at UC Santa Cruz (see page 77). They consist of a general access analytical facility for the support of research in the marine sciences. Scientific instruments and other equipment to aid research in marine chemistry, biology, geology, and environmental

toxicology are housed in a central lab complex within the Earth and Marine Sciences Building. Analytical instrumentation; instruction in use of the equipment; consultation in experimental design, sampling, analysis, and data interpretation; and general assistance in all aspects of analytical science are available. Web: ims.ucsc.edu/mal

Mass Spectrometry Facility. Mass spectrometry is an analytical technique used to measure the mass-to-charge ratio of chemical ions. The facility currently houses two mass spectrometers: a Thermo Finnigan LC/MS/MS (LTQ) and an Ettan MALDI-TOF. This equipment is capable of determining the molecular weight of both small molecules and peptides, identifying proteins, and characterizing protein modifications. Web: biomedical.ucsc.edu/MassSpecFacility.htm

Microarray Facility. Used for genome-wide splicing and expression analyses of diverse organisms, from microbes to humans, the facility supports both spotted microscope slide and Affymetrix microarray research. Equipment includes an Affymetrix GeneChip system, a robotic microscope slide arrayer, an Axon slide scanner, and a 96-channel automated liquid handler. The staff offer wet-lab expertise to investigators, with bioinformatics specialists from the School of Engineering providing computational support. Web: biomedical.ucsc.edu/Microarray.html

Mineral Physics Laboratory. Experiments to determine the thermochemical and elastic properties of planetary materials at ultrahigh pressure (up to 150 GPa) and temperature (up to 6,000 K) are conducted in this lab. High P-T conditions are generated using the diamond anvil cell coupled with laser heating. Presently, both Raman and infrared spectroscopic facilities are available for characterization of the structural and bonding properties of minerals and fluids in situ at pressures and temperatures characteristic of planetary interiors. In addition, a high-intensity x-ray generator is used to determine the equations of state and phase equilibria of mineral assemblages relevant to the Earth's mantle and core, and a transmission electron microscope is used to analyze crystal defects and for micro-phase identification. Web: www.emerald.ucsc.edu/research/mineral.html

Molecular Ecology and Evolutionary Genetics Facility. The MEEG facility provides molecular technologies for analyses of

the structure and dynamics of genetic diversity found in animal, plant, and microbial populations. The facility includes two ABI 3100 Genetic Analyzers for analysis of DNA sequences and DNA fragments, a Packard Multiprobe II Automated Liquid Handling System to facilitate DNA preparation, and a Becton Dickinson FACSCalibur Flow Cytometer, for immunophenotyping, analyses of cellular ploidy level, absolute cell counting, and cell sorting. The facility is capable of assessing hundreds of samples each week for differences in the DNA sequence of individual genes, specific genetic markers, and overall DNA content. Web: microbiology.ucsc.edu/meeg.html

Nanosecond Time-resolved Laser

Spectroscopy. The Department of Chemistry and Biochemistry maintains several laser spectroscopy systems capable of measuring time-resolved spectra from the far UV to the near IR regions. Various systems are optimized to measure nanosecond-resolution time-resolved absorption spectra, linear dichroism spectra, circular dichroism spectra, magnetic circular dichroism spectra, optical rotatory dispersion, or magnetic optical rotatory dispersion. Software is available to collect and analyze data to obtain kinetics and spectra of reaction intermediates from nanosecond to second time scales. These facilities are used in a wide variety of research, including photochemical and photobiological studies, examination of functional and folding mechanisms of peptides and proteins, and investigation of fast electron and proton transfer in proteins involved in mitochondrial and bacterial respiration. Web: biomedical.ucsc.edu/Laser.html

Nuclear Magnetic Resonance/Mass

Spectroscopy Facilities. The NMR facility brings together an interdisciplinary group of researchers from the departments of Chemistry and Biochemistry and Molecular, Cell, and Developmental Biology. Ongoing research includes structural elucidation of anticancer natural product isolation from marine organisms, organic intermediates for drug synthesis, specially designed peptide intermediates, and oligonucleotide derivatives that remain attached to solid supports. At present, the facility manages four high-resolution NMR spectrometers: two 3-channel Varian Unity+500s with direct and inverse detection probes; a Varian INOVA 600 system with a 600-MHz cold-probe system; and a Bruker/TecMag AC250. Initial funding came from the Lucille

P. Markey Charitable Trust and the W. M. Keck Foundation, as well as individual research grants from the National Institutes of Health, the National Science Foundation, and other sources available to UCSC. Web: chemistry.ucsc.edu/research/nmr.html

Paleomagnetism Laboratory. This lab is located in a remote building specially constructed with nonmagnetic materials and isolated from major sources of man-made magnetic noise. Inside this building, a magnetically shielded room houses a state-of-the-art superconducting magnetometer, a sensitive spinner magnetometer, thermal and alternating field demagnetizers, and paleointensity equipment. A second lab, devoted to the study of rock and mineral magnetic properties and housed in the Earth and Marine Sciences Building, contains another spinner magnetometer, devices for measuring Curie temperatures, magnetic susceptibility and its anisotropy, hysteresis loops, and computer facilities for data analysis and graphics. Web: www.es.ucsc.edu/research/paleomag

Proteomics Facility. Designed to perform large-scale comparisons in protein expression, such as in cancer progression, Parkinson's disease and manganese toxicity, the facility houses an Amersham Ettan Proteomics Lab with Differential Gel Electrophoresis (DIGE) technology. School of Engineering computer scientists will assist in processing the large amounts of protein data generated. Web: microbiology.ucsc.edu/proteomics.html

Rock Preparation Facility. The facility is fully equipped to aid researchers in petrographic section making, rock crushing, sample sieving, and mineral separation. A full-time technical staff member oversees the facility. Web: www.es.ucsc.edu/research/rock.html

Shared Stem Cell Facility (SSCF). This facility comprises an advanced stem cell laboratory for research and training in manipulation techniques and the production of transgenic organisms. It supports faculty-led research and course work for the UCSC CIRM Training Program in Systems Biology of Stem Cells. This facility enables work on non-NIH approved human embryonic stem cell (hESC) lines. The facility consists of a laboratory for embryonic stem cell growth and manipulation, a state-of-the-art transgenic facility, and staff with expertise in experimental design, protocol development, and data analysis. The SSCF suite includes a core cell culture room and a

cell culture training room for instructing individual researchers, small groups, and students taking the stem cell biology laboratory course. Adjoining rooms include a microscopy core, a live imaging and cytometry core, and rooms for reagent preparation and sample processing and analysis. Web: <http://stemcell.ucsc.edu/facilities/sscf>

Stable Isotope Laboratory. This lab is a state-of-the-art facility that houses five isotope ratio mass spectrometers for the isotopic analyses of carbon, nitrogen, hydrogen and oxygen species in solid and liquid samples. Samples can be analyzed from either natural abundance or, in some instances, enriched sources. Front-ends for the IRMSs include two automated carbonate devices and a full suite of continuous-flow peripheral devices. Web: www.es.ucsc.edu/research/sil.html

Santa Cruz Center for International Economics (SCCIE)

The SCCIE is a group of UCSC and other scholars working in the field of international economics, broadly defined to cover international finance, open-economy macroeconomics, international trade, development economics (and linkages with environmental issues), and international political economy. SCCIE applies leading-edge research, in order to understand the most pressing issues in the international arena, including financial crises, global imbalances, world poverty, economic development in China and India, international labor migration, and world-wide trade patterns.

The objective of SCCIE is to broaden understanding of international economic issues by sponsoring faculty and graduate student research, conferences, undergraduate research internships studies, and the exchange of scholars from around the world. The center also supports and participates in nonpartisan programs designed to bring greater public awareness and understanding to policy issues involving international economics. To this end, SCCIE supports public seminars, publication of working papers, and occasional public forums.

For more information, visit the SCCIE web site: <http://sccie.ucsc.edu>; call (831) 459-1553; fax (831) 459-5077; or e-mail: sccie.ucsc.edu.

Santa Cruz Institute for Particle Physics (SCIPP)

The SCIPP was established on the Santa Cruz campus by the Regents in 1980 to coordinate research and instruction in elementary particle physics and related areas. Its staff members, as well as visiting scientists, are engaged in theoretical and experimental particle physics and particle astrophysics projects that concern the fundamental interactions of matter. Additional work includes projects in neurobiology and radiobiology. They are also involved in graduate and undergraduate instruction as regular faculty or adjunct professors, usually with the Department of Physics.

Experimental work such as the design, testing, and construction of large-scale particle detectors, as well as associated electronics, takes place in the development laboratories on campus. Many of the experiments are ultimately performed at large facilities, national or international laboratories, or using space-based detectors.

The detector development at SCIPP is largely concerned with miniaturization of detectors. Design and testing of custom-integrated circuitry is a major facet of this effort. At present, the institute's principal experimental projects include the following:

- Analysis of data from the BaBar detector, with an emphasis on matter-antimatter mixing for charmed particles, and rare "radiative penguin" decays in which a bottom particle decays into an array of light particles accompanied by the emission of a single high-energy gamma ray
- Studies of ultrahigh-energy cosmic-ray showers at facilities associated with Los Alamos National Laboratory and the VERITAS telescope array
- Scientific exploitation of the ATLAS detector at the Large Hadron Collider facility at the CERN Laboratory in Geneva, Switzerland, of which SCIPP played a major role in design and construction; research and development of the future upgrade to the ATLAS detector, including radiation-hardened electronics and silicon sensors and high-speed data transmission, is a parallel activity
- Development of the ground station and flight components for the BARREL balloon program to study the loss of relativistic electrons from the Van Allen belts to Earth's atmosphere
- Development of the ADELE airborne gamma-ray detector to study particle acceleration associated with lightning

- Scientific exploitation of the GLAST orbiting gamma-ray telescope of which SCIPP played a key role in the design and fabrication

Both graduate and undergraduate students take part in these projects, which give them opportunities for thesis work, independent study, and part-time employment. Students have gained experience in electronics, computer-aided design (CAD) and use of scientific instrumentation as well as in actual experimentation and data analysis.

The institute's theorists have broad interests in high-energy physics, astrophysics, and cosmology—subjects that have become increasingly interrelated in recent years. Topics of their recent work have included the following:

- Phenomenological properties of Higgs bosons and formulation of search strategies for their discovery
- Development and analysis of other new theories of particle physics that can be tested at present and future accelerators, especially supersymmetric theories
- Investigations of gauge theories of strong and electroweak interactions, topics in quantum field theory and string theory
- Physics of the early universe including the origin of matter-antimatter asymmetry, inflation, and the nature of the dark matter and dark energy
- Theories of galaxy formation

The theory group collaborates with the SCIPP experimental group, the UCSC astrophysicists and astronomers associated with Lick and Keck Observatories, the large theoretical physics group at SLAC, and theorists at UC Berkeley, UC Davis, and the Institute for Theoretical Physics at UC Santa Barbara. The theory group supports the research and thesis work of graduate students and occasionally supervises undergraduate theses. Web: scipp.ucsc.edu

Social Sciences Division

Research Facilities

Archaeology and Physical Anthropology Laboratories. These laboratories are dedicated to teaching and research in both anthropological archaeology and physical (biological) anthropology. Within the labs are spaces for the study of ceramics, lithics, spatial archaeology (CISR), zooarchaeology, comparative anatomy and osteology, and forensic anthropology. The laboratories maintain collections related to local Monterey Bay archaeology, as

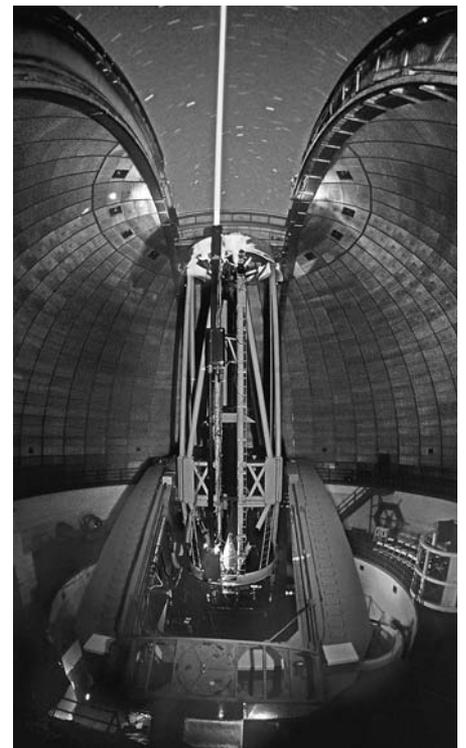
well as comparative vertebrate osteology and taphonomic specimens. Web: anthro.ucsc.edu/labs.shtml

Center for Integrated Spatial Research. See page 71.

Center for Tropical Research in Ecology, Agriculture, and Development (CenTREAD)

is a coalition of faculty and students spanning several departments and centers at UC Santa Cruz. The center fosters interdisciplinary research and training to understand tropical environmental issues and develop ecologically based, economically viable, culturally respectful, nonexploitative solutions that serve as a foundation for future generations. The center offers a variety of undergraduate and graduate courses at UCSC, and strives to provide educational opportunities to U.S. citizens who work in tropical countries and to students from tropical countries. Web: centread.ucsc.edu

Lick Observatory, near San Jose, California, is equipped with a state-of-the-art adaptive optics system that corrects distortion to incoming light caused by atmospheric blurring. Both Lick Observatory and the W. M. Keck Observatory in Hawaii are managed by the University of California Observatories/Lick Observatory (UCO/Lick), headquartered at UCSC.



CineMedia Project (CMP). This is a non-circulating research archive dedicated to the study of Latin American and Latino film and video. CMP, located on the first floor of Casa Latina at Merrill College, is open to UCSC faculty, graduate students, and advanced undergraduates. by making arrangements with the department manager. Visitors may have access to the archive by special arrangements. Visit us at <http://lals.ucsc.edu/research/>.

Life Lab Science Program. Life Lab helps bring learning to life in a garden through curriculum, professional development, and innovative programs at our Garden Classroom site, located on the UCSC Farm.

Museum of Natural History Collections (MNHC). MNHC is dedicated to cultivating an increased understanding and appreciation of the natural world by promoting the use of its natural science collections for teaching, research, and aesthetics. The museum, part of the Environmental Studies Department, is the main repository for natural science collections at UC Santa Cruz. Collections include specimens of plants, fungi, insects, fishes, amphibians, reptiles, birds, and mammals. Web: mnhc.ucsc.edu

Plant Growth Facility (Greenhouses). See page 81.

Social Sciences Media Laboratory. This lab comprises an academic support and resource center for media equipment and services within the Division of Social Sciences. The Media Lab provides technical consultation and support; equipment training; and equipment loans for faculty, students and staff in the division.

The Media Lab has video workstations, audio workstations, digital-photography workstations, and black-and-white chemical darkroom facilities. The lab's facilities are available for use by Social Sciences faculty, undergraduates and graduate students doing research, course work, independent studies and undergraduate or graduate thesis work within the division.

The Media Lab offers lab classes and specialized workshops to educate faculty and students about the technical fundamentals of the video, audio, and photographic medium.

The lab may be contacted by phone at (831) 459-4010 or by e-mail at mmlab@ucsc.edu. Web: http://socialsciences.ucsc.edu/administration/media_lab

South Asia Studies Initiative. UC Santa Cruz is the University of California's campus that meets the needs of Silicon Valley, including the vibrant South Asian diaspora that has contributed to the region's innovations and economic growth. An important aspect of the campus's educational mission is creating a major new South Asia Studies Center with global visibility, contributing to understanding not only South Asia's priceless heritage, but also its future trajectory. The center will focus particularly on India's new role as a leading participant in the world economy, including its emergence as a source of management expertise, entrepreneurship, capital, and innovation. The initiative is a campus-wide collaboration that builds on existing initiatives and research from multiple disciplines and in strong partnership with the region's South Asian community. Currently, the initiative hosts the Mapping the Future of India public lecture series, featuring speakers from around the world focusing on issues of science, technology, economics, and politics in India and the region. For additional information, please contact Andrea Cohen, acohen@ucsc.edu, (831) 459-2919.

UCSC Farm and the Alan Chadwick Garden. See page 69.

University Affiliated Research Center (UARC)

Under a 10-year, \$330 million research contract between NASA and the University of California, which began in September 2003, UC Santa Cruz is leading the UC-wide UARC at NASA Ames. Research, which takes place at the NASA Ames's Moffett Field facility, as well as at several UC campuses, focuses on multi-disciplinary research in the following:

- Materials, energy, and nanoscience
- Information sciences
- Biotechnology and fundamental space biology
- Aerospace systems
- Astrobiology (space, life, and Earth sciences)

In addition to research, UARC offers an educational program via its Systems Teaching Institute, which provides opportunities for students to work alongside university and Ames researchers, enhancing their educational experiences while training them to become 21st-century world-class scientists, engineers, and educators.

To learn more about UARC and its programs, go to uarc.ucsc.edu.

University of California Observatories/Lick Observatory

Lick Observatory was established on Mt. Hamilton in the 1880s as a result of the gift of James Lick, a Pennsylvania piano maker who came to San Francisco in 1848 and amassed a fortune through investment in California real estate. The observatory has been part of the University of California since 1888, when the Lick Trustees conveyed the just completed original installation to the Regents.

UCO/Lick astronomers became a partner with California Institute of Technology astronomers to operate and provide instruments for the W. M. Keck Observatory, located at the summit of Mauna Kea in Hawaii. The two Keck 10-meter telescopes began operating in 1993 and 1996. These are the largest and most capable optical/IR telescopes in the world.

In 1988 the Regents established an organization to manage the university's ground-based optical and infrared observatories as a single unit. Known as the University of California Observatories (UCO), the organization includes Lick Observatory and UC's component of the Keck Observatory. UCO is headquartered at UCSC; the Lick director serves also as the director of UCO. UCO/Lick plays a large role in the Keck enterprise: both of the Keck telescopes' secondary mirrors were polished in the optical laboratory at Santa Cruz, and the high-resolution echelle spectrograph (HIRES), designed and constructed in the instrument-development laboratories here, was the first Keck instrument to become fully operational. The laboratories have also designed and constructed instruments for the second Keck telescope, including a powerful new optical instrument to aid in the search for dark matter (DEIMOS) and a new medium-resolution echelle spectrograph and imager (ESI). Web: www.ucolick.org.

As resident members of the Santa Cruz faculty, the UCO/Lick staff are members of UCSC's Department of Astronomy and Astrophysics, which offers the graduate program in astronomy and astrophysics and an undergraduate minor (see page 143). A B.S. degree in astrophysics is offered through the Physics Department (see page 411). The UCO laboratories are located on campus, as are optical, electronics, engineering, programming, and detector and instrument-development groups. There are resources for measurement, analysis, and computation of data on campus as well.

The telescopes and accompanying facilities on the 3,762-acre reservation on Mt. Hamilton

east of San Jose are operated as an observatory, with faculty, research, and student observers commuting to the facility. Telescopes include the Lick 36-inch refractor, the Carnegie 20-inch twin astrograph, and the CAT 24-inch, Crossley 36-inch, Nickel 40-inch reflectors, and the Katzman 30-inch robotic reflector, dedicated to searching for supernovas. The newest telescope is the Automated Planet Finder, which is in the final stages of completion. The largest and most powerful of the Lick telescopes is the Shane 120-inch reflector, which was completed in 1959 and is one of the world's most effective telescopes. The observatory's equipment also includes a variety of auxiliary instruments used in connection with observations at the 120-inch telescope. Among the most recent is the Hamilton echelle spectrograph, judged to be one of the world's most efficient instruments for high-resolution analysis of the light of stars and galaxies and the instrument by which astronomers have discovered new planets outside our solar system. Other instruments include the Kast double spectrograph, a pioneering example of UCO/Lick's innovative instrumentation capabilities; the multiple-object spectrograph, which gives astronomers the opportunity to look at the spectra of 100 objects simultaneously; and the prime-focus Wide Field Camera, capable of taking digital images of large areas of the sky. One of the most exciting technological innovations developed at Lick Observatory, in conjunction with Lawrence Livermore National Laboratory, is the use of an adaptive-optics system with an artificial laser-produced guide star to correct distortions to incoming light caused

by the blurring effects of the atmosphere. The observatory is a systemwide facility used extensively by observers and students from other UC campuses and the national laboratories.

UCSC's courses in astronomy and astrophysics are taught on campus. Advanced students gain observing experience with the Mt. Hamilton telescopes and conduct research directed by the staff.

UCO/Lick astronomers work on a wide variety of astrophysical problems, including solar system and star formation, stellar evolution, the origin and evolution of the Galaxy and external galaxies, abundances of the chemical elements, and the size, structure, and evolution of the universe.

Since 2000, UCO has been a partner in a project to build a giant telescope (30-meter diameter primary mirror) and the adaptive optics systems and instruments that will make this the most powerful astronomical facility of the coming decades. This project—in a \$63 million design and development phase—is called the Thirty-Meter Telescope (TMT).

Center for Adaptive Optics (CfAO)

The Center for Adaptive Optics is a Science and Technology Center that was funded for 10 years by the National Science Foundation (NSF) and is now funded by the University of California. The Center is headquartered at UC Santa Cruz, with members from eight other UC campuses and with many academic and industrial affiliates. Its mission is to advance and disseminate the technology of adaptive optics (AO) in service to science, health care, industry, and education. Its goal is to

lead the revolution in AO by developing and demonstrating the technology, creating major improvements in AO systems, and catalyzing advances nationwide. The CfAO implemented a highly successful education program to teach our graduate students methods of inquiry-based science teaching, and to apply this knowledge in programs that attract and retain a new generation of scientists, particularly among women and underrepresented minorities. This education program now resides in the Institute for Scientist and Engineer Educators at UCSC, which serves graduate students throughout the science and engineering fields. The Akamai Workforce Initiative, a partnership between the University of Hawaii's Institute for Astronomy, UCSC's CfAO and ISEE, and Maui Community College, runs education and internship programs in Hawaii. The CfAO is building on UC's strong leadership in AO by connecting UC campuses, by fostering research collaborations across disciplines, and by developing the next generation of young leaders in this field. The center brings together UC astronomers and vision scientists, today's primary users of AO, with UC engineers and technologists who design and construct these systems. A hardware-based outgrowth of the center, the Laboratory for Adaptive Optics within UC Observatories, was established through a \$9 million grant from the Gordon and Betty Moore Foundation. This state-of-the-art laboratory explores new AO techniques, develops and tests new components, and provides training for our students and postdocs. E-mail: cfao@ucolick.org
Web: cfao.ucolick.org and lao.ucolick.org



Under a 10-year, \$330 million agreement between NASA and the University of California, UC Santa Cruz is leading the UC-wide University Affiliated Research Center (UARC), which focuses on multidisciplinary research in nanotechnology, information sciences, biotechnology and fundamental space biology, aerospace systems, and astrobiology (space, life, and Earth sciences). In addition to research, UARC offers an educational program through its Systems Teaching Institute, which provides opportunities for students to work alongside university and Ames researchers while training to become 21st-century scientists, engineers and educators. All of this important work is being done at UCSC's Silicon Valley Center, located in the heart of Silicon Valley at NASA Ames's Moffet Field facility.

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The Colleges

The University of California, Santa Cruz, is a collegiate university. All undergraduate students and most faculty are affiliated with one of the colleges, their home within the larger university. The colleges are committed to fostering a nurturing and academically thriving environment for students of all backgrounds. Each college strives to promote the attributes of a diverse and multicultural community in its own unique way. In order of founding, the colleges are Cowell, Stevenson, Crown, Merrill, Porter, Kresge, Oakes, College Eight, College Nine, and College Ten.

Self-contained and architecturally distinct, each college is a relatively small community of 30 to 110 faculty members and between 1,400 and 1,500 students, about half of whom live on campus. Each college has its own housing, as well as academic and recreational programming, and each is an integral part of the larger campus. The colleges have their own academic emphases and cultural traditions, although each seeks faculty and students from a variety of disciplines to foster broad intellectual interests. The colleges play a primary role in academic advising and are the center of student life. Students graduate from their college. At the same time, *all university academic programs, resources, and student services are open to students of every college.*

The information students need to rank their college preferences can come from a variety of sources—personal acquaintance, a campus visit, literature available from the colleges, and the descriptions in this section of the catalog. Entering students are asked to list several colleges in order of preference; whenever possible, students are assigned to the college of their choice.

Similarities and Differences

Each college is residential and able to house close to half of its students. Most frosh choose to live on campus, as do a number of sophomores, juniors, and seniors. The particular style of housing varies among the colleges, ranging from residence halls, with a mix of single, double, and triple rooms, to apartment-style housing, where students live together in small groups and may do some of their own cooking. Faculty, staff, and graduate students, along with undergraduate resident assistants, reside in college housing units.

The faculty, or fellows, of each college come from a variety of academic disciplines; many faculty have their offices in the colleges.

Each college offers a distinctive academic program for entering frosh. The required fall course provides a significant bridge between academic and residential life, since all frosh, regardless of major, will be in the course, and most will be in residence as well. Stevenson's core course extends over two quarters, while the other colleges offer one-quarter courses. College core course requirements for transfer students vary (see page 36). The colleges also offer selected courses in their area of interdisciplinary emphasis and host events and speakers that enhance this focus.

Each college provides academic advising as well as academic and general campus orientations to help you plan your academic program. College academic preceptors and advisers provide advice on general academic matters outside a student's major, including general education, choosing a major, and strategies for academic success. (See pages 40–42 for further information on academic advising.) Psychological and personal counseling is also available in each college, and many colleges have well-developed peer advising and tutoring.

The colleges differ in architecture; each was planned by a different architect, who was encouraged to convey the distinct personality of that college through the design of its buildings and their placement in the natural environment. Above all, the colleges differ in subtle ways having to do with their intellectual and social traditions, the different designs of their student governments, and the predominant interests of their students and faculty.

Changing Colleges

Most students, having affiliated with a particular college, develop friendships and intellectual attachments there, and they remain members of that college throughout their undergraduate years. Some students find that changing academic interests draw them to a different college. During the specified filing period, students may request a change of college with the approval of both college administrations.

Cowell College

Cowell College inaugurated the Santa Cruz campus when it opened with a pioneer class of 600 students in 1965. The founding faculty shaped an educational program that challenged and enriched students through wide-ranging inquiry and disciplined study.

Today, Cowell has more than 1,500 affiliated students and 100 faculty fellows. Its motto—The Pursuit of Truth in the Company of Friends—expresses a continuing commitment to create a serious academic environment within a humane and broadly inclusive community. The college is named for the S. H. Cowell Foundation, which endowed the college at its founding.

Academic Emphases

The academic theme of the college encourages students to pursue their general and disciplinary study with attention to the values of liberal arts education: understanding one's individual perspective by exploration of its historical background and world context. Students affiliated with the college pursue majors from all departments on campus.

The faculty fellows affiliated with the college represent all academic divisions (arts, engineering, humanities, physical and biological sciences, and social sciences). The faculty fellows guide the college academic programs and serve as academic mentors to the students, supplementing the advising provided by the college academic advisers and departmental advising.

In satisfying their general education requirements, first-year Cowell students are required to take the Cowell Core Course in the fall term. The core course, Cowell 80, taught in small seminar sections, seeks to develop critical reading, analytical writing, and seminar discussion skills by reading a selection of classic and contemporary texts focused on the theme of justice.

The college academic buildings house humanities faculty, with notable concentrations in philosophy, classics (study of ancient Greek and Latin language and civilization), and modern foreign languages, especially Chinese, French, Italian, Russian, German, and Japanese. Interdisciplinary faculty groups in visual and performance studies and in pre- and early-modern studies are centered at Cowell College.

Students who develop ideas for research, creative projects, community service, or internship experiences may apply to the college provost for financial support. The college awards several annual scholarships, sponsors prizes for outstanding academic work.

The college enriches the intellectual and cultural life of the campus by sponsoring events of various kinds: lectures and presentations by local faculty and visiting scholars, theatrical

and musical performances, and forums and debates on topics of current interest.

College Community and Facilities

Cowell's seven residence halls and three apartment buildings are arranged in three quadrangles on a hillside overlooking the city of Santa Cruz and Monterey Bay. About 675 students are housed in the college. Each residence hall houses from 40 to 60 students and is divided into two wings, with seven to 11 residents on each floor. Most floors are coed, with men and women sharing common lounges and other facilities, but single-gender floors are provided for those who prefer this arrangement. Apartments house 185 continuing students in six-person units. The residential staff members facilitate diverse educational, social, and recreational programming to enhance the living and learning environment.

Arranged around the college's central plaza are the dining hall, the Page Smith Study Library, the fireside lounge, the coffee shop, and conference rooms and classrooms. Unique to Cowell College are the Eloise Pickard Smith Gallery, which regularly mounts exhibits, and the Cowell Press, where students can learn the fine technique of hand-operated letterpress printing.

Since the college's founding, regularly scheduled College Nights in the dining hall have offered students, staff, and faculty a special meal and a rich mix of after-dinner programs presented by students and professional artists. Community life is enlivened by many other scheduled and impromptu intellectual, cultural, and social events.

The Student Senate meets weekly to discuss campus issues and student government. The Senate advises the college on the allocation of funds for student activities and programs. Members of the Senate are selected each year by lot, but any student may become a voting member by steady attendance at meetings. The college's multicultural advisory board works with staff to create a supportive community for students of color affiliated with the college and to increase awareness of the many dimensions of diversity in the community.

For more information on the college, see www2.ucsc.edu/cowell or call (831) 459-2253.

Cowell Faculty and Staff

Provost

DEANNA SHEMEK, *Italian Literature*

Fellows

KAREN BASSI, *Classics*

MARCO BATTAGLIA, *Santa Cruz Institute for Particle Physics*

JAMES H. BIEMAN, *Theater Arts (Drama)*

HUNTER BIVENS, *Comparative and German Literature*

JOHN BOWIN, *Philosophy*

DONALD BRENNIS, *Anthropology*

JEAN P. BRODIE, *Astronomy and Astrophysics*

GIULIA CENTINEO, *Italian Language*

SANDRA CHUNG, *Linguistics*

PHILIP CREWS, *Chemistry*

JONATHAN ELLIS, *Philosophy*

ANGELA ELSEY, *French Language*

MARK FRANKO, *Theater Arts*

CAROL M. FREEMAN, *Writing*

SAKAE FUJITA, *Japanese Language*

RAYMOND W. GIBBS JR., *Psychology*

WLAD GODZICH, *Literature*

DANIEL GUEVARA, *Philosophy*

GILDAS HAMEL, *French Language and Classical Studies*

CHARLES W. HEDRICK JR., *History*

THEODORE HOLMAN, *Chemistry and Biochemistry*

CHRISTINE HONG, *Literature*

THEO HONNEF, *Literature*

DAVID C. HOY, *Philosophy*

JOCELYN HOY, *Philosophy*

GRETA HUTCHISON, *French Language*

MICHAEL M. HUTCHISON, *Economics*

KIMBERLY JANNARONE, *Theater Arts*

KEVIN KARPLUS, *Computer Engineering*

DAVID KEENAN, *Chinese Language*

WILLIAM A. LADUSAW, *Linguistics*

CAMPBELL LEAPER, *Psychology*

H. M. LEICESTER JR., *English Literature*

PATRICE L. MAGINNIS, *Music*

TYRUS MILLER, *Literature*

GLENN L. MILLHAUSER, *Chemistry and Biochemistry*

JEROME NEU, *Philosophy*

WILLIAM NICKELL, *Russian Literature*

JASON NIELSEN, *Physics*

MATTHEW O'HARA, *History*

CHARLES L. (LEO) ORTIZ, *Ecology and Evolutionary Biology*

RICHARD E. OTTE, *Philosophy*

MARIA (TONIA) PRENCIPE, *Italian Language*

S. RAVI RAJAN, *Environmental Studies*

FRANK A. RAMIREZ, *Spanish Language*

BETH REMAK-HONNEF, *Librarian*

PAUL ROTH, *Philosophy*

ZACK SCHLESINGER, *Physics*

SUSAN Y. SCHWARTZ, *Earth and Planetary Sciences*

DEANNA SHEMEK, *Italian and Comparative Literature*

CATHERINE M. SOUSSLOFF, *History of Art and Visual Culture*

ABRAHAM D. STONE, *Philosophy*

JOSHUA M. STUART, *Biomolecular Engineering*

NINA TREADWELL, *Music*

ANTHONY J. TROMBA, *Mathematics*

GEORGES VAN DEN ABEELE, *Literature*

THOMAS WALSH, *Literature*

PAUL WHITWORTH, *Theater Arts*

JAMES WILSON, *Writing, College Academic Preceptor*

Emeriti Fellows

W. EMMANUEL ABRAHAM, *Philosophy, Emeritus*

GEORGE T. AMIS, *English Literature, Emeritus*

HARRY BERGER JR., *English Literature and Art*

History, Emeritus

RALPH J. BERGER, *Ecology and Evolutionary Biology, Emeritus*

MARGARET R. BROSE, *Italian and Comparative Literature, Emerita*

CHARLES W. DANIEL, *Molecular, Cell, and Developmental Biology, Emeritus*

JOHN DIZIKES, *American Studies, Emeritus*

ROBERT M. DURLING, *Italian and English Literature, Emeritus*

MIRIAM ELLIS, *French Language, Emerita*

MARY-KAY GAMEL, *Classics and Comparative Literature, Emerita*

ROBERT GOFF, *Philosophy, Emeritus*

MARGO HENDRICKS, *Literature, Emerita*

VIRGINIA JANSEN, *History of Art and Visual Culture, Emerita*

S. PAUL KASHAP, *Philosophy, Emeritus*

BRUCE D. LARKIN, *Politics, Emeritus*

THOMAS A. LEHRER, *American Studies and Mathematics, Emeritus*

JOHN P. LYNCH, *Classics, Emeritus*

MELANIE J. MAYER, *Psychology, Emerita*

GARY B. MILES, *History, Emeritus*

ANDREW TODD NEWBERRY, *Ecology and Evolutionary Biology, Emeritus*

RICHARD R. RANDOLPH, *Anthropology, Emeritus*

AUDREY E. STANLEY, *Theater Arts, Emerita*

THOMAS A. VOGLER, *English and American Literature, Emeritus*

MICHAEL J. WARREN, *English Literature, Emeritus*

HAYDEN WHITE, *History of Consciousness, Emeritus*

STANLEY M. WILLIAMSON, *Chemistry and Biochemistry, Emeritus*

College Administrative Officer

E. JAMES CARTER

Staff

DEBORAH ALEXANDER, *Dining Hall Manager*

ELIZABETH COWAN, *Financial/Budget Specialist*

CLAIRE CRUM, *Groundskeeper*

DEBRA ELLIS, *Coordinator for Residential Education*

JOHN HADLEY, *Coffee Shop Manager*

KAREN HILKER, *Associate College Programs Coordinator*

ROBERT MANDELL, *Senior Building Maintenance Worker*

DANIELLE MELLO, *Academic Adviser*

JED MILROY, *Housing Coordinator*

DAN MONKO, *Facilities Asset Coordinator*

MARY JAN MURPHY, *Counseling Psychologist*

EMILIO NAVARRO, *Senior Building Maintenance Supervisor*

JASON NELSON, *Senior Building Maintenance Worker*

LINDA POPE, *Gallery Curator*

GARY ROE, *Groundskeeper*

CATHERINE SHENDER, *Advising and Records Coordinator*

S. JADEN SILVA-ESPINOZA, *Assistant to the Provost and the College Administrative Officer*

SHANNON SMIGO, *Coordinator for Residential Education*

KARA SNIDER, *College Programs Coordinator*

TONY SOOTTINANCHAI, *College Assistant*

SARAH STEIGER, *Senior Academic Preceptor*

ADRIANNE WAITE, *Associate College Administrative Officer*

NICK YUKICH, *Community Safety Officer, Zone Supervisor*

Stevenson College

We are Stevensonians; we are free agents of history and masters of our own destinies. Every one of us is important, and we cherish our differences as much as we cherish our shared values of love, chivalry, honesty, hard work, and responsibility.

—Seung Kyun Joseph Mok,
Stevenson Alumnus/Regents Scholar

Stevenson College is named after former statesman and U.S. Ambassador to the United Nations Adlai E. Stevenson. Our faculty, students, and staff take pride in intellectual critical inquiry, academic and civic leadership, and respect for students' concerns about shared student governance, human rights, and social justice.

Stevenson College has a long-standing reputation for excellence in liberal education. The college strives to provide an academically, culturally, and socially supportive environment for all its members, fostering social responsibility and academic achievement. Stevenson has brought to the campus distinguished individuals such as Senator George McGovern, Congresswoman Bella Abzug, Nobel Laureate Elie Wiesel, Chief of the Miwok Tribe Greg Sarris, Producer Lourdes Portillo, and Associate Director-Counsel Theodore M. Shaw of the NAACP Legal Defense and Educational Fund.

The college's faculty and staff offer professional and personal service for the diverse needs of students. Faculty and staff assist students in all areas of their academic and social experience at Stevenson College, and are committed to instilling respect for the diverse backgrounds of Stevenson students.

Academic Emphases

- Faculty drawn from social sciences, humanities, natural sciences
- Two-quarter frosh core course
- Writing Assistants
- Junior Fellows Program

Stevenson distinguishes itself as the only college with a two-quarter core course intended to provide all first-year students with a common academic experience. The core course allows for more rigorous development of students' critical, writing, and analytical skills. It provides a unique learning environment and a supportive intellectual community for all Stevenson first-year students. Those admitted as transfer students are exempt from the core course requirement but may take the core course at their option pending available space; lower-division transfer students who, prior to enrolling, have not completed at least one UC-transferable college English composition course with a minimum grade of C (2.0) are able to take the core course to satisfy the C1 requirement. Stevenson alumni can be found in legal, political, educational, engineering, medical, computer and information sciences, business, and public administration careers, among others.

The faculty at Stevenson, drawn from a variety of disciplines in the social sciences, humanities, and physical and biological sciences, share a common concern for the study of social processes that shape modern society and determine the quality of our individual lives throughout various global regions and periods of world history. Linguistics, sociology, history, politics, psychology, biology, chemistry, and computer science are strongly represented in the college.

The Stevenson core course, *Self and Society* (see page 455), enables students to examine the nature of the self and the relationship of the individual to society. In addition, the course fosters an intellectual commitment to the general philosophy that has helped to define Stevenson College since its inception: preservation of human dignity, the social cultivation of individual creativity and citizenship, and a belief in ethical responsibility. The core course reflects the college's long-standing commitment to interdisciplinary and culturally diverse readings, while at the same time it affords students an opportunity to develop research interests, to acquire greater understanding of the role of research universities in contemporary societies, and to acquire the requisite skills to engage in increasingly more sophisticated intellectual work while at UCSC.

The Stevenson College Junior Fellows Program offers juniors and seniors an opportunity to serve as instructors in *Self and Society*. Junior fellows, who must have completed outstanding work in *Self and Society* during their first year, undergo a rigorous application and selection process. Junior fellows (enrolled in Stevenson 120, *Teaching Practicum*) earn 5 course credits.

Stevenson provides writing assistance for all of its students. Stevenson Writing Assistantships are paid student positions open to juniors and seniors with excellent academic records.

College Community Programs

- College Nights
- Stevenson Student Council
- Stevenson Ethics Bowl Team
- Multicultural Advisory Committee (MAC)
- Path to a Greener Stevenson (PTAGS)
- Social and Multicultural Programs/Activities
- Stevenson Housing Association (SHA)
- Rainbow Theater

Stevenson holds regular College Nights, where joining together for a special dinner presents an opportunity for Stevenson faculty, staff, and students to get together in a social context. College Nights—such as Cinco de Mayo, Chinese New Year, Vietnamese College Night—provide the opportunity to celebrate many different cultures. Dinner is followed by entertainment.

The Stevenson Student Council meets on Thursday evenings. This group is responsible for allocating college membership fees to student activities. The council also serves as a forum for the discussion of college and campuswide issues and appoints student representatives to college and campuswide committees.

Facilities

- Eight small residence halls
- Three apartment buildings
- Theme floors in residence halls:
 - Multicultural and Social Justice House
 - Outdoor Adventure House
 - Continuing Student House
- Coffee house
- Wagstaff Fireside Lounge
- Writers' Center
- Stevenson Library
- Stevenson Event Center

- Silverman Conference Room
- Recreation room

Stevenson has a wide variety of facilities and activities to appeal to many tastes. The college, designed by San Francisco architect Joseph Esherick, has won many architectural awards. The buildings are situated amid redwood trees and sprawling lawns, and the main quad overlooks Monterey Bay. Stevenson is situated close to the campus bookstore, restaurants, McHenry Library, gym, and pool. There are eight small residence houses at the college providing a choice of single-gender or coed floors; each house accommodates about 65 undergraduates. The apartments provide space for 156 continuing students. Nearby are a picnic area, playing fields, and a garden.

The Stevenson Coffee House, which has become *the* gathering place in the college, is a friendly and inviting spot to enjoy lunch or an espresso and pastry—indoors or out on the patio. It is the scene of lively conversation, occasional musical entertainment, and chess matches. Adjoining the coffee house is the recreation room, with Ping-Pong, foosball, pool tables, and television. This area is also the site of much socializing and spontaneous group activity.

In contrast, the Stevenson Library is a striking building designed for quiet reading and study. The Wagstaff Fireside Lounge, a retreat for relaxed discussion, is also used for recitals, special lectures, meetings, and residence house activities. Art exhibits (both student and professional) are on display throughout the year in the lounge, library, and coffee house.

For more information, call (831) 459-4930 or visit the web site: stevenson.ucsc.edu.

Stevenson Faculty and Staff

Provost

ALICE YANG, *History*

Senate Faculty Fellows

JUDITH AISSSEN, *Linguistics*
 PRANAV ANAND, *Linguistics*
 DAVID ANTHONY, *History*
 DANE ARCHER, *Sociology*
 ELLIOT ARONSON, *Psychology, Emeritus*
 JONATHAN F. BEECHER, *History*
 ILAN BENJAMIN, *Chemistry and Biochemistry*
 PETER H. BODENHEIMER, *Astronomy and Astrophysics*
 REBECCA BRASLAU, *Chemistry and Biochemistry*
 FRANK G. BRIDGES, *Physics*
 BRIAN CATLOS, *History*
 MARK CIOC, *History*
 CATHERINE R. COOPER, *Psychology and Education*
 NATHANIEL DEUTSCH, *History*

MICHAEL DINE, *Physics*
 G. WILLIAM DOMHOFF, *Psychology, Emeritus*
 DONKA FARKAS, *Linguistics*
 HIROSHI FUKURAI, *Sociology*
 ROBERT E. GARRISON, *Earth and Planetary Sciences, Emeritus*
 HERMAN GRAY, *Sociology*
 MARVIN J. GREENBERG, *Mathematics, Emeritus*
 ISEBILL V. GRUHN, *Politics, Emerita*
 HOWARD E. HABER, *Physics*
 CRAIG W. HANEY, *Psychology*
 JORGE HANKAMER, *Linguistics*
 DAVID M. HARRINGTON, *Psychology*
 AIDA HURTADO, *Psychology*
 JUNKO ITO, *Linguistics*
 CATHERINE JONES, *History*
 MICHAEL KAHN, *Psychology, Emeritus*
 AL KELLEY, *Mathematics, Emeritus*
 PETER KENEZ, *History*
 KENNETH KLETZER, *Economics*
 JOSEPH P. KONOPELSKI, *Chemistry and Biochemistry*
 ROBERT P. KRAFT, *Astronomy and Astrophysics, Emeritus*
 JEAN H. LANGENHEIM, *Ecology and Evolutionary Biology, Emerita*
 ROBERT A. LEVINSON, *Computer Science*
 RONNIE D. LIPSCHUTZ, *Politics*
 MARC S. MANGEL, *Environmental Studies*
 JAMES McCLOSKEY, *Linguistics*
 DENNIS C. McELRATH, *Sociology, Emeritus*
 GRANT MCGUIRE, *Linguistics*
 R. ARMIN MESTER, *Linguistics*
 MARCIA MILLMAN, *Sociology*
 CARLOS G. NOREÑA, *Philosophy, Emeritus*
 GREG O'MALLEY, *History*
 JAYE PADGETT, *Linguistics*
 THOMAS F. PETTIGREW, *Psychology, Emeritus*
 IRA POHL, *Computer Science*
 CYNTHIA POLECRITTI, *History*
 ANTHONY R. PRATKANIS, *Psychology*
 RALPH H. QUINN, *Psychology*
 CRAIG REINARMAN, *Sociology*
 FORREST ROBINSON, *American Studies*
 DONALD T. SAPOSNEK, *Psychology*
 PETER L. SCOTT, *Physics, Emeritus*
 BUCHANAN SHARP, *History*
 PRISCILLA W. SHAW, *English and Comparative Literature, Emerita*
 WILLIAM F. SHIPLEY, *Linguistics, Emeritus*
 M. BREWSTER SMITH, *Psychology, Emeritus*
 ELLEN SUCKIEL, *Philosophy*
 MARSHALL SYLVAN, *Mathematics, Emeritus*
 DANA TAKAGI, *Sociology*
 HIROTAKA TAMANOI, *Mathematics*
 KIP TÉLLEZ, *Education*
 DAVID J. THOMAS, *Politics, Emeritus*
 BRUCE THOMPSON, *History*
 JOHN N. THOMPSON, *Ecology and Evolutionary Biology*
 AVRIL THORNE, *Psychology*
 MARK TRAUGOTT, *History*
 MICHAEL E. URBAN, *Politics*

MATT WAGERS, *Linguistics*
 HOWARD H. WANG, *Molecular, Cell, and Developmental Biology, Emeritus*
 MANFRED K. WARMUTH, *Computer Science*
 RICHARD A. WASSERSTROM, *Philosophy, Emeritus*
 CANDACE WEST, *Sociology*
 MARILYN WESTERCAMP, *History*
 HAROLD WIDOM, *Mathematics, Emeritus*

Core Course Fellows

EMILY ABBINK
 CAREN CAMBLIN
 EDWARD KEHLER
 BRIJ LUNINE
 DARLENE PURSLEY
 JESSICA SAMUELS
 KEVA SILVER
 MICHAEL TASSIO
 BRUCE THOMPSON
 AMY WEAVER

Honorary Fellows

JACK BASKIN
 BORIS KEYSER
 NORMAN LEZIN
 ELEANOR MCGOVERN
 CHARLES NEIDER
 CHARLES H. PAGE
 WILLIAM M. ROTH
 ALMA SIFUENTES
 F. M. GLENN WILLSON

Stevenson Fellows-in-Residence

GEORGE MCGOVERN (1982)
 BELLA ABZUG (1983)
 PAUL SARBANES (1983)
 ARTHUR S. FLEMMING (1984)
 CAROLE KING (1985)
 CLARK KERR (1987)
 PETER SHAFFER (1987)
 DONALD MCHENRY (1988)
 PAT CONROY (1990)
 MOCTESUMA ESPARZA (1992)
 LOURDES PORTILLO (1992)
 GREG SARRIS (1997)
 JESSE JACKSON (1998)
 AMIRI BARAKA (1999)
 RON DELLUMS (1999)
 THEODORE M. SHAW (2002)

College Administrative Officer

E. JAMES CARTER

Staff

MARY ALVAREZ, *Academic Adviser*
 CAREN CAMBLIN, *Core Course Coordinator*
 JOSEPH CARTER, *Community Safety Officer*
 SADEK CHAKIB, *Community Safety Officer*
 ELIZABETH COWAN, *Financial/Budget Specialist*
 DARLENE DENNY, *Groundskeeper*
 LAUREN DUN, *Assistant College Programs Coordinator*

ELIDA ERICKSON, *Coordinator for Residential Education*

CANDACE FREIWALD, *Academic Services Supervisor*

JOHN HADLEY, *Coffee House Manager*

LINDA HART, *Housing Coordinator*

RACHEL JABLON, *Associate College Administrative Officer for Student Life*

MICHELLE KALUS, *Academic Programs Coordinator/Academic Adviser*

GUSTAVO NOLAZCO, *College Assistant/Records Coordinator/Mail Services Supervisor*

STAN PRATHER, *Coordinator for Residential Education*

PAUL RICHTER, *Community Safety Officer*

AVA SNYDER, *Police Captain/Liaison*

MICHAEL TASSIO, *Provost Assistant*

AMY WEAVER, *Writing Program Coordinator*

SARMA WILLIAMS, *Coordinator for Residential Education*

MARIE YOO, *Senior Academic Preceptor*

NICK YUKICH, *Community Safety Officer*

Crown College

Crown College faculty and students represent a wide variety of academic disciplines. The majority of the faculty are in the physical, biological and social sciences. Although Crown has more science and engineering students than any of the other colleges, the majority of Crown's students major in the social sciences, humanities, and arts. This diversity of interests and thinking enriches our intellectual environment.

An important goal of the college is to foster an appreciation for the contributions of diverse cultural groups and to provide an atmosphere in which issues of both diversity and common social purpose are integrated into a wide range of programs and discussions.

Crown is located on a hilltop surrounded by a redwood forest. The core buildings consist of an administration office, dining commons, lounge spaces, recreation facilities, study spaces, faculty offices, and classrooms built around a large patio and central fountain. The award-winning architecture with its white walls and high-pitched tiled roofs suggests a hillside Mediterranean village. The college's residential facilities are made up of eight traditional residence hall buildings and eight apartment buildings housing approximately 700 students. The facilities at Crown College were built through a partnership of public funds and a gift from the Crown Zellerbach Foundation.

Academic Emphases

From the time of its founding in 1967, issues pertaining to the role of science and technology in society have been a focus of special interest at Crown College. We approach these issues from an interdisciplinary perspective that recognizes the influence of social and cultural factors on the scientific enterprise, as well as the ways in which science and technology influence our society.

The Crown College core course, Crown 80A or 80B, *Ethical Issues in Emerging Technologies*, is an interdisciplinary seminar concerning the effects of these world-changing technologies and encourages students to develop decision-making strategies to steer these technologies. The course examines the impacts of these technologies on society using a variety of disciplinary approaches that engage the perspectives of both humanists and scientists. The fall-quarter core course is required of all nontransfer students during their first quarter at UCSC. As with the core courses from our sister colleges, the development of critical reading and writing skills is a major thrust of Crown 80A and 80B. (See page 184 for the course description.)

The Crown Science and Engineering Learning Community is an innovative program to support first-year students who are interested in pursuing a major in engineering and the sciences. Students enrolled in this program live together, forming a supportive community promoting collaborative learning and group problem solving. To facilitate this process, students are placed in a special section of Chemistry 1A or Math 3 and participate in a residentially based study group. The program is designed especially for students who have a strong interest in the sciences but feel slightly underprepared for university-level course work. It often acts as a bridge to the ACE Program in the physical and biological sciences and engineering (see page 43). Participation—limited to first-year students at Crown College—requires a commitment to succeed, a willingness to work hard, and a positive attitude.

The Engineering Learning Community for ACCESS scholars focuses on underrepresented student success in the field. Students receive support from the Baskin School of Engineering, including tutoring, mentoring, and specialized programs.

Juniors and seniors can participate in the college's Undergraduate Research Fellowship Program, which awards \$800 fellowships to student-faculty teams and encourages their interaction through undergraduate research.

College Community and Facilities

Crown sponsors a wide variety of cocurricular events spanning cultural, educational, and social areas of interest. One popular series is the Science/Public Affairs Tables, informal dinners at the Provost House that offer students an opportunity to socialize with a faculty member outside the classroom and learn about his or her research.

Students become involved in Crown life by both initiating and participating in a wide range of activities. Social activities vary each year according to the interests of students. At the monthly College Night in the dining commons, a special dinner is followed by entertainment, both often sharing a common cultural theme. Some major events have become a tradition: for example, Karaoke College Night, the Crown Formal, and Regression Night. Crown activities and dances draw students from all over campus. Outdoor activities organized by the student government, College Programs Office, or residential staff range from whale watching on the Monterey Bay to atomic bowling and from backpacking to stargazing.

The Social Fiction Conference every April brings students, staff, faculty, and community members together to focus on the intersection of social justice issues with the genres of science fiction, fantasy, and gaming.

The Crown Student Senate (CSS), the elected student government at Crown, holds open weekly meetings to recommend fund allocations for student activities and to discuss issues of concern to students and the college. CSS also sponsors events to enhance the college experience, including the very popular Casino Night.

Crown offers two types of residential facilities: residence halls and apartments. Eight traditional residence halls each house approximately 60 students in single, double, and triple rooms in a coed environment (single-gender bedrooms with unisex bathrooms) or on all-female floors. For students particularly interested in living with and learning about a special-interest environment, Crown provides transfer floors, Outdoor Pursuits and Academic Success Houses, and a Science and Engineering Learning Community, and continuing student houses.

In addition, the college has apartments for approximately 230 upperclass students. Like the residence halls, the apartments are built on a small scale. Each three-story building has two or three apartments per floor that house four to six students in a combination of single, double, and triple rooms and include a

kitchen, living room, dining room, bathroom, and outside deck.

Other facilities in the college include the Crown Library study space; a modern computer laboratory housing Sun workstations, which provides students with access to several kinds of systems and an array of applications and instructional software selected to support academic course work; the Fireside Lounge with a piano and a flatscreen television; the Music Practice Room; and the Crown-Merrill Community Room, which has a television, pool table, foosball, and ping-pong table, and provides an informal place to study, hold meetings, or just visit with friends. Dining facilities boast continuous dining and Banana Joe's fast-food and convenience store.

For general information, call the college assistant at (831) 459-2665 or visit the web site: www2.ucsc.edu/crown/. For residential or college programs information, call the Student Life Office manager at (831) 459-4656.

Crown Faculty and Staff

Provost

F. JOEL FERGUSON, *Computer Engineering*

Fellows

SCOTT BRANDT, *Computer Science*

KENNETH W. BRULAND, *Ocean Sciences, Emeritus*

JOSEPH F. BUNNETT, *Chemistry and Biochemistry, Emeritus*

MAUREEN CALLANAN, *Psychology*

KENNETH L. CAMERON, *Earth and Planetary Sciences, Emeritus*

MANEL CAMPS, *Microbiology and Environmental Toxicology*

SUE A. CARTER, *Physics*

PAK CHAN, *Computer Engineering*

NANCY N. CHEN, *Anthropology*

YIN-WONG CHEUNG, *Economics*

MARGARET L. DELANEY, *Ocean Sciences*

NATHANIEL DOMINY, *Anthropology*

CHONGYING DONG, *Mathematics*

MICHAEL P. DOOLEY, *Economics*

ÓLÖF EINARSDÓTTIR, *Chemistry and Biochemistry*

GABRIEL ELKAIM, *Computer Engineering*

SANDRA M. FABER, *Astronomy and Astrophysics*

JOHN FAULKNER, *Astronomy and Astrophysics, Emeritus*

TIMOTHY FITZMAURICE, *Writing*

CORMAC FLANAGAN, *Computer Science*

A. RUSSELL FLEGAL, *Environmental Toxicology*

LAUREL R. FOX, *Ecology and Evolutionary Biology*

MARIA CECILIA FREEMAN, *Writing, Emerita*

DANIEL FRIEDMAN, *Economics*

KWOK-CHIU FUNG, *Economics*

ALISON GALLOWAY, *Anthropology*

J. J. GARCÍA-LUNA-ACEVES, *Computer Engineering*

LYNDA GOFF, *Ecology and Evolutionary Biology, Emerita*

MATTHEW GUTHAUS, *Computer Engineering*

JUDITH A. HABICHT-MAUCHE, *Anthropology*

DAVID HAUSSLER, *Computer Science*

RALPH T. HINEGARDNER, *Ecology and Evolutionary Biology, Emeritus*

RICHARD P. HUGHEY, *Computer Engineering*

GARTH D. ILLINGWORTH, *Astronomy and Astrophysics*

DAVID E. KAUN, *Economics*

ALAN H. KAWAMOTO, *Psychology*

PAUL L. KOCH, *Earth and Planetary Sciences*

JONATHAN M. KRUPP, *Biology; Coordinator, Microscopy and Imaging Laboratory, Emeritus*

NANCY KRUSOE, *Writing Program*

TRACY LARRABEE, *Computer Engineering*

DEBRA LEWIS, *Mathematics*

DOUGLAS N. C. LIN, *Astronomy and Astrophysics*

SURESH LODHA, *Computer Science*

DARRELL D. E. LONG, *Information Systems Management*

ROBERT A. LUDWIG, *Molecular, Cell, and Developmental Biology*

BRUCE MARGON, *Astronomy and Astrophysics; Vice Chancellor, Research*

PHILLIP McCALMAN, *Economics*

ETHAN MILLER, *Computer Science*

JOSEPH S. MILLER, *Astronomy and Astrophysics*

RICHARD MONTGOMERY, *Mathematics*

JUDIT N. MOSCHKOVICH, *Education*

HARRY F. NOLLER, *Molecular, Cell, and Developmental Biology*

LOISA NYGAARD, *German Literature*

KAREN OTTEMANN, *Environmental Toxicology*

TRILOKI N. PANDEY, *Anthropology*

GRANT H. POGSON, *Ecology and Evolutionary Biology*

DONALD C. POTTS, *Ecology and Evolutionary Biology*

JOEL R. PRIMACK, *Physics*

JIE QING, *Mathematics*

HARTMUT F.-W. SADROZINSKI, *Physics, Emeritus*

THOMAS W. SCHLEICH, *Chemistry and Biochemistry*

MARIA SCHONBEK, *Mathematics*

JUDITH A. SCOTT, *Education*

ABRAHAM SEIDEN, *Physics*

ELI A. SILVER, *Earth and Planetary Sciences*

NIRVIKAR SINGH, *Economics*

LISA C. SLOAN, *Earth and Planetary Sciences; Vice Provost/Dean, Graduate Studies, Emerita*

DONALD R. SMITH, *Environmental Toxicology*

WILLIAM T. SULLIVAN, *Molecular, Cell, and Developmental Biology*

EUGENE SWITKES, *Chemistry and Biochemistry*

KIP TÉLLEZ, *Education*

ROLAND G. THARP, *Education and Psychology, Emeritus*

STEPHEN E. THORSETT, *Astronomy and Astrophysics*

JOHN F. VESECKY, *Electrical Engineering*

STEVEN S. VOGT, *Astronomy and Astrophysics*

CARL E. WALSH, *Economics*

MANFRED K. WARMUTH, *Computer Science*

MARGARET L. WILSON, *Psychology*

W. TODD WIPKE, *Chemistry and Biochemistry, Emeritus*

STANFORD E. WOOSLEY, *Astronomy and Astrophysics*

FITNAT YILDIZ, *Environmental Toxicology*

A. PETER YOUNG, *Physics*

JAMES ZACHOS, *Earth and Planetary Sciences*

JIN Z. ZHANG, *Chemistry and Biochemistry*

College Administrative Officer

ALEX BELISARIO

Staff

MARIA ACOSTA-SMITH, *Senior Academic Preceptor*

CINDY BLAKE, *Groundskeeper*

ALLEN BUSHNELL, *Special Projects Coordinator*

SADEK CHAKIB, *Community Safety Officer Supervisor*

SERENA DIONYSUS, *College Programs Coordinator*

KEN EREZ, *Student Life Office Manager/Assistant*

SAMARA FOSTER, *Coordinator for Residential Education*

SALLY GAYNOR, *Academic Programs and Development Coordinator*

JEANNE JOHNSON, *Academic Adviser*

SAMANTHA PEREZ, *Housing Coordinator*

ANDREW PARK, *College Assistant*

HEATHER RICKS, *Assistant to the CAO*

IMANI RUPERT, *Coordinator for Residential Education*

CHUCK SCHMIT, *Facilities*

JOANIE WEBBER, *Assistant Budget Analyst*

SARAH WOODSIDE, *Associate College Administrative Officer for Student Life*

Merrill College

Merrill College seeks to expand its students' awareness of their own heritage and of the diversity of cultures around the world, past and present. Drawn largely from history as well as the social sciences, literature, and foreign languages, many Merrill faculty specialize in social theory, international affairs, and social change. The college makes a special effort to be a home for students from different cultural backgrounds and for international students; it presents unusual opportunities to those who value multicultural perspectives.

Merrill houses the Departments of Politics and Legal Studies, and Latin American and Latino Studies. Merrill is also the home of a Peace Corps satellite office, which helps UCSC students who are interested in working overseas apply to the Peace Corps after graduation. It also hosts the Chicano/Latino Research Center; UCSC's Gay, Lesbian, Bi, Trans, Intersex Resource Center (aka the Lionel Cantú Center); the student-run Pottery Co-op, the only one of its kind at UCSC; and the Ming

Ong Computer Center, a modern computer facility with more than 40 state-of-the-art personal computers.

College Theme and Core Course

Cultural Identities and Global Consciousness is the theme of Merrill College and of its core course. In the Core Course students read four books: Daoud Hari's *The Translator*; Le Ly Hayslip's *When Heaven and Earth Changed Places*; Fatima Mernissi's *Dreams of Trespass*; and Luis Rodriguez's *Always Running*. (Some of these titles will change in 2010–2011.) Additionally, students are introduced to a selection of secondary sources that supplement and enrich the aforementioned readings. All the Core Course readings are first-person narratives—memoirs or autobiographical works of fiction. They bear witness not only to conflict and crisis but also to individual strength and hope. They constitute material examples of how individuals and communities have dealt with various forms of crisis and conflict, and how people often turn to social activism as a form of healing the wounds left to communities and to individuals as a result of violence.

Through these astonishing personal narratives, the great movements of nationalism, imperialism, and globalization, and their attendant cultural clashes, religious conflicts, and social and gender inequalities are explored. Students are introduced to a myriad of opinions that will heighten their awareness of how differences and diversity relate to contemporary issues of global import. In addition, these secondary readings explore theories that seek to explain the persistent underdevelopment of many countries in the world, and the increasing poverty in the U.S.

Those admitted as transfer students are exempt from the Core Course requirement but may take it at their discretion.

Other Courses and Academic Initiatives

Merrill sponsors a variety of 2- and 5-credit courses on topics that change from year to year, recently ranging from the benefits of reevaluation counseling, to personal empowerment, to Caribbean migrations. Enrollment in these courses is kept to a size that facilitates discussion. Additionally, students can enroll in *Classroom Connection*, a service-learning course that provides opportunities to volunteer in local elementary school classrooms while also engaging in classroom discussions of relevant readings

on current issues in educational theory and making a final presentation.

Recognizing the increasingly rigorous requirements for science majors, Merrill—in collaboration with the Academic Excellence Program—coordinates the Science Learning Community to support students majoring in the sciences. Students participating in the program enroll in small discussion sections that encourage a collaborative learning approach.

In 2007–08, Merrill College began an undergraduate mentorship program. The Merrill Mentorship Program aims to inspire and prepare undergraduate students to pursue graduate studies. It is designed to provide research experience and personal and professional development for Merrill students. Merrill faculty participants nominate a student whose work they are familiar with and whose interests are similar to their own area of research and expertise. Students who participate in the program (juniors and seniors) will be employed as research assistants by their faculty mentors, and receive up to \$1,000 for the school year.

Twenty ten also marks the fourth year of the Merrill College Distinguished Visiting Scholars Program, which hosts public and class presentations by national and international academics, artists, writers, and activists, representing a wide variety of perspectives.

College Community and Facilities

Located on a hilltop, Merrill's award-winning buildings thread upward through the edge of a redwood forest. The brick patios, gardens, outdoor café, and mission bell tower suggest California's Latino heritage.

Merrill offers residence-hall and apartment-style options for students. Four residence halls house approximately 500 students in two high-rise structures and two smaller buildings. Groups of about 16 students share common bathroom and lounge facilities.

The apartments, which are located a short distance from the central area of the college, house 180 continuing Merrill students. Grouped amid winding pathways and redwood trees, these three-story buildings have two or three apartments per floor. Each apartment houses four to six students in a combination of single, double, and triple rooms, and comes fully equipped with kitchen and bath, large living area, and outside deck. Facilities at the apartment complex include common lounges, a large community room, and two laundry rooms.

With the help of the Merrill Coordinators for Residential Education, an enthusiastic residential staff plans recreational activities that include

potluck dinners, intramural sports competitions, dances, musical events, film series, and a yearly outdoor mural-painting party. Many of these social and educational activities focus on building a multicultural community. Other facilities at Merrill include the Cultural Center, where events like College Nights and the Glitterball take place. The Baobab Lounge has study space and a television. The taqueria, run by local business Tacos Moreno, provides dining alternatives to the community. Finally, Merrill Academic Success (MAS) provides Merrill students with a place to study as well as computers and a printer. Merrill is the only college that has a student-run pottery co-op. Students can throw, fire, and glaze their works in the workshop space, which is open to Merrill students on a first-come first-served basis.

Merrill College is also the home of the campus Peace Corps office, UCSC's Lionel Cantú GLBTI Resource Center, and KZSC, the campus's radio station.

The physical facilities of Merrill College were provided through a partnership of public funds and gifts from the Charles E. Merrill Trust and the family of Ming Ong. The Ming Ong Computer Center is located at Merrill.

For more information, call (831) 459-2144 or visit the web site: www2.ucsc.edu/merrill/.

Merrill Faculty and Staff

Provost

LOURDES MARTÍNEZ-ECHAZÁBAL, *Latin American Literature*

Faculty Fellows

JORGE ALADRO FONT, *Spanish Literature*

MARK D. ANDERSON, *Anthropology*

FRANK C. ANDREWS, *Chemistry and Biochemistry, Emeritus*

GABRIELA ARREDONDO, *Latin American and Latino Studies*

NORIKO ASO, *History*

BRENDA BARCELÓ, *Spanish Language*

DILIP K. BASU, *History*

ROBERT F. BERKHOFFER JR., *History, Emeritus*

CLAUDE F. BERNASCONI, *Chemistry and Biochemistry*

EVA BERTRAM, *Politics*

JOHN G. BORREGO, *Latin American and Latino Studies*

MICHAEL K. BROWN, *Politics, Emeritus*

WAYNE B. BRUMBACH, *Physical Education, Emeritus*

EDMUND BURKE III, *History, Emeritus*

JULIANNE BURTON-CARVAJAL, *Literature, Emerita*

CARLOS CALIERNO, *Spanish Language*

BENJAMIN CARSON, *Music*

PEDRO G. CASTILLO, *History*

ALAN S. CHRISTY, *History*

RENA V. COCHLIN, *Physical Education*
 CINDY CRUZ, *Education*
 GUILLERMO DELGADO-P., *Latin American and Latino Studies*
 JOSHUA M. DEUTSCH, *Physics*
 MARÍA ELENA DIAZ, *History*
 MAY N. DIAZ, *Anthropology, Emerita*
 KENT EATON, *Politics*
 BERNARD L. ELBAUM, *Economics*
 VERONICA FÉLIU, *Spanish*
 JONATHAN FOX, *Latin American and Latino Studies*
 DANA FRANK, *History*
 ROSA LINDA FREGOSO, *Latin American and Latino Studies*
 WILLIAM H. FRIEDLAND, *Community Studies and Sociology, Emeritus*
 HARDY T. FRYE, *Sociology, Emeritus*
 CAROLE GERSTER, *Core Course; Film and Digital Media*
 MARGARET (GRETA) A. GIBSON, *Education, Emerita*
 DIANE P. GIFFORD-GONZÁLEZ, *Anthropology*
 SHANNON GLEESON, *Latin American and Latino Studies*
 WALTER L. GOLDFRANK, *Sociology, Emeritus*
 MARÍA VICTORIA GONZÁLEZ-PAGANI, *Spanish Language*
 M. LISBETH HAAS, *History*
 JUDITH HARRIS-FRISK, *German Language and Core Course*
 GAIL B. HERSHATTER, *History*
 MINGHUI HU, *History*
 JOHN W. ISBISTER, *Economics, Emeritus*
 ROBERT P. JOHNSON, *Physics*
 SUSANNE JONAS, *Latin American and Latino Studies*
 NORMA KLAHN, *Latin American Literature*
 FLORA LU, *Latin American and Latino Studies*
 PATRICK E. MANTEY, *Computer Engineering*
 MARK MASSOUD, *Politics*
 JOHN MARCUM, *Politics, Emeritus*
 DEAN MATHIOWETZ, *Politics*
 MARIA EUGENIA MATUTE-BIANCHI, *Education, Emerita*
 BARRY McLAUGHLIN, *Psychology, Emeritus*
 MARTA MORELLO-FROSCHE, *Literature, Emerita*
 MARIA MORRIS, *Spanish Language*
 OLGA NÁJERA-RAMÍREZ, *Anthropology*
 ELLEN NEWBERRY, *Writing*
 MATTHEW O'HARA, *History*
 SHIGEKO OKAMOTO, *Japanese Language*
 ALEX T. PANG, *Computer Science*
 SARAH-HOPE PARMETER, *Writing*
 ELEONORA PASOTTI, *Politics*
 HECTOR PERLA, *Latin American and Latino Studies*
 JUAN POBLETE, *Literature*
 CLIFTON A. POODRY, *Molecular, Cell, and Developmental Biology, Emeritus*
 BENJAMIN READ, *Politics*
 ALAN R. RICHARDS, *Environmental Studies*
 CECILIA RIVAS, *Latin American and Latino Studies*
 PAMELA A. ROBY, *Sociology, Emerita*
 ALVARO ROMERO-MARCO, *Spanish Language*

BARBARA ROGOFF, *Psychology*
 JOHN M. SCHECHTER, *Music, Emeritus*
 STUART A. SCHLEGEL, *Anthropology, Emeritus*
 ROGER SCHOENMAN, *Politics*
 ANA MARIA SEARA, *Portuguese Language*
 VANITA SETH, *Politics*
 BAKTHAN SINGARAM, *Chemistry and Biochemistry*
 GRAEME H. SMITH, *Astronomy and Astrophysics*
 DAVID G. SWEET, *History, Emeritus*
 MEGAN THOMAS, *Politics*
 GEORGE E. VON DER MUHLL, *Politics, Emeritus*
 DANIEL J. WIRLS, *Politics*
 DONALD A. WITTMAN, *Economics*
 ALICE YANG MURRAY, *History*
 PATRICIA ZAVELLA, *Latin American and Latino Studies*
 MARTHA C. ZÚÑIGA, *Molecular, Cell, and Developmental Biology*
 EVE ZYZIK, *Spanish Language*

Honorary Fellows

ZINA JACQUE
 CLARK KERR (deceased)
 JOHN LAIRD
 ALICE LYTLE
 CHARLES E. MERRILL JR.
 JOHN VASCONCELLOS
 YORI WADA
 REV. CECIL WILLIAMS
 MARDI WORMHOUDT (deceased)

Class Honorary Fellows

ROBERT TAYLOR, 1991, 1992, 1993
 LEILANI FARM, 1994
 MICHAEL PAUL WONG, 1995
 DAVID SILVERA, 1996
 ZIESEL SAUNDERS, 1997
 VICTOR HERNANDEZ, 1998
 MARÍA MATA, 1999
 WENDY BAXTER, 2000
 LARRY TRUJILLO, 2001
 GINA DIAZ, 2002
 MARÍA MATA, 2003, 2004, 2007, 2008
 JOHN SCHECHTER, 2005
 CURTIS SWAIN, 2006
 BETH THOMPSON, 2009

College Administrative Officer

ALEX BELISARIO

Staff

GABRIELA ALANIZ, *Coordinator for Residential Education*
 TIM BARBOUR, *Assistant College Programs Coordinator*
 ALLEN BUSHNELL, *Special Projects Coordinator*
 SADEK CHAKIB, *Community Safety Officer Supervisor*
 SAPANDEEP CHADDA, *Housing Coordinator*
 VALERIE CHASE, *Associate College Administrative Officer*
 CONNIE CREEL, *Provost Assistant/Academic Adviser*

SETH HODGE, *College Programs Coordinator*
 MARÍA MATA, *Senior Academic Preceptor*
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 WILLIAM MILLER, *Senior Building Maintenance Worker*
 AIMEE MUNROE, *Peace Corps Coordinator*
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 BILL POOL, *Senior Building Maintenance Worker*
 MARIANNA SANTANA, *Faculty Services*
 ELIZABETH THOMPSON, *Academic Adviser*
 JOANIE WEBBER, *Assistant Budget Analyst*
 SARMA WILLIAMS, *Coordinator for Residential Education*

Porter College

The Porter College theme, Arts in a Multicultural Society, reflects the consensus among Porter College fellows that the creative process is an inseparable aspect of a broad-minded and rigorous education. The seminars, cocurricular activities, and cultural environment at Porter encourage creativity in all fields—from composition to community studies to computer programming.

Academic Emphases

Porter's faculty includes most of the campus's practicing artists and art scholars, though some of the college's faculty (and half of its students) specialize in the humanities or in the physical and biological or social sciences. The college is the administrative home of the Division of the Arts and the History of Art and Visual Culture Department. The Digital Arts and New Media Program also has offices here.

Porter 80, the core course (see page 425) focuses on writing across the arts, with concentration on literature and arts of California and the Pacific Rim. Those who are admitted as transfer students are exempt from the core course requirement but may take the core course at their option pending available space; lower-division transfer students who, prior to enrolling, have not completed at least one UC-transferable college English composition course with a minimum grade of C (2.0) or better are permitted to take the core course to satisfy the C1 requirement. Students meet with their faculty member in a seminar, attend regular lecture/performances, and participate in writing groups, advising, and other sessions that introduce some of the academic issues they will confront at the university. The course emphasizes critical reading, writing, and close intellectual contact with faculty and other students.

The college also offers 2-credit courses in a variety of areas connected to the arts. These

are small classes in the practice or theory of the arts; they may involve studies in music, dance, theater, or film from a particular culture or region, exploration of careers in a field related to the arts, or creation of a show in one of the college galleries. These diverse offerings enable Porter students to experience the significance of creativity in a university education.

The college provides fellowship funds each year to talented students pursuing original research and creative projects.

College Community and Facilities

The traditional residence halls and apartments play an important role in bringing the college community together. Students are encouraged to spend their beginning years in residence in the college, where housing is available for 1,273 students. The residence halls are divided into smaller units, with from 20 to 35 students sharing common lounges and other facilities. Theme halls include Performing Arts, Film and Digital Media, Visual Arts, and Outdoors Experiences. Students also have a choice of quiet/intensive study, same gender, or substance-free halls. The six-person apartments are reserved for upper-division students.

Porter College is also home to the new transfer student living/learning community in Porter A building. All on-campus incoming transfer students reside at Porter regardless of their college affiliation. Special programs are designed to help new transfer students adapt to life at UCSC.

In addition to traditional classrooms, Porter has many specialized facilities such as a fireside lounge, galleries, a study center, and a dining hall that converts to a theater space. The Arts Instructional Computing Laboratories, located at Porter College, consist of two high-end labs oriented toward the arts.

Adjacent to the college are the campus's Theater Arts Center (see page 456), the Elena Baskin Visual Arts Center (see page 135), and the Music Center (see page 384).

Porter provides constructive opportunities for relaxation and recreation to balance the intellectual demands of a university education. The Porter Activities Office, in conjunction with the Porter Student Senate, organizes formal and informal events, including dances and recreational activities, which augment campuswide activities in these areas. For relaxation, Porter students and faculty gather at the college's coffeehouse—the Hungry Slug.

Many students and faculty perform or exhibit their work at Porter, and cultural events are a constant feature of life at the college. The din-

ing commons has been the site of performances by artists such as El Teatro Campesino, lectures and readings by contemporary authors such as Amiri Baraka, and performances by artists such as Komar & Melamid and Nina Wise.

Porter College facilities were constructed through a partnership of public funds and a gift from the Porter-Seson family of Santa Cruz. Part of the gift was used to establish an endowment for the college.

For more information, call (831) 459-2273 or visit the web site: www2.ucsc.edu/porter.

Porter Faculty and Staff

Provost

DAVID EVAN JONES, *Music*

Fellows

KEN ALLEY, *Art*

ELLIOT W. ANDERSON, *Art*

LAWRENCE ANDREWS, *Film and Digital Media*

MANUEL ARES JR., *Molecular, Cell, and*

Developmental Biology

DORIS B. ASH, *Education*

CHARLES ATKINSON, *Writing*

BRANDIN S. BARON-NUSBAUM, *Theater Arts*

AMY C. BEAL, *Music*

TANDY BEAL, *Theater Arts*

MARTIN BERGER, *History of Art and Visual Culture*

JAMES H. BIERMAN, *Theater Arts*

ROBERTO A. BOGOMOLNI, *Chemistry and Biochemistry*

JOYCE BRODSKY, *Art, Emerita*

GEORGE S. BROWN, *Physics, Emeritus*

LINDA C. BURMAN-HALL, *Music*

ELISABETH CAMERON, *History of Art and Visual Culture*

BENJAMIN L. CARSON, *Music*

ROBERT S. COE, *Earth and Planetary Sciences*

RAY T. COLLETT, *UCSC Arboretum, Emeritus*

DAVID H. COPE, *Music*

WILLIAM D. COULTER, *Music*

E. G. CRICHTON, *Art*

DAVID CUTHBERT, *Theater Arts*

SHARON DANIEL, *Film and Digital Media*

CAROLYN S. DEAN, *History of Art and Visual Culture*

ANDREW DOE, *Theater Arts, Emeritus*

SHERWOOD DUDLEY, *Music, Emeritus*

KATE EDMUNDS, *Theater Arts*

PETER Q. ELSEA, *Music*

HARLAND W. EPPS, *Astronomy and Astrophysics*

MARIA EVANGELATOU, *History of Art and Visual Culture*

MARIA V. EZEROVA, *Music*

M. KATHLEEN FOLEY, *Theater Arts*

DOYLE FOREMAN, *Art, Emeritus*

JEAN FOX TREE, *Psycholinguistics*

SUSAN FRIEDMAN, *Art*

GREGORY FRITSCH, *Theater Arts*

PATTY GALLAGHER, *Theater Arts*

FRANK GALUSZKA, *Art*

GEORGE GASPARI, *Physics, Emeritus*

INGEBORG GERDES, *Art*

ROBERT GIGES, *Core Course*

JENNIFER A. GONZALEZ, *History of Art and Visual Culture*

IRENE GUSTAFSON, *Film and Digital Media*

MELISSA GWYN, *Art*

HARDY HANSON, *Art, Emeritus*

AMELIE HASTIE, *Film and Digital Media*

JOHN HAY, *History of Art and Visual Culture, Emeritus*

IRENE HERRMANN, *Music*

KARLTON E. HESTER, *Music*

CLEMENS A. HEUSCH, *Physics, Emeritus*

DEE HIBBERT-JONES, *Arts*

ELI E. HOLLANDER, *Film and Digital Media*

EDWARD F. HOUGHTON, *Music*

FRED HUNNICUTT, *Art, Emeritus*

DONNA HUNTER, *History of Art and Visual Culture*

KIMBERLY JANNARONE, *Theater Arts*

DAVID EVAN JONES, *Music*

STACY KAMEHIRO, *History of Art and Visual Culture*

HI KYUNG KIM, *Music*

L. S. KIM, *Film and Digital Media*

THORNE LAY, *Earth and Planetary Sciences*

JIMIN LEE, *Art*

ANATOLE LEIKIN, *Music*

FREDRIC LIEBERMAN, *Music*

PETER LIMBRICK, *Film and Digital Media*

NORMAN LOCKS, *Art*

CHARLES (CHIP) L. LORD, *Film and Digital Media*

IRENE LUSZTIG, *Film and Digital Media*

BORETH LY, *History of Art and Visual Culture*

PAVEL MACHOTKA, *Psychology, Emeritus*

DOMINIC W. MASSARO, *Psychology*

WILLIAM G. MATHEWS, *Astronomy and Astrophysics, Emeritus*

JENNIE LIND MCDADE, *Art, Emerita*

CHARLES E. MCDOWELL, *Computer Science*

DOUGLAS MCCLELLAN, *Art, Emeritus*

TANYA MERCHANT, *Music*

KATHRYN METZ, *Art, Emerita*

LETA E. MILLER, *Music*

MARGARET MORSE, *Film and Digital Media*

PETER MOSTKOFF, *Theater Arts*

GORDON MUMMA, *Music, Emeritus*

PAUL NAUERT, *Music*

DARD NEUMAN, *Music*

MESUT OZGEN, *Music*

NICOLE A. PAIEMENT, *Music*

JENNIFER A. PARKER, *Art*

KENNETH PEDROTTI, *Electrical Engineering*

PAUL RANGELL, *Art*

B. RUBY RICH, *Community Studies*

ELAINE YOKOYAMA ROOS, *Theater Arts, Emerita*

NORVID J. ROOS, *Theater Arts, Emeritus*

JASPER ROSE, *Art/History/HAVC, Emeritus*

BRUCE ROSENBLUM, *Physics, Emeritus*

WARREN SACK, *Film and Digital Media*

RUTH SOLOMON, *Theater Arts, Emerita*

SHELLEY STAMP, *Film and Digital Media*
 AUDREY E. STANLEY, *Theater Arts, Emerita*
 BRIAN J. STAUFENBIEL, *Music*
 S. PAGE STEGNER, *American Literature, Emeritus*
 ELIZABETH STEPHENS, *Art*
 UNDANG SUMARNA, *Music*
 DAVID SWANGER, *Education and Creative Writing, Emeritus*
 JOHN W. TAMKUN, *Molecular, Cell, and Developmental Biology*
 OTHMAR T. TOBISCH, *Earth and Planetary Sciences, Emeritus*
 JUDITH TODD, *Writing*
 ANDREY TODOROV, *Mathematics*
 ALLEN VAN GELDER, *Computer Science*
 GUSTAVO VAZQUEZ, *Film and Digital Media*
 YIMAN WANG, *Film and Digital Media*
 EDWARD WARBURTON, *Theater Arts*
 LEWIS WATTS, *Art*
 C. GORDON WELLS, *Education*
 LINDA WERNER, *Computer Science*
 DONALD WEYGANDT, *Art, Emeritus*
 JAMES WHITEHEAD, *Computer Science*
 QUENTIN C. WILLIAMS, *Earth and Planetary Sciences*
 SHIRLEY WYNNE, *Theater Arts, Emerita*
 DAVID YAGER, *Art*
 JACK ZAJAC, *Art, Emeritus*

College Administrative Officer

MICHAEL YAMAUCHI-GLEASON

Staff

LUPE ALLEN, *Academic Preceptor*
 JORGE ARROYO, *Coordinator for Residential Education*
 SUSAN J. BEACH, *Assistant to the Provost*
 JAMES BLAINE, *College Programs Coordinator*
 JIMMIE BROWN, *Community Safety Officer Supervisor*
 MARY CLARKE, *Counseling Psychologist*
 KATHY COONEY, *Associate College Administrative Officer for Student Life*
 JOE DEPAGE, *Housing Coordinator*
 LISSA GEIKEN, *Counseling Psychologist*
 ROBERT GIGES, *Academic Preceptor*
 SUSAN J. GULBE-WALSH, *Counseling Psychologist*
 BIHYU MARY LIU, *Receptionist/Mailroom Supervisor*
 SHERYL MCCARTNEY, *Senior Building Maintenance Worker*
 KALIN MCGRAW, *Special Assistant to the CAO*
 ERIC PETERSON, *Senior Building Maintenance Worker Supervisor*
 SUE ROTH, *Assistant to the College Administrative Officer*
 ANA SANCHEZ, *Assistant College Programs Coordinator*
 MARY SIERRA, *Budget and Planning Specialist*
 MARY SPAFFORD, *College Academic Adviser*
 STEVE STRICKLEY, *Groundskeeper*
 SARAH WIBE, *Coordinator for Residential Education*

Kresge College

Kresge's motto is Independence, Creativity, Community.

Academic Emphases

Kresge's core course 80, *Power and Representation* (see page 337), is a writing class that explores the relationships between individuals and their communities—communities as small as families and friendship, colleges and cities; communities as large as nations and the world. Our goal is to empower individuals to think beyond easy answers, to express themselves clearly, to feel at home in writing, and to feel powerful in representing themselves on the page. In *Power and Representation*, we examine the many ways we constitute ourselves (and are constituted) as individuals in relation to communities. First, we will study ideas about representation as a theoretical grounding, and then focus on representations of nationality, ethnicity, sexual orientation, gender, and race in many genres—critical theory, film, fiction, theater, and nonfiction. Our purpose is to create a dialogue of ideas about ourselves and our relationship to our communities as it is, as it might be, and as we might help make it.

In addition to section meetings, on Tuesday nights all students come together to watch core-related films or performers or listen to lectures. All students will complete a final creative project that engages with the theme of the course.

Lower-division transfer students who, prior to enrolling, have not completed at least one UC-transferable college English composition course with a minimum grade of C (2.0) or better are permitted to take the core course to satisfy the C1 requirement.

In addition to the core course, Kresge offers a series of courses taught by guest faculty, alumni, and faculty affiliated with the college. These courses give students a chance to study in small groups on topics close to faculty or alumni research interests and offer students the opportunity to enrich the standard curriculum. A new array of classes is offered each year. For example, Kresge has offered journalism, comic writing, documentary film, gardening, and service learning.

Perhaps because Kresge is known for its creativity and independent spirit, it's also known for its association with writing. We house the Writing Program and The Science Writing Program, and are associated with Literature. Our co-provost, Micah Perks, is co-director of the Creative Writing Program at UCSC. Kresge

is the home of *Rapt* and *The Kresge Town Krier*, two literary journals, as well as *City On A Hill*, UCSC's student-run newspaper. Writers House is a residential option for students with an interest in journalism and/or creative writing, regardless of their prospective majors.

Residential Life

Kresge was the sixth college to be built on the UCSC campus. The college was founded on the principle of participatory democracy as a means of encouraging a strong sense of community. Architecturally renowned, Kresge has apartments rather than residence halls.

The Kresge apartments attract students with a sense of independence and community participation. Distinctively designed, the apartments at Kresge proper are configured for four to nine people. Kitchen and living areas look out onto the street, with other rooms facing the surrounding redwood forest. At Kresge East, apartments face the forest for greater quiet. These apartments, with three single and one double bedroom, are typically reserved for continuing upper-division students. Kresge's three-person "in-fill" apartments, Buildings J and K, which are situated between Kresge and Porter colleges, are reserved for continuing upper-division students. These two-bedroom apartments have an efficiency-style kitchen and living area.

The Residential Life and College Programs staff at Kresge work to bring students of similar interests together, academically and socially, by designing fun and unique programming based on student interest. Programs that focus on celebrating the diversity of the residential community, on multicultural community-building, and on enhancing academic success, through film series, music events, mural painting, food-centered events, are highlighted.

Community Life

There are a wide variety of events and activities at the college that shape community life: Lectures, workshops, trips, plays, dances, concerts, and films are a regular part of student life at the college. The nature and tenor of these events are a reflection of the interests of students and staff, who are committed to providing voice and opportunity for all community members.

Students actively shape the college community through participation in Kresge Parliament, an openly structured student organization responsible for voting the allocation of all college membership fees in support of activities and events. Parliament and Town Meetings also serve as a

forum for the discussion of college and campus-wide issues with college staff and faculty.

Transfer Students

In recognition of the wealth of diversity that transfer students bring to the community—in terms of culture and experience—Kresge is the home of the Transfer Center for campuswide transfer students regardless of college affiliation. This is a staffed facility where students can gather to relax, socialize, hold meetings, and obtain campus information and resource support in a central location. The resource center offers workshops, social evenings, and special events that are tailored to meet the needs of transfer students.

Kresge also offers special advising workshops and 2- and 3-credit courses designed to help transfers in the process of entering the university and moving forward in their careers from here.

Facilities

At the entrance to the college is the restful Piazzetta with a beautiful, architecturally designed fountain. Leading off from the Piazzetta are the Transfer Center, the Commuter Lounge, and a student lounge, equipped with television and DVD player. In addition to the Transfer Center, as a unique facility on the campus, the Commuter Lounge is a place for off-campus students who want to use a kitchen, shower, or lockers while on campus. Kresge's Photo Lab Co-op is above the Piazzetta and offers 24-hour accessibility to darkroom equipment. Adjacent to the nearby meadow are a racquetball court and an outdoor basketball court. The college includes a study center with soaring ceilings and walls of glass overlooking the forest, which also houses a writing center, a computer lab equipped with PCs for student use, and a student-run food co-op, where organic produce is sold and working memberships are available. At the top of the college are the Town Hall performance facility, the Music Co-op, and a cafe.

For more information, call (831) 459-2071 or visit the web site: www2.ucsc.edu/kresge.

Kresge Faculty and Staff

Provosts

MICAH PERKS, *Creative Writing*

JUAN POBLETE, *Latin American Literature*

Members

RALPH H. ABRAHAM, *Mathematics, Emeritus*

ELIZABETH ABRAMS, *Writing*

BETTINA APTHEKER, *Feminist Studies and History*

ANJALI ARONDEKAR, *Feminist Studies*

KAREN BARAD, *Feminist Studies*

MURRAY BAUMGARTEN, *English and Comparative Literature*

RAOUL BIRNBAUM, *History of Art and Visual Culture*

GINA DENT, *Feminist Studies*

SHELLY E. ERRINGTON, *Anthropology*

J. PETER EUBEN, *Politics, Emeritus*

MARGE FRANTZ, *American Studies and Feminist Studies, Emerita*

CARLA FRECCERO, *Literature*

PASCAL GAITET, *French Literature and Language*

JODY GREENE, *English Literature*

CONN HALLINAN, *Journalism, Retired*

HENRY R. HILGARD, *Molecular, Cell, and Developmental Biology, Emeritus*

EMILY HONIG, *Feminist Studies and History*

AKASHA HULL, *Feminist Studies and Literature, Emerita*

EARL JACKSON JR., *Japanese Literature*

JOHN O. JORDAN, *English Literature*

ELISE KNITTLE, *Earth and Planetary Sciences*

DIANE K. LEWIS, *Anthropology, Emerita*

NATHANIEL E. MACKEY, *20th-Century Literature, Afro-American Literature, Creative Writing*

MARY KAY MARTIN, *Writing, Emerita*

ALMA R. MARTÍNEZ, *Theater Arts*

CAROLYN MARTIN SHAW, *Anthropology*

GEOFFREY MASON, *Mathematics*

KAREN C. McNALLY, *Earth and Planetary Sciences, Emerita*

ROBERT L. MEISTER, *Politics*

HELENE MOGLEN, *Literature and Feminist Studies, Emerita*

MADELINE MOORE, *English Literature, Emerita*

MARCIA OCHOA, *Community Studies*

LISA ROFEL, *Anthropology*

MATTHEW SANDS, *Physics, Emeritus*

JOHN H. SCHAAR, *Politics, Emeritus*

DANNY SCHEIE, *Theater Arts*

PAUL N. SKENAZY, *American Literature, Emeritus*

ROSWELL (ROZ) SPAFFORD, *Writing, Emerita*

RICHARD TERDIMAN, *Literature*

ANNA TSING, *Anthropology*

KAREN TEI YAMASHITA, *Literature*

College Administrative Officer

MICHAEL YAMAUCHI-GLEASON

Staff

PAM ACKERMAN, *College Programs Coordinator*

ELIZABETH ALSBERG, *Frontline Adviser/Advising Services Coordinator*

KIA PARKS BURTON, *College Assistant*

KATHY COONEY, *Associate College Administrative Officer*

KAWAMI CRAIG EVANS, *Coordinator for Residential Education*

HELEN MAYER, *Academic Adviser*

KALIN MCGRAW, *Special Assistant to the College Administrative Officer*

URSULA OBERG, *Academic Preceptor*

CLAUDIA PARRISH, *Transfer Center Coordinator*

CHARLES PERRY, *Coordinator for Residential Education*

DARIEN RICE, *Groundskeeper*

SUE ROTH, *Assistant to the College Administrative Officer*

PEG SHEMARIA, *Counseling Psychologist*

MARY SIERRA, *Budget Analyst*

JOAO SIMAS, *Housing Coordinator*

DAVE SULSER, *Maintenance Assistant*

CHRIS YANG, *Assistant College Programs Coordinator*

MINDY YANINEK, *Assistant to the Provost*

NICK YUKICH, *Community Safety Officer Supervisor*

Oakes College

Oakes was founded in 1972 to provide high-quality education to students from diverse cultural and social backgrounds. Students, staff, and faculty associated with the college believe that learning takes place not only in the classroom but also in residential settings. For that reason, they work hard to create a multicultural community whose members strive together for certain universal goals—including equal access to educational opportunity and freedom from oppression—while simultaneously affirming and celebrating some of the distinctive aspects of the different backgrounds from which they come.

Academic Emphases

Oakes faculty members represent a variety of disciplines in the humanities, social sciences, and physical and biological sciences. Since its founding, Oakes has made a special effort to provide academic programs and experiences for underrepresented groups, including women. These programs and experiences are enriched by the presence of core faculty from disciplines housed in the college: American studies, American literature, writing, world literature, and history of consciousness. Oakes graduates have gone on to successful careers in fields such as medicine, law, education, medical research, and community service.

The Oakes core course 80, *Communicating Diversity for a Just Society*, is required of all first-year students. The course is writing intensive and examines individual and collective responses to issues of culture, gender, sexuality, race, and class. (See page 395 for a description of the course.) Those who are admitted as transfer students are exempt from the core course requirement but may take the core course at their option pending available space; lower-division transfer students who, prior

to enrolling, have not completed at least one UC-transferable college English composition course with a minimum grade of C (2.0) or better are permitted to take the core course to satisfy the C1 requirement.

Students at Oakes are challenged in many ways. Not only do they have the opportunity to live and work with people from different backgrounds, but they are also expected to demonstrate academic excellence in their chosen fields of study. To enable all students to succeed academically a variety of services are available:

- The Learning Center at Oakes College serves as a location for study groups as well as tutoring and advising programs. Special assistance in writing and tutoring in a variety of subjects is offered to Oakes students and EOP students.
- The Oakes Computer Lab provides access to 20 PCs for Oakes students.
- Oakes 77: *Exploring Opportunities for Social Justice Field Work* provides students with the opportunity to work with a variety of community service organizations. All Oakes students are encouraged to contribute service to public agencies, schools, and community organizations in the city of Santa Cruz and in economically deprived areas of Santa Cruz and Monterey Counties. Oakes students serve as tutors, teachers, mentors, and community builders. Academic credit is available through the Oakes 77 course.
- Student services at Oakes include academic advising and psychological counseling.

College Community and Facilities

Oakes College, located on the west side of the UCSC campus, commands a sweeping view of Monterey Bay. Students may choose between apartment and residence hall living. The residence halls have lounges on each floor, attractive courtyards, and views of the ocean and the city of Santa Cruz. Students can also share an apartment-style living space, which includes a common living area and small kitchen. All students participate in a University Meal Plan. Residence halls are coed and provide space for students in double and single rooms.

Full-time coordinators for residential education and neighborhood assistants help residents develop cooperative ways of living together. As one student put it, "Oakes is a community where people of many different colors, backgrounds, interests, and goals form a friendly neighborhood. We share our cultures and adapt to the different lifestyles of our neighbors."

The residential program is designed to assist all students in integrating their academic and social needs. The residential staff hosts activities such as brunches, study breaks, and block dinners, each with a different theme and often reflecting the various cultures represented by Oakes students. Other events include College Night Dinners in the dining hall, celebrations of cultural traditions such as an annual Harvest Dinner for the Oakes community, a Valentine's Day party, a fall block party, and a spring underdome basketball tournament.

The college staff seeks to nurture and sustain a community in which mutual respect, understanding, and concern for others are the norm. Within that atmosphere of community expectations, students are also supported and encouraged to find room for their own creative personal expression.

The other physical facilities at Oakes further support the special programs of the college and provide recreational opportunities for the students. College facilities include the Learning Center; a multipurpose room for lectures, movies, and small theater productions; a college library; a dining facility shared with College Eight; TV lounges in the residences and adjacent to the Oaks Café; and a small basketball court, the "Underdome." Additional recreational facilities located close to the college include tennis courts, a large soccer field, and an indoor basketball court.

A grant from the San Francisco Foundation—from Roscoe and Margaret Oakes Foundation funds—was used in partnership with public funds for the construction of Oakes. Part of the grant was used to establish an endowed fund for the college.

For further information, call (831) 459-2558 or visit the web site: oakes.ucsc.edu.

Oakes Faculty and Staff

Provost

KIMBERLY J. LAU, *American Studies*

Fellows

ROGER W. ANDERSON, *Chemistry and Biochemistry*
 LAWRENCE ANDREWS, *Film and Digital Media*
 DAVID H. ANTHONY III, *History*
 GOPAL BALAKRISHNAN, *History of Consciousness*
 GEORGE R. BLUMENTHAL, *Astronomy and Astrophysics*
 BARRY BOWMAN, *Molecular, Cell, and Developmental Biology*
 DAVID BRUNDAGE, *Community Studies*
 VÍCTOR BURGÍN, *History of Consciousness, Emeritus*
 PEDRO CASTILLO, *History*
 LOUIS CHUDE-SOKEI, *Literature*
 JAMES T. CLIFFORD, *History of Consciousness*

CHRISTOPHER CONNERY, *Chinese Literature*
 VILASHINI COOPAN, *Literature*
 MICHAEL H. COWAN, *Literature and American Studies*
 ANGELA Y. DAVIS, *History of Consciousness, Emerita*
 TERESA DE LAURETIS, *History of Consciousness, Emerita*
 DAVID E. DORFAN, *Physics, Emeritus*
 BARBARA L. EPSTEIN, *History of Consciousness*
 PASCALE GARAU, *Applied Mathematics and Statistics*
 JAMES B. GILL, *Earth and Planetary Sciences*
 SUSAN GILLMAN, *American Literature*
 GARY GLATZMAIER, *Earth and Planetary Sciences*
 KIRSTEN GRUESZ, *Literature*
 DONNA J. HARAWAY, *History of Consciousness*
 MELISSA JURICA, *Molecular, Cell and Developmental Biology*
 SHARON KINOSHITA, *Literature and Language Studies*
 DAVID S. KLIGER, *Chemistry and Biochemistry*
 ANN M. LANE, *American Studies, Emerita*
 DIANE K. LEWIS, *Anthropology, Emerita*
 AMY J. LONETREE, *American Studies*
 DAVID S. MARRIOTT, *History of Consciousness*
 PRADIP K. MASCHARAK, *Chemistry and Biochemistry*
 ANDREW MOORE, *Ocean Sciences*
 ERIC PORTER, *American Studies*
 CATHERINE RAMIREZ, *American Studies*
 RENYA RAMIREZ, *American Studies*
 ENRICO RAMIREZ-RUIZ, *Astronomy and Astrophysics*
 A. CHRISTINA RAVELO, *Ocean Sciences*
 B. RUBY RICH, *Community Studies*
 DONALD L. ROTHMAN, *Writing, Emeritus*
 MICHAEL ROTKIN, *Community Studies*
 DANIEL SELDEN, *Literature*
 MARY W. SILVER, *Ocean Sciences*
 FRANK J. TALAMANTES, *Molecular, Cell, and Developmental Biology, Emeritus*
 HONGYUN WANG, *Applied Mathematics and Statistics*
 HAYDEN WHITE, *History of Consciousness, Emeritus*
 DON WILLIAMS, *Culture Arts Diversity*
 ROB WILSON, *Literature*
 JUDY YUNG, *American Studies, Emerita*
 ADRIENNE L. ZIHLMAN, *Anthropology*

Honorary Associates

J. HERMAN BLAKE
 BRUCE N. COOPERSTEIN
 DAVID DODSON
 ALLEN B. FIELDS
 DOLORES HUERTA
 ELBA R. SÁNCHEZ

College Administrative Officer

SUSAN WELTE

Staff

ROBERT BARTEE, *Counseling Psychologist*
 CHER BERGEON, *Academic Preceptor*

HOMAYUN ETEMADI, *Advising and Records Coordinator*

JUAN GOVEA, *Senior Maintenance Assistant*

VALERIE GUERRERO, *College Programs Coordinator*

BILL HEINRICH, *Coordinator for Residential Education*

ELAINE KIHARA, *Academic Preceptor*

SANDY LORD CRAIG, *Assistant Budget Analyst*

ALESHA MAGEE, *Student Life and Housing Assistant*

GWENDOLYN MATHIEU, *Housing Coordinator*

MARIE MORONES, *College Assistant*

MARI ORTIZ-MCGUIRE, *Associate College Administrative Officer*

JOHN PALOCHAK, *Grounds*

AMANDA STOUT, *Coordinator for Residential Education*

HEATHER RICKS, *Assistant to Provost and to College Administrative Officer*

CURTIS SWAIN, *Community Safety Officer/Supervisor*

College Eight

The theme of College Eight is “Environment and society,” and our mission is to help nurture green innovators and entrepreneurs. College Eight has a vigorous intellectual life. During the course of the academic year, our faculty and our many associates—mainly professionals from Silicon Valley—offer seminars, lectures, and guest classes on environmental issues and a wide range of other topics, ranging from philosophy to business. College Eight also affords students a sense of community and offers opportunities to augment academic training with a wide range of extracurricular activities. Our students major on nearly every discipline offered at UCSC, while being strongly committed to environmental stewardship.

Academic Emphases

College Eight is in the process of launching a number of exciting new initiatives aimed at furthering its mission. In fall 2009, a pioneering new three-quarter core course, entitled *Nurturing Environmental Citizenship*, was introduced. The course is taught by senior faculty from the departments of Environmental Studies, Ecology and Evolutionary Biology, Earth and Planetary Sciences, and Electrical Engineering. The course is designed to provide all students, regardless of their eventual major, a solid foundation for success in the emerging green economy. The fall-quarter course is mandatory for all incoming freshmen, and its goal is to introduce students to environmental issues, past, present, and future. The winter-quarter

course takes on the principles of environmental science, and the spring quarter course, the ability of technological innovation to address environmental challenges.

College Community and Facilities

College Eight is located on a sunny, terraced hillside on the west side of the UCSC campus, a site that offers a spectacular view of Monterey Bay and the coastline. The college is designed to encourage interaction among resident and commuter students, faculty, and staff. Outdoor spaces allow for relaxing and informal opportunities to converse and socialize; they include small residence hall patios, grass quadrangles, and a large plaza—the heart of the college—where pedestrian traffic converges. Adjacent to the college are recreational facilities including the West Field House, tennis courts, basketball and sand volleyball courts, and playing fields. The Theater Arts and Music Centers, McHenry Library, and Porter and Oakes Colleges are a short distance from the college.

College Eight’s facilities include an academic building that accommodates the college office, the Sociology Department and associated research centers, a computer lab with printers, classrooms, and faculty offices.

Approximately 450 students live in a community of two- and three-story residence halls with single, double, and triple rooms, and suites. The residence halls include designated study lounges, laundry facilities, and lobbies that serve as living rooms—favorite places where residents gather to relax, watch television, and catch up on the news of the day. Another 307 students are housed in College Eight’s two-, three-, and four-bedroom apartments.

The college’s enthusiastic residential staff is composed of coordinators for residential education, who are full-time live-in professionals, along with undergraduate resident assistants. The residential staff plans a variety of educational and recreational events including community barbecues, outdoor movies, and a quarterly cultural festival celebrating the diversity of our community. More intimate gatherings include study breaks, coffee talks, brunches, and potlucks. The residential staff is available to ease the transition to college life, making the college a comfortable new home for our residents.

The Student Commons building contains the office of College Eight’s college programs coordinator and a large meeting room for student use. The study center is located across the plaza. The lively College Eight Café features a pool table and a quiet, comfortable corner with

couches. The café is a favorite haven and gathering place for students, faculty, staff, and other members of the campus community.

The College Eight Student Programs Office, in conjunction with the student government and student organizations, plans social, multicultural, and educational events for the college community. Weekly Café Nights—featuring open mikes, music, art shows, and guest speakers—accommodate the diverse spectra of cultural and artistic interests of the students. College Night, a monthly cultural event, provides an opportunity for students to learn about a variety of cultures through entertainment and delicious cuisine. In addition, the College Eight Student Programs Office works closely with the Student Environmental Center to bring programs that educate and build long-lasting networks, which aim to address the environmental issues affecting our world today.

Above all, College Eight seeks to create a community of inclusion, in which each person is encouraged to share and explore beliefs, worldviews, values, and ideas in an atmosphere of mutual support and trust.

For more information, contact the college at (831) 459-2361, e-mail 8housing@ucsc.edu or crmeusel@ucsc.edu, or visit the web site: eight.ucsc.edu.

College Eight Faculty and Staff

Provost

S. RAVI RAJAN, *Environmental Studies*

Fellows

JENNIFER K. ANDERSON, *Environmental Studies*

ERIC ASPHAUG, *Earth and Planetary Sciences*

DAVID P. BELANGER, *Physics*

JULIE BETTIE, *Sociology*

BRUCE BRIDGEMAN, *Psychology*

JEFFREY BURY, *Environmental Studies*

MELISSA L. CALDWELL, *Anthropology*

BRUCE N. COOPERSTEIN, *Mathematics*

DANIEL P. COSTA, *Ecology and Evolutionary Biology*

BEN CROW, *Sociology*

ROBERT R. CURRY, *Environmental Studies, Emeritus*

DANIEL F. DOAK, *Environmental Studies*

DAVID DRAPER, *Applied Mathematics and Statistics*

BRYAN H. FARRELL, *Environmental Studies, Emeritus*

F. JOEL FERGUSON, *Computer Engineering*

ANDREW FISHER, *Earth and Planetary Sciences*

MARGARET I. FITZSIMMONS, *Environmental Studies*

WILLIAM H. FRIEDLAND, *Community Studies and Sociology, Emeritus*

HIROSHI FUKURAI, *Sociology*

MARGARET H. FUSARI, *Environmental Studies;*

Natural Reserve Director

J. J. GARCÍA-LUNA-ACEVES, *Computer Engineering*

GREGORY S. GILBERT, *Environmental Studies*

VIKTOR GINZBURG, *Mathematics*

STEPHEN R. GLIESSMAN, *Environmental Studies*
 WALTER L. GOLDFRANK, *Sociology, Emeritus*
 DAVID E. GOODMAN, *Environmental Studies, Emeritus*
 GARY B. GRIGGS, *Earth and Planetary Sciences; Director, Institute of Marine Sciences*
 BRENT HADDAD, *Environmental Studies*
 DAVID P. HELMBOLD, *Computer Science*
 KAREN D. HOLL, *Environmental Studies*
 MINGHUI HU, *History*
 SHELDON KAMIENIECKI, *Environmental Studies*
 PAUL L. KOCH, *Earth and Planetary Sciences*
 PHOKION G. KOLAITIS, *Computer Science*
 DAVID C. KOO, *Astronomy and Astrophysics*
 DEBORAH K. LETOURNEAU, *Environmental Studies*
 RONNIE D. LIPSCHUTZ, *Politics*
 SURESH K. LODHA, *Computer Science*
 PAUL M. LUBECK, *Sociology*
 ANDREW MATHEWS, *Anthropology*
 PATRICK MCKERCHER, *Writing*
 ETHAN L. MILLER, *Computer Science*
 ONUTTOM NARAYAN, *Physics*
 PAUL NIEBANCK, *Environmental Planning, Emeritus*
 JAMES R. O'CONNOR, *Sociology, Emeritus*
 ART PEARL, *Education, Emeritus*
 JOHN S. PEARSE, *Ecology and Evolutionary Biology, Emeritus*
 JAMES E. PEPPER, *Environmental Planning, Emeritus*
 DANIEL M. PRESS, *Environmental Studies*
 MARY BETH PUDUP, *Community Studies*
 PETER T. RAIMONDI, *Ecology and Evolutionary Biology*
 DAVID M. RANK, *Astronomy and Astrophysics, Emeritus*
 JENNIFER REARDON, *Sociology*
 CRAIG REINARMAN, *Sociology*
 LISA B. ROFEL, *Anthropology*
 RAJ SAMPATH, *Philosophy*
 MARTINE D. F. SCHLAG, *Computer Engineering*
 DANIEL SCRIPTURE, *Writing*
 ALI SHAKOURI, *Electrical Engineering*
 MICHAEL SOULÉ, *Environmental Studies, Emeritus*
 ROSWELL (ROZ) SPAFFORD, *Writing, Emerita*
 ANDREW SZASZ, *Sociology*
 ANNA L. TSING, *Anthropology*
 ANUJAN VARMA, *Computer Engineering*
 SUSAN WATROUS, *Writing*
 CANDACE WEST, *Sociology*
 TERRIE M. WILLIAMS, *Ecology and Evolutionary Biology*
 ERIKA S. ZAVALA, *Environmental Studies*
 YI ZHANG, *Chemistry and Biochemistry*

Affiliate Fellows

WILLIAM JACKSON (JACK) DAVIS, *Ecology and Evolutionary Biology, Emeritus*
 SYLVIA JENKINS, *Music*
 BURNLEY LE BOEUF, *Ecology and Evolutionary Biology, Emeritus*
 JOEL R. PRIMACK, *Physics*

College Administrative Officer

SUSAN WELTE

Staff

PAUL BIANCHINI, *Asset Coordinator*
 JAN BURROUGHS, *Academic Preceptor*
 AUDREY CHING, *Coordinator for Residential Education*
 JODY CROCE, *Café Manager*
 WENDY GITTINGS, *Café Assistant Manager*
 MIKE KITTRIDGE, *College Programs Coordinator*
 SANDRA LORD CRAIG, *Assistant Budget Analyst*
 MARY MCKINNON, *Associate College Administrative Officer*
 CHARLES MEUSEL, *College Assistant*
 A. PATRICE MONSOUR, *Counseling Psychologist*
 JOY PEHLKE, *Coordinator for Residential Education*
 LAUREN REED, *Academic Preceptor*
 CURTIS SWAIN, *Community Safety Officer/Supervisor*
 SARA WALSH, *Assistant to the Provost*
 BALDO ZARAGOZA, *Facilities Supervisor*

College Nine

At College Nine, we introduce students to our increasingly interconnected world. Students can learn about the impact of economic globalization. We also expect them to come to appreciate the diversity of cultural traditions.

—Campbell Leaper,
 College Nine Founding Provost

Academic Emphases

College Nine's theme of International and Global Perspectives emphasizes the impact of our increasingly interconnected world. We consider how people around the world affect one another through global economies, politics, and culture. Some specific issues that our academic and cocurricular programs consider are economic and cultural globalization, immigration, ethnic conflicts, genocide, and human rights. Our programs seek to respect both diversity and unity in understanding individuals and societies. Students interested in these issues either as their major focus or as part of their general education are invited to join the College Nine community.

Writing Seminar

In the first-quarter frosh course, *Introduction to University Discourse: International and Global Issues* (see page 176), students examine current issues pertinent to the college's intellectual theme. Topics address issues such as globalization, inequities in wealth and poverty across the world, human rights, and regional conflicts.

The seminar emphasizes the development of students' writing skills. Being able to write well is a valuable asset for success in college and in most careers. Students write several reflective and analytical papers during the quarter. Each paper undergoes at least one revision after the student receives constructive feedback from the instructor. Thus, the instructors work closely with each student throughout the quarter.

All students who enter as frosh are required to pass the college writing seminar with a grade of C or better. Those who are admitted as transfer students are exempt from the core course requirement but may take the core course at their option pending available space; lower-division transfer students who, prior to enrolling, have not completed at least one UC-transferable college English composition course with a minimum grade of C (2.0) or better are permitted to take the core course to satisfy the C1 requirement.

Global Action

In this workshop facilitated by peer instructors, students will learn about current international and global issues through interactive exercises, small group discussions and faculty presentations. Students will develop an "action plan" to raise awareness about one or more of these concerns and take practical steps to create positive change in the world.

Global Issues Colloquium Series

Through weekly presentations by leading experts, students learn about global challenges and also consider possible solutions. Students have the option of taking this as a 1-credit class or of attending the presentations on a drop-in basis.

CLNI 105, *Researching Food Sovereignty*, is a 5-credit seminar course in which students engage in individual and collective research projects on transformational food systems in the U.S. and abroad. Readings will look at the current global food system and grassroots responses to food and environmental crises.

Special Academic and Cocurricular Programs

Optional programs are available to involve College Nine students in academic and cocurricular activities beyond the first-quarter course. They are designed to promote students' academic achievement and success by connecting them with faculty mentors and helping them pursue leadership experiences in particular contexts.

Service Learning: Esprit de Corps (110 and 110B)

Students can extend their learning beyond the classroom by gaining practical experience volunteering for a school or a nonprofit organization in the Santa Cruz community. Examples include assisting in a classroom or at a homeless shelter. College Nine has its own service-learning class, *Esprit de Corps* (110 and 110B), taught by our service-learning coordinator. Students meet weekly to reflect on their experiences, discuss readings, and listen to speakers from the community. To complete the service experience, students develop a final paper or project related to civic engagement. The class is available all three quarters and is facilitated by students during the winter and spring. Praxis, College Nine's community-service organization, provides another way to serve the Santa Cruz community.

Students as Teachers and Mentors

College Nine students have special opportunities to become course assistants, tutors, and student mentors for course credit. Students gain independent experience as teachers leading their own discussion sections of a College Nine course. They receive close supervision that emphasizes a collaborative approach to developing and enhancing teaching, communication, and leadership skills. The College Nine academic advisers can also direct students to other opportunities for student teaching and peer-mentoring programs on campus. These are excellent opportunities to work closely with a faculty member and to develop one's own skills as a teacher and a leader.

Global Information Internship Program

The Global Information Internship Program (GIIP) places highly motivated students in internships with nongovernmental organizations and community groups. Students in GIIP help these organizations and groups in the use of Internet-based information and communications technologies. Interns acquire leadership and organizational skills through the "learning-by-doing" method. For more information, see page 47 and visit the web site at www2.ucsc.edu/giip.

Practical Activism: Tools for Local and Global Change

The annual Practical Activism Conference is a daylong, student-led event featuring keynote speakers, 10 workshops, various on- and off-campus organizations, performances, and a variety of hands-on activism activities. Students gain valuable leadership and organizing skills through developing and planning this exceptional program, which involves collaboration

among faculty, staff, and the local community. Visit activism.ucsc.edu for more information.

Education Abroad

The UC Education Abroad Program (see page 45) places students at a university in another country for one or more quarters. Studying abroad can be a valuable way to expand one's understanding of the world. Given the international focus at College Nine, students are encouraged (but not required) to develop a second language or to study abroad.

Research Opportunities

The faculty at UC Santa Cruz are ranked high in their quality of research. College Nine students are encouraged to take advantage of the many excellent opportunities available to work closely with faculty as research apprentices. Students will find many internship, independent study, or senior thesis programs in the departments of most majors. The College Nine academic advisers will help link students with these programs.

College Nine Scholars Program

Eligible College Nine frosh may apply to the Scholars Program. This may include enrolling in an honors section of the frosh writing seminar in the fall quarter, the 2-credit workshop in the winter, and a special seminar with a social sciences faculty member in the spring.

College Nine Pathways to Distinction

Another feature of College Nine is that qualified students may graduate with College Nine Distinction. This recognition is intended to serve as an incentive for students to pursue activities that are especially apt to help them succeed in college and beyond. Two pathways are possible:

Research and scholarship. In this pathway, students pursue research with faculty by completing three quarters (15 credits) of work on a senior thesis or a research internship. Students may be recognized with College Nine Distinction if they do a thesis or a research internship in their major on a topic related to international or global issues.

Language and culture. Students who enroll in at least three quarters (15 credits) in either Education Abroad or a foreign language (or a combination) may qualify for College Nine Distinction.

College Community and Facilities

Founded in fall 2000, College Nine is one of the newest colleges at UCSC. Consistent with

UCSC's founding vision, College Nine creates an integrated living and learning environment through engaging academic and extracurricular programs focusing on the theme of International and Global Perspectives. Students and staff collaborate to develop an array of programs exploring the many aspects of the college's theme. Some of the programs include faculty presentations, guest speakers, debates, films, arts events, and interactive workshops. These programs bring together members of our community to learn, debate, and challenge ourselves about important issues facing us today in an atmosphere of mutual respect and engagement.

College Nights

Several times a quarter, the college community comes together to plan College Night, which is a large-scale community celebration held in the dining commons and open to all College Nine students whether or not they live on campus. These events are planned by students and focus on some element of international and global issues. College Nights include food, entertainment, and educational materials related to the theme. Some past College Nights have included Carnival and Lunar New Year.

International Living Center

The International Living Center (ILC) at College Nine offers a unique living environment fostering understanding, cooperation, and friendship among upper-division students from different nations, cultures, and backgrounds. Half of the residents are students from the United States, and the other half are students from various countries around the world. Students reside in the College Nine and Ten Apartments. Based out of the International Living Center, the International Affairs Group (IAG) offers all College Nine and Ten community members the opportunity to engage in lively discussions about important current international issues with one another through guest speakers, film, literature, media and personal experience.

Cocurricular Programs and Opportunities

Getting involved in cocurricular activities is a predictor of college success. Not only do college activities help students make friends, they foster leadership and group cooperation skills. There are many opportunities at College Nine for student involvement. These include the following groups as well as many other programs, activities, and clubs.

Global Leadership Development (GLAD)

GLAD meets weekly throughout the fall quarter and provides a wide range of exercises, guest speakers, and programs designed to foster and develop participants' efficacy as world citizens and leaders of College Nine.

Student Government

Student Government represents the students in the college. It appoints students to campus and college committees, consults with college administration on policy development, and provides monetary support to student organizations.

CREATE

CREATE (Cultural Resources to Educate and to Empower) offers a community at College Nine for students of color to find support and empowerment through mentorship and friendship.

PHAT

PHAT (Programming House Activities Team) is a planning committee for the apartment residents who are interested in getting people out of their rooms and into their communities. Programs include the annual Haunted House and the Battle of the Buildings.

WATER

WATER (White Allies To End Racism) tackles issues of diversity and racism through the exploration of white racial identity. The group provides a safe and open space for dialogue and the opportunity to work with students of color groups on collaborative action projects.

Praxis (Student Volunteer Community)

Praxis is an organization geared toward community building and social justice. By participating in Praxis, students gain exposure to a variety of Santa Cruz community agencies and explore what it means to be agents of social change.

Intercultural Community Weekend

This two-day retreat provides international and American students from diverse backgrounds the opportunity to explore various components of intercultural communication. Through a series of structured exercises and small-group discussions, students share perspectives on issues such as multiculturalism, values orientation, and diversity. The goal of the workshop is to build community and friendship among international and American students as well as to increase students' understanding of the complexity of communicating across cultures.

Physical Surroundings

College Nine is situated in a redwood grove next to the Social Sciences 1 and 2 Buildings near the heart of campus. One of the campus's Instructional Computing Labs is conveniently located in the Social Sciences 1 Building.

A nature preserve serves as College Nine's "backyard." College Nine students have immediate access to hiking, running, and mountain bike trails in the adjacent forest.

Residence halls offer approximately 500 single, double, and triple bedrooms. These fully furnished residence halls include student lounges, recreational spaces, and Internet connections. In addition, there is a state-of-the-art dining hall with an adjoining multipurpose room and recreation lounge for both Colleges Nine and Ten.

Colleges Nine and Ten also house approximately 300 upper-division students in apartments, with 190 students in single bedrooms and the balance in double and triple rooms. All apartments have full kitchens, living rooms, bathrooms, and Internet connections. Ground-floor apartments have decks, and most upper apartments have private balconies.

For more information about academic or general college programs, call (831) 459-5034, e-mail dslater@ucsc.edu, or visit the web site: collegenine.ucsc.edu.

College Nine Faculty and Staff

Provost

HELEN SHAPIRO,* *Division of Social Sciences; Sociology*

Fellows

Charter Fellows*

JOSHUA AIZENMAN,* *Economics*

DILIP BASU,* *History*

DONALD BRENNEIS,* *Anthropology*

EDMUND BURKE III,* *History, Emeritus*

MELISSA CALDWELL,* *Anthropology*

NANCY CHEN,* *Anthropology*

WEIXIN CHENG,* *Environmental Studies*

MARK CIOC,* *History*

ANNETTE CLEAR,* *Politics*

BEN CROW,* *Sociology*

KENT EATON,* *Politics*

BERNARD ELBAUM,* *Economics*

JONATHAN A. FOX,* *Latin American and Latino Studies*

K. C. FUNG,* *Economics*

MARGARET A. GIBSON,* *Education and Anthropology*

PER F. GJERDE,* *Psychology*

STEPHEN R. GLIESSMAN,* *Environmental Studies*

WALTER L. GOLDFRANK,* *Sociology, Emeritus*

JUNE A. GORDON,* *Education*

ISEBILL V. GRUHN,* *Politics, Emerita*

JULIE GUTHMAN,* *Community Studies*

MICHAEL M. HUTCHISON,* *Economics*

DAVID E. KAUN,* *Economics*

KENNETH KLETZER,* *Economics*

CAMPBELL LEAPER,* *Founding College Provost; Psychology*

HERBERT K. LEE III,* *Applied Mathematics and Statistics*

DANIEL T. LINGER,* *Anthropology*

RONNIE D. LIPSCHUTZ,* *Politics*

SURESH K. LODHA,* *Computer Science*

PAUL M. LUBECK,* *Sociology*

STEVEN MCKAY,* *Sociology*

JAYE PADGETT,* *Linguistics*

INGRID PARKER,* *Ecology and Evolutionary Biology*

JENNIFER POOLE,* *Economics*

LISA ROFEL,* *Anthropology*

JEROME SHAW,* *Education*

NIRVIKAR SINGH,* *Economics*

MICHAEL E. URBAN,* *Politics*

CARTER WILSON,* *Community Studies, Emeritus*

College Administrative Officer

DEANA SLATER

Senior Academic Preceptor

ROBERT TAYLOR

Staff

ABBEY ASHER,* *Service Learning Coordinator*

WENDY BAXTER,* *Associate College Administrative Office for Cocurricular and College Programs*

DENISE BOOTH,* *Academic Adviser*

JIMMIE BROWN,* *Community Safety Officer*

OSCAR GUILLEN,* *Asset Coordinator*

JANE HARTMAN,* *Assistant to the College Administrative Officer*

MIRA HUTTON,* *Coordinator for Residential Education*

SARA JAKL,* *Housing/Student Life Assistant*

HASHIM JIBRI,* *Coordinator for Residential Education*

AUDREY KIM,* *Psychologist*

ROBIN KIRSKEY,* *Financial Analyst*

MAURÍCIO MAGDALENO,* *Senior Building Maintenance Worker*

LETICIA MALDONADO,* *College Programs Coordinator*

KRYSTINNE MICA,* *College Programs Coordinator*

RACHEL OGATA,* *Cocurricular Programs Assistant*

KAREN O'HANLON,* *College Assistant*

ERIC PETERSON,* *Senior Building Maintenance Supervisor*

ERIN RAMSDEN,* *Cocurricular Programs Coordinator*

BILL REID,* *Groundskeeper*

RACHEL STONE,* *Housing Coordinator*

College Ten

Our goal at College Ten is to foster students' concerns for social justice and their respect for diversity. This appreciation develops through both understanding and practice. Students can study the roots of social problems such as prejudice, ethnic hatreds, poverty, and political oppression. Another form of learning can occur through involvement in community organizations and other agencies. In these ways, we hope our students can contribute to the makings of a better world.

—Campbell Leaper,
College Ten Founding Provost

Academic Emphases

College Ten's theme of Social Justice and Community addresses a range of social problems and their impact on all members of society. In particular, the academic and cocurricular programs consider the injustices that many people confront in their lives. Possible community and governmental policies for addressing social, political, and economic inequalities are also examined. In addition, the college provides students with opportunities to make their own positive contributions to social change through community involvement or scholarly research.

The college curriculum will explore the causes and consequences of social injustice in several ways. Students will examine the roots of prejudice, discrimination, and violence directed toward groups based on their ethnicity, skin color, gender, sexual orientation, religious beliefs, or political views. They will also consider the causes and consequences of poverty both within the United States and around the world.

Writing Seminar

In the first-quarter frosh course, *Introduction to University Discourse, Social Justice and Community* (see page 177), students examine current issues pertinent to the college's intellectual theme. Topics address issues such as poverty, discrimination, and economic injustice. Ways that communities, governments, and businesses can address inequities in society are also examined.

The seminar emphasizes the development of students' writing, reading, and speaking skills. Being able to write well is a valuable asset for success in college and later in most careers. Students write several reflective and analytical papers during the quarter. Each paper undergoes at least one revision after the student

receives constructive feedback from the instructor. Thus, the instructors work closely with each student throughout the quarter.

All students who enter as frosh are required to pass the college writing seminar with a grade of C or better. Those who are admitted as transfer students are exempt from the core course requirement but may take the core course at their option pending available space; lower-division transfer students who, prior to enrolling, have not completed at least one UC-transferable college English composition course with a minimum grade of C (2.0) or better are permitted to take the core course to satisfy the C1 requirement.

CLTE 105, *The Making and Influencing of Nuclear Policy*, is a 5-credit seminar course that explores how policy is made and influenced, using nuclear policy as a case study. Topics include FOIA, legislation and rulemaking, licensing and judicial proceedings, research and news media. Focus is on skills that enable citizens to influence policy.

Special Academic and Cocurricular Programs

Optional programs are available to involve College Ten students in academic and cocurricular activities beyond the first-quarter core course. They are designed to promote students' academic achievement and success by connecting them with faculty mentors and helping them pursue leadership experiences in particular contexts.

Social Justice Issues Workshop

College Ten students have the option of enrolling in the *Social Justice Issues Workshop* in winter quarter. This 2-credit course meets once per week and can be taken in addition to a regular 15-credit academic load. The workshop offers a small, dynamic learning community in which members explore important issues of personal and cultural identity; social, political, and environmental concerns; and community-mindedness. The class emphasizes small-group experiential learning through structured exercises and group activities, and also includes discussions, film presentations, and guest speakers.

Service Learning: Esprit de Corps (110 and 110B)

Students can extend their learning beyond the classroom by gaining practical experience volunteering for a school or nonprofit in the Santa Cruz community for credit. Examples include assisting in a classroom or at a home-

less shelter. College Ten has its own service-learning class, *Esprit de Corps* (110 and 110B), taught by our service-learning coordinator. Students meet weekly to reflect on their experiences, discuss readings, and listen to speakers from the community. To complete the service experience, students develop a final project related to civic engagement. The class is available all three quarters and is facilitated by students during the winter and spring. Praxis, College Nine's community-service organization, provides another way to serve the Santa Cruz community.

Practical Activism: Tools for Local and Global Change

The annual Practical Activism Conference is a daylong, student-led event featuring keynote speakers, 10 workshops, various on- and off-campus organizations, performances, and a variety of hands-on activism activities. Students gain valuable leadership and organizing skills through developing and planning this exceptional program, which involves collaboration among faculty, staff, and the local community. Visit activism.ucsc.edu for more information.

Students as Teachers and Mentors

College Ten students have special opportunities to become course assistants, tutors, and student mentors for course credit. Students gain independent experience as teachers leading their own discussion sections of a College Ten course. They receive close supervision that emphasizes a collaborative approach to developing and enhancing teaching, communication, and leadership skills. The College Ten academic advisers can also direct students to other opportunities for student teaching and peer-mentoring programs on campus. These are excellent opportunities to work closely with a faculty member and to develop one's own skills as a teacher and a leader.

Research Opportunities

The UC Santa Cruz faculty are ranked high in their quality of research. College Ten students are encouraged to take advantage of the many excellent opportunities available to work closely with faculty as research apprentices. Students will find many internship, independent study, or senior thesis programs in the departments of most majors. The College Ten academic advisers will help link students with these programs.

College Ten Pathways to Distinction

We understand that learning styles and educational commitments are unique and personal. Therefore, students are recognized with College Ten Distinction upon successful completion of three quarters (15 Credits) of experiential course work in **Service and Leadership** and/or **Research and Scholarship** focused on social justice and diversity issues. Applicable courses in service-learning and research opportunities with faculty can fulfill the criteria for distinction. This recognition is intended to serve as an incentive for students to pursue activities that are apt to help them succeed in college and beyond.

College Community and Facilities

Founded in fall 2002, College Ten is the newest college at UCSC. Consistent with UCSC's founding vision, College Ten creates an integrated living-and-learning environment through engaging academic and extra-curricular programs focusing on the theme of Social Justice and Community. Students and staff collaborate to develop an array of programs exploring the many aspects of social justice. Some of the programs include faculty presentations, guest speakers, debates, films, arts events, and interactive workshops. These programs bring together members of our community to learn, debate, and challenge ourselves about important issues facing us today in an atmosphere of mutual respect and engagement.

College Nights

Several times a quarter, students and staff work together to plan College Nights, which are large-scale community celebrations held in the dining commons and open to all College Ten students whether or not they live on campus. College Nights include food, entertainment, and educational materials related to a theme.

Student Government

Student Government represents the students in the college. It appoints students to campus and college committees, consults with college administration on policy development, and provides monetary support to student organizations.

Cocurricular Programs and Opportunities

Getting involved in cocurricular activities is a predictor of college success. Not only do college activities help students make friends, they foster leadership and group coopera-

tion skills. There are many opportunities at College Ten for student involvement. These include the following groups as well as many other programs, activities, and clubs.

CREATE

The purpose of CREATE (Cultural Resources to Educate and to Empower) is to facilitate the ongoing discussion of diversity issues at College Ten and in our living communities, learn about and promote multiculturalism, plan activities, and help students and staff have a resource for inclusiveness and training.

ENGAGE

ENGAGE (Explore New Growth and Gain Experience) offers students the opportunity to explore and develop their own beliefs, values, and feelings about current issues and social concerns through a wide range of exercises, guest speakers, discussions, and debates. Participants develop leadership skills and increase their efficacy as world citizens and leaders at College Ten. ENGAGE meets weekly throughout fall quarter.

PHAT

PHAT (Programming House Activities Team) is a planning committee for the apartment residents who are interested in getting people out of their rooms and into their communities. Programs include the annual Haunted House, the Battle of the Buildings, and Freestyle Fridays.

WATER

WATER (White Allies To End Racism) tackles issues of diversity and racism through the exploration of white racial identity. The group provides a safe and open space for dialogue and the opportunity to work with students of color groups on collaborative action projects.

Multicultural Community Weekend

This two-day retreat provides students from diverse backgrounds the opportunity to explore aspects of social justice, diversity, and community through a series of exercises and discussions (both structured and informal). Participants explore issues impacting our individual identities (e.g., race, class, gender, sexual orientation, ability, religion), increase their understanding of the complexities of communicating across diverse experiences and backgrounds, build communication skills, and share in celebrating and deconstructing the diversity of our community. The Multicultural Community Weekend is optional; students apply for this opportunity in the fall.

Café Revolución

Located at College Ten, Café Revolución is a favorite gathering place. It is open nightly for social justice performances, music, and social interaction.

Physical Surroundings

College Ten is situated in a redwood grove next to the Social Sciences 1 and 2 Buildings near the heart of campus. One of the campus's Instructional Computing Labs is conveniently located in Social Sciences 1.

A nature preserve serves as College Ten's "backyard." College Ten students have immediate access to hiking, running, and mountain bike trails in the adjacent forest.

Residence halls offer 400 single and double bedrooms. These fully furnished residence halls include student lounges, recreational spaces, and Internet connections. In addition, there is a state-of-the-art dining hall with an adjoining game room and student lounge for both Colleges Nine and Ten.

Colleges Ten and Nine also house approximately 300 upper-division students in apartments, with 190 students in single bedrooms and the balance in double and triple rooms. All apartments have full kitchens, living rooms, bathrooms, and Internet connections. Ground-floor apartments have decks, and most upper apartments have private balconies.

For more information about academic or general college programs, call (831) 459-5034, e-mail dslater@ucsc.edu, or visit the College Ten web site: collegeten.ucsc.edu

College Ten Faculty and Staff

Provost

HELEN SHAPIRO, *Division of Social Sciences; Sociology*

Fellows

Charter Fellows*

NAMEERA AKHTAR,* *Psychology*
 JENNIFER ANDERSON,* *Environmental Studies*
 BETTINA APTHEKER, *Feminist Studies and History*
 MARGARITA AZMITIA, *Psychology*
 HEATHER BULLOCK,* *Psychology*
 GEORGE C. BUNCH, *Education*
 MAUREEN CALLANAN, *Psychology*
 MARTIN M. CHEMERS,* *Psychology, Emeritus*
 JOHN BROWN CHILDS,* *Sociology*
 FAYE CROSBY,* *Psychology*
 ROBERT FAIRLIE,* *Economics*
 RICARD GIL, *Economics*
 RONALD GLASS, *Education*
 MIRIAM GREENBERG, *Sociology*
 PHILLIP HAMMACK, *Psychology*
 SHELDON KAMIENIECKI, *Environmental Studies*



LORI KLETZER,* *Economics*
 CAMPBELL LEAPER,* *Founding College Provost, Psychology*
 EDUARDO MOSQUEDA,* *Education*
 RODNEY OGAWA,* *Education*
 DANIEL PRESS,* *Environmental Studies*
 S. RAVI RAJAN,* *Environmental Studies*
 JENNIFER REARDON,* *Sociology*
 CRAIG REINARMAN,* *Sociology*
 GABRIELA SANDOVAL,* *Sociology*
 ROGER SCHOENMAN,* *Politics*
 TRAVIS SEYMOUR,* *Psychology*
 NANCY STOLLER,* *Community Studies, Emerita*
 DANA TAKAGI,* *Sociology*
 EILEEN ZURBRIGGEN,* *Psychology*

College Administrative Officer

DEANA SLATER

Senior Academic Preceptor

ROBERT TAYLOR

Staff

ABBEY ASHER,* *Service Learning Coordinator*
 GREG BANKS,* *Academic Adviser*
 DAVE BARRY,* *Community Safety Officer*
 WENDY BAXTER,* *Associate College Administrative Office for Cocurricular and College Programs*
 JENNIFER BOSCO,* *Coordinator for Residential Education*
 JIMMIE BROWN,* *Community Safety Officer*
 OLIVIA CHAN,* *Academic Adviser*
 OSCAR GUILLEN,* *Asset Coordinator*
 JANE HARTMAN,* *Assistant to the College Administrative Officer*
 SARA JAKL,* *Housing/Student Life Assistant*
 ROBIN KIRSKEY,* *Financial Analyst*
 MAURÍCIO MAGDALENO,* *Senior Building Maintenance Worker*
 LETICIA MALDONADO,* *College Programs Coordinator*
 KRISTINNE MICA,* *Assistant College Programs Coordinator*
 RACHEL OGATA,* *Cocurricular Programs*
 ERIC PETERSON,* *Senior Building Maintenance Supervisor*
 JOSÉ REYES-OLIVAS,* *Cocurricular Programs Coordinator*

MICHELLE SASSE,* *Groundskeeper*
 MATTHEW SERNAKER,* *Events and Facilities Coordinator*
 REGGIE SHAW JR.,* *Coordinator for Residential Education*
 RACHEL STONE,* *Housing Coordinator*

Student Life

Campus life is all about learning, discussion, and debate; meeting people from diverse backgrounds; making new and lasting friendships; attending cultural celebrations and artistic and musical performances; and getting involved with student organizations and clubs. UCSC provides a wealth of opportunity for personal growth within the context of a rich and meaningful academic experience. You will live, study, and socialize with other students in your college. You will also meet students from the other colleges—in your classes and at the many campuswide events that take place throughout the year. The colleges (described in the previous section) and various campuswide units provide a wide range of student services to respond to individual needs, interests, and levels of personal development. In addition, students can take advantage of the campus's stunning natural setting, the friendly and engaging local community, and easy access to the Monterey and San Francisco Bay Areas.

Santa Cruz Community

Located on the northern tip of Monterey Bay, Santa Cruz is famous for its Mediterranean climate, forested state parks, and miles of scenic beaches. Recreational opportunities abound—hiking through redwood forests, bicycling along mountain roads, and surfing, sailing, and scuba diving. The Santa Cruz Mountains are minutes away; the majestic Sierra Nevada is a four-hour drive to the east.

The metropolitan centers of the San Francisco Bay Area are easily accessible. By car, Berkeley and San Francisco are less than two hours from campus. San Jose, Monterey, and Carmel are one hour away.

The city of Santa Cruz, with a population of about 56,000, was originally founded as a Spanish mission. Santa Cruz is a small community with cosmopolitan appeal and a strong awareness of environmental and political issues. Art exhibits, local theater companies, a symphony orchestra, fine restaurants, and a lively contemporary music scene combine to make Santa Cruz an interesting place to live.

Housing

College Residences

All undergraduate students are affiliated with one of 10 residential colleges at UC Santa Cruz, whether they live on campus or not. Each college provides academic support, organizes student activities, and sponsors events

that enhance the intellectual and social life of the campus in addition to housing students in small-scale residential communities. About 45 percent of single undergraduate students live in university housing.

Freshmen and new transfer students entering in fall quarter are guaranteed university housing for their first two years at UCSC. All deadlines must be met to qualify for guarantees.

You must be admitted as a full-time student and affiliated with one of the 10 colleges before applying for housing. All new single students who state a preference for university housing as part of the admissions acceptance process and submit the required advance housing fee by the stated deadline will be sent housing information after college assignments are made. The housing packet will include additional information about your affiliated college and instructions for completing the online housing application/contract process.

The room and board rates for the 2010–11 academic year range from \$9,559 to \$15,562, depending upon the type of accommodation and meal plan (see pages 19–20 for more detailed information on rates).

The colleges at UC Santa Cruz offer two kinds of living accommodations—residence halls and apartments, both with access to common dining facilities. The residence hall floors, typically shared by 12 to 30 students, have common bathrooms and lounge areas. Students can request to live in a coed or single-gender area. Gender-neutral rooms are also available. Apartments, typically shared by four to seven students, have common living/dining rooms, kitchens and bathrooms, and a combination of shared and private bedrooms. Each community provides accessible housing for students with disabilities.

The specific room options available to you will differ, depending on which college you are affiliated with and whether you are a new freshman or a new transfer student. Freshmen are generally assigned to live at their colleges. Beginning 2010–11, all incoming transfer students requesting university housing will be housed at the Transfer Community, regardless of college affiliation. These residential settings provide academically and socially supportive environments to help new students transition to campus life and get the most out of their UCSC experience.

The Transfer Community, located in the newly renovated Porter College residence hall, is perfectly situated on campus to provide easy access to Services for Transfer and Re-Entry Students (STARS) and the Academic Resource Center (ARC). Students live at the Transfer

Community for their first quarter to full academic year, at which time they may choose to move to another university housing community. (See pages 89–107 for more detailed descriptions of college housing facilities.)

There are a variety of theme-housing options for those who are interested. Based on academic pursuits, hobbies, individual backgrounds, and lifestyle preferences, these living/learning options serve to complement a student's experience in residence.

Each college's residential program is a team effort. Professional staff (coordinators of residential education) work with students trained as resident assistants. They help organize activities and events, provide referral information about academic or personal concerns, and assist with roommate problems.

All housing contracts for residence halls and apartments at the colleges, and at the University Inn, include meal plans. Students with meal plans may use their student ID cards to access any of the five dining halls on campus, as well as the University Inn dining hall in downtown Santa Cruz. Meal plans include Flexi Dollars (a dollar-for-dollar exchange for "food dollars" that can be used at college coffee shops, campus restaurants, and all dining halls). Additional Flexi Dollars may be added to any meal plan.

For more information on the colleges, refer to the brochure titled *UC Santa Cruz, The Colleges: Communities of Learning*, or contact the Campus Housing Office.

Redwood Grove Apartments

Located on the west side of campus, between Kresge College and Graduate Student Housing, Redwood Grove Apartments is a community where undergraduate students from all colleges can live together. Each apartment has four single bedrooms, living room, kitchen, dining room, and bathroom. The room and board rates for 2010–11 range from \$13,429 to \$15,562 depending upon the type of meal plan. Call (831) 466-1359 or e-mail redwoodgrove@ucsc.edu for more information.

The Village

Located in the Lower Quarry, the Village houses a mix of continuing undergraduates and graduate students. Each of the 17 houses has nine single bedrooms with Internet connections, three bathrooms, and a kitchenette. A meal plan is optional. A manager's apartment, office, laundry facility, community kitchen, and community lounge are located on site. The live-in manager and residential assistants are available to assist students. The Village housing fee for academic year 2010–11 is \$9,028. Call

(831) 459-4388 or e-mail village@ucsc.edu for more information.

University Town Center

The University Town Center (UTC), located at the corner of Pacific and Cathcart in downtown Santa Cruz, provides housing for continuing students in two- and three-person studio apartments. A meal plan is optional. The UTC housing rates for 2010–11 range from \$7,777 to \$10,026 depending on the type of accommodation. Contact the UTC Housing Office for more information, (831) 502-0031 or utc@ucsc.edu.

University Inn

The Inn, located on Ocean Street in downtown Santa Cruz, provides housing for continuing students during the academic year in double and single rooms with private bathrooms. Students living at the University Inn have a meal plan that may be used at any dining hall on campus, in addition to the Inn dining hall. The room and board rates for 2010–11 range from \$10,963 to \$15,076 depending on the type of accommodation and meal plan. Contact the University Inn Housing Office for more information, (831) 466-1359 or inn@ucsc.edu.

Family Student Housing

Family Student Housing, located on the west side of campus, has apartments for students and their families (see page 116 for information on child care and youth programs). The apartments are unfurnished, and each has two bedrooms, a bathroom, a small study, a combined living-dining area, and an electric kitchen. Several apartments are accessible to people with mobility impairments. For 2010–11 the monthly rent is \$1,366, not including utilities and phone. There is a \$500 refundable security deposit and a \$25 nonrefundable application fee. If you are interested in an apartment, download an application form at housing.ucsc.edu/fsh and submit it with the application fee. Early application is advisable as these apartments are in great demand. Students with children are given priority. For more information, contact the Family Student Housing Office, (831) 459-2549, or fsh@ucsc.edu.

Camper Park

A 42-space camper park on the north side of campus is available to students who own recreational vehicles. All have water and electrical hookups; eight also have sewer hookups. Rates for 2010–11 are \$485; or \$540 with sewer hookup. The community includes a small central facility with rest rooms, showers, a meeting

room, and a laundry room. For more information about the park and the vehicle requirements, or to request an application, contact the Village Office, (831) 459-4388, rvpark@ucsc.edu.

Graduate Student Housing

Four-bedroom apartments for single graduate students are located on the west side of campus, between Kresge College and the Baskin Engineering Building. See page 54 for a more detailed description. For more information, contact the Graduate Student Housing Office, (831) 459-5712, gradhsg@ucsc.edu.

Campus Housing Office

This office is responsible for the application and contract records for all single students living in campus residence halls and apartments, the Village, University Town Center, University Inn, and Graduate Student Housing. Staff are available to advise students about room and board billing, payment plans, and contractual responsibilities. Students can purchase meal plans or Flexi Dollars online at studenthousing.ucsc.edu.

Centrally located at 104 Hahn Student Services Building, Campus Housing is open 8 A.M. to 5 P.M. Monday through Friday, (831) 459-2394, e-mail: housing@ucsc.edu, Web: housing.ucsc.edu.

Community Rentals Office

The Community Rentals Office (CRO) maintains current rental listings accessible on the CRO web site. Other services include online Renters' Workshop, rental forms and resource information, and basic advising about tenants' rights and responsibilities.

Locating suitable housing in the Santa Cruz area can take from one to four weeks, depending on specific requirements and restrictions. Average rental rates are available at housing.ucsc.edu/cro/costs.html.

The Community Rentals Office, located at 104 Hahn Student Services (North Entrance), is open 8 A.M. to 5 P.M., Monday through Friday. For further information, call (831) 459-4435, e-mail communityrentals@ucsc.edu, or visit the web site: communityrentals.ucsc.edu.

The Sustainable Living Center at UCSC (SLC)

SLC's mission is to create a site on campus where students from multiple disciplines can apply classroom knowledge in real settings, gain hands-on experience in sustainable technologies and community food systems, and prepare to become environmental educators and leaders.

We believe that with such experience students can become engaged agents of change within their communities and embody the values of environmental consciousness and social justice to create a more sustainable world.

SLC is being developed as a program of the Environmental Studies Department and is located in the Village of the Lower Quarry on campus. It is home to the Program in Community and Agroecology (PICA) and Friends of the Community Agroecology Network (FoCAN). At SLC, students from diverse majors are engaged in projects including food production, ecological landscaping, green building, alternative trade systems and much more.

At SLC, young people learn the necessary skills and tools to become leaders in educating and engaging communities in sustainable and equitable food systems. We follow an educational model in which students engage in project-based learning, gain experience through community internships, and use the knowledge they gain from their internships to educate others in the student community.

SLC Programs

Program in Community and Agroecology (PICA), an academic program of the Environmental Studies Department, is an experiential living/learning program at UCSC where students use agroecological principles in the maintenance of a half-acre organic garden, work together to develop community projects such as a composting program for the Village, and share in the many aspects of sustainable living—by harvesting, cooking, and eating healthful food grown organically right next to their rooms. Through a unique collaboration that integrates classroom instruction and community-based experience, PICA has become a model for an experiential learning program that allows students to practice sustainability at a hands-on level.

Academics. PICA offers classes and training in agroecology, horticulture, and organic agriculture through UCSC's Environmental Studies Department. PICA students and faculty work closely in both the classroom and in the field, addressing topics such as:

- Ecological design of farming, landscaping, and gardening practices
- The impact of consumer choice within a global food system
- Food equity for diverse urban communities
- Social justice and empowerment in agricultural communities
- Environmental education focused on sustainability

Many PICA classes incorporate on-farm experience as a vital component of the academic curriculum. The various campus gardens and the world-renowned farm at UCSC serve as outdoor classrooms for hands-on learning. Through PICA, students are finding unique ways to learn and participate in sustainable food systems and communities.

On-campus living at PICA. The PICA residential program offers students an alternative to standard dorm living. At the Village in the Lower Quarry, students from across academic disciplines come together to create a sustainable living environment on campus. PICA residents grow organic food at the nearby Foundational Roots Garden, come together to share in weekly community meals, implement ecological landscaping projects around their housing units, and direct a Village-wide composting program. This living/learning experience allows students a way to link healthy communities with healthy food systems.

Internships and Field Studies. Through internship and field studies programs, students participate in community partnerships and placements in agricultural communities that span geographic and cultural situations ranging from local to international. PICA continues to broaden its network of partnerships with nonprofit, government, community-based, and private agencies and farms working toward sustainability. These internship and field-studies opportunities are an important way of engaging students with issues facing food systems and farming communities around the world.

Friends of CAN is a UCSC student organization affiliated with the Community Agroecology Network, a nonprofit organization that assists rural communities in Mexico and Central America to develop sustainable livelihoods while conserving the natural resources and landscapes of their regions. Through three programs (Action Education, Trade Network Innovations, and Participatory Action Research), an educational and research model for achieving sustainable development has been put in place.

Together these organizations facilitate hands-on learning activities that engage students with all aspects of a sustainable food system—from growing organic food that supports local communities to conscious consumerism on a global level.

For further information, please contact Bee Vadakan at vvadakan@ucsc.edu.

Student-Run Cooperatives

Co-ops are an alternative form of organizing a group of people or a business. Here at UCSC, the co-ops are entirely student run and operated. Although memberships in the Bike and Kresge Food Co-ops are available, anyone, student or otherwise, is welcome to use them.

Kresge Food Co-op

Mission statement: “We are a group of students whose goal is to run a natural food store through consensus decision-making and group responsibility. We embrace cooperation as our tool for social change. We are not for profit; we are for collective power. As a cooperative business we seek to educate all members of the community, including ourselves. We use our buying power to reflect our ideals regarding ecological, social, and political issues. For this reason we carry healthful, locally based, cruelty-free, organic products. We focus on products that are good for the earth, the people who produce them, and the people who consume them. Open to all, we provide a space where good food and revolutionary action meet at the checkout line.” Call (831) 426-1506 for more information.

Bike Co-op

The co-op is student owned and operated, run cooperatively, and nonprofit. Whether you need to purchase a bike, repair a bike, or want to learn, the co-op can accommodate your needs. People are encouraged to attend meetings, learn more about cooperatives, and get involved. The Bike Co-op is located at the Student Union. For information, come by or call (831) 457-8281.

Transportation and Parking Services

The UCSC campus strives for an academic environment disturbed as little as possible by automobile traffic. The university has chosen to reserve flatlands for future buildings, natural areas, and social and recreational spaces; as a result, parking is a limited resource on campus. UCSC requests that students not bring cars.

Comprehensive transportation systems have been developed to reduce traffic and eliminate the need for a car. Movement on the spacious campus is made easier by the care with which buildings have been located, a network of foot and bicycle paths, and an extensive intracampus shuttle system that links the colleges, central core facilities, and the two remote parking lots. Shuttle buses operate on 10- to 30-minute frequencies from 7:30 A.M. to 8 P.M. weekdays (except on academic holidays). During summer and quarter breaks, day shuttle service is provided at 12- to 15-minute intervals. In

addition, a night shuttle service, operating at 10- to 30-minute intervals, runs seven nights a week between 8 P.M. and 12:30 A.M. during the academic year. The night shuttle provides curb-to-curb transportation to the colleges. Both day and night shuttles provide wheelchair-accessible services and are free of charge. Transportation and Parking Services (TAPS) also operates the Disability Van Service, which provides transportation to those with mobility impairments. Shuttle routes and schedules are available at the colleges and at campus Transportation Information Centers.

The Santa Cruz Metropolitan Transit District (Metro) provides regular and convenient bus transportation to campus and to outlying areas from Boulder Creek to Watsonville, as well as to the Santa Cruz community. Metro provides service to UCSC every five to eight minutes on weekdays during academic sessions. Metro “Night Owl” buses provide late-night service to campus until 3 A.M. on Friday and Saturday nights. Sunday-through-Thursday-night service to campus operates until 2 A.M. This service is funded by a mandatory student fee. Students may ride any Metro bus without additional charge by showing their current UCSC identification card to the driver.

Bicycles are a popular means of transportation on campus and in Santa Cruz. UCSC offers bicycle programs including licensing, a bike trailer for commuters, and bike racks on the shuttles. Multigear bicycles are advisable because of the hilly terrain, and helmets are required.

Permits for on-campus parking are limited. Parking in the residential areas adjacent to the campus is restricted and strictly enforced. Due to lack of space, storage of vehicles for on-campus residents is limited, and the majority of remote-lot spaces are available to commuting students. Parking on campus for first- and second-year students living on campus is available by exception only. Parking regulations are strictly enforced; all students who bring a car to campus must purchase a permit in advance. UCSC requests that students not bring vehicles to campus if they are not eligible to purchase an on-campus parking permit.

UCSC offers a weekend shuttle between the campus and the Fremont BART Station. Use the shuttle to connect with BART, which offers rail service throughout the north bay, including stops in San Francisco, Berkeley, Pittsburg, Pleasanton, Concord, and Richmond. The UCSC Fremont BART Connector provides service on Fridays and Sundays during the academic year. Reservations are required and can be made weekdays 10 A.M. to 3 P.M. at (831) 459-3779.

Santa Cruz is served by commercial bus lines on a regularly scheduled basis. The nearest commercial airport is in San Jose, approximately 35 miles from Santa Cruz. The San Francisco Airport is about 70 miles from campus. Both airports are accessible by commercial van and limousine services.

For the occasional need of a car to travel off campus, go to the beach, go shopping, or even go home for the weekend, UC Santa Cruz has contracted with Zipcar to provide car sharing services to all eligible UCSC students 18 year of age and older. Zipcar is a membership-based car rental program providing self-service access to a variety of vehicles located on and off campus, 24/7. Reserve a car online by the hour or day, just “pay as you go”; low fees include rental costs, gas, mileage and insurance. Join Zipcar even before arriving campus at www.zipcar.com/ucsc.

Services can change, so it is recommended that you get up-to-date information from TAPS. Call (831) 459-2190, e-mail taps@ucsc.edu, or visit the web: taps.ucsc.edu.

Student Health Services

Located on McLaughlin Drive across from Colleges Nine and Ten, the Student Health Center provides quality health care focused on the particular needs of students. All registered students have access to the Student Health Center regardless of their insurance plan, as services are partially supported by their Student Services fee. Care is provided by board-certified physicians, nurse practitioners, and physician assistants. Students can be seen by appointment or, in cases of acute illness or injury, on the same day in Urgent Care. In case of emergencies, either during the day or after normal operating hours, please call 911.

In addition, the Student Health Center offers psychiatry services, nutritional counseling, health promotion, x-ray, and laboratory and pharmacy services on site. The center is open daily during the regular academic year. (For summer services and hours, visit the Student Health Center’s web site.) For more information about the Health Center, call (831) 459-2211; e-mail healthcenter@ucsc.edu; web: healthcenter.ucsc.edu.

Student Health Insurance

To ensure emergencies and other health care costs do not interfere with a student’s education, all University of California students are required to carry medical insurance. A comprehensive and inexpensive program specifically designed for students is available through the university via the Student Health Insurance

Plan (SHIP). All students are automatically enrolled in SHIP and billed quarterly through their student account, unless they choose to waive this coverage by providing proof of comparable insurance by the specified deadline. For detailed information regarding insurance coverage and the waiver process, visit healthcenter.ucsc.edu. You may also contact the insurance office at insure@ucsc.edu or (831) 459-2389.

Mandatory Hepatitis B Immunization

California state law mandates that all entering students under 19 years old must be immunized against Hepatitis B. These students are required to provide the Student Health Center with documentation proving their compliance with this law. Those not in compliance at the beginning of the quarter may be dropped from their classes. For more information, visit healthcenter.ucsc.edu or call (831) 459-2211.

Student Health Outreach and Promotion

Student Health Outreach and Promotion (SHOP) provides opportunities for students to explore and enhance their health and wellness as they pursue their academic and personal goals. Our various programs and services offer UCSC students culturally sensitive, nonjudgmental information, education, resources, and support around issues related to alcohol and other drug use, sexuality and sexual health, holistic health, and other health concerns. Students can get involved with SHOP by becoming peer educators, HIV test counselors, Volunteers for the Condom Co-op, and/or CUIP Interns. For more information about these positions, visit SHOP at Kresge College in the Piazza (across from STARS), view the SHOP web site at www2.ucsc.edu/healthcenter/shop, e-mail us at shop@ucsc.edu, or call (831) 459-3772.

Alcohol and Other Drug Education.

SHOP coordinates alcohol and other drug (AOD) education, prevention, and early intervention efforts on campus. Staff members work collaboratively with students to help identify relevant information and facilitate informed decision making. Educators provide formal and informal sessions and workshops for students, college residential staff, and other campus groups. Staff also serve on the campuswide AOD Advisory Committee, which develops, implements, and assesses policies.

HIV and Other STI Prevention. Helping students explore their options around the sexual choices that they make, SHOP seeks to reduce students’ risk of HIV, other sexually transmitted infections (STIs), and unplanned pregnancy. SHOP offers the following: free and anony-

mous HIV testing, run by highly trained student test counselors; the Condom Co-op, selling safer-sex supplies at a reduced cost; SLUG LOVE workshops and other presentations addressing STIs, safer sex, and values clarification and communication; and academic classes. SHOP also cosponsors special events such as the annual Santa Cruz AIDS Walk.

Student Health Advisory Committee. The Student Health Advisory Committee (SHAC) is composed students interested in health care at UCSC. The group serves as a liaison between students and the Health Center staff; creates and supports campus health initiatives and other educational opportunities; and provides a fun, practical way for students to get involved and make connections with other students and health care practitioners.

Counseling and Psychological Services

Counseling and Psychological Services (CAPS) offers a range of professional services to undergraduate and graduate students seeking help with personal concerns. We provide assistance for students with academic and personal stress, relationship and family issues, psychological problems, and crisis situations. Depending on a student’s needs, a student may be provided with brief individual or couples counseling, group counseling, psychiatric services, crisis intervention, or a referral for longer-term therapy off campus. Information provided to any CAPS professional staff member is confidential and cannot be released without a student’s permission except in specific circumstances involving risk and safety. All services are aimed at helping a student gain greater personal effectiveness and academic success. Professional staff members are available at various locations on campus, including the Student Health Services building, the Colleges, and Family Student Housing.

Staff members are also available to provide consultation to staff, faculty, individuals, or family members for assistance in helping students in distress. Counseling psychologists can also provide trainings and programs on a variety of mental health topics, stress and coping skills, multicultural issues, and organizational development.

For more information about Counseling and Psychological Services, please call (831) 459-2628 or visit our web site at www2.ucsc.edu/counsel/.

Sexual-Assault and Rape-Prevention Education

Since 1979, UCSC has addressed the issues of rape—especially acquaintance rape. Students are required to take an online education course called *Sexual Assault Edu* and to attend educational presentations to encourage respect, responsibility, and mutuality among students. Workshops are organized in the residence halls and a variety of educational resources are available for male and female students. In addition, self-defense classes for women are offered quarterly.

An experienced Sexual Health Educator in SHOP is available for individual appointments and provides nonjudgmental support for those who have experienced sexual assault or have been raped. These resources are available for their friends and loved ones. The sexual health educator is certified as a crisis counselor by the state of California. Police officers are available 24 hours a day, as are emergency phones, guards at campus entrances from 8 P.M. until 3 A.M., and frequent shuttles and buses. For more information, contact SHOP at the Student Health Center, (831) 459-3772; e-mail: shop@ucsc.edu; web: healthcenter.ucsc.edu/shop.

Resource Centers

African American

The African American Resource and Cultural Center (AARCC) develops and fosters cocurricular initiatives that promote academic success, leadership training, and student development. Since the center's inception in 1991, the program's primary mission has been to serve as a key resource to acclimate students to general campus life and academic culture. In addition, the program provides advocacy and support in helping to monitor students' academic progress and subsequent achievement of their educational goals. AARCC works closely with overall campus outreach to enhance the recruitment and retention of students of African descent.

AARCC welcomes volunteers and student interns to serve as members of TEAM AARCC Outreach Program or on our Advisory Council. Academic clubs include Black Science Network, Student National Medical Association, UCSC Gospel Choir, Honors and Scholars Club, and National Society of Black Engineers. Other organizations affiliated with the center include African/Black Student Alliance, African American Theater Arts Troupe, Black Sistas United, Black Men's Alliance, Alpha Kappa Alpha Sorority, Destination Higher Education, Rainbow Theatre, University Brothers/Sisters, MLK Youth Classic, and Delta Sigma Theta

Sorority. AARC works collaboratively with others on campus and in the surrounding community to enhance cultural and ethnic diversity initiatives on the UCSC campus. The center, located on the third floor of the Bay Tree Building in Quarry Plaza, is open Monday through Friday from 9 A.M. to 5 P.M. For more information, call (831) 459-3207, fax (831) 459-2469, e-mail african@ucsc.edu, or consult our web site at www2.ucsc.edu/aasl.

American Indian

The American Indian Resource Center (AIRC) works in collaboration with the Student Alliance of North American Indians (SANAI), the University of California American Indian Counselors/Recruiters Association, and native faculty and staff, as well as the indigenous tribal community leaders of the region to develop information, programs, and events that assist public understanding of native peoples. Invested in creating a campus climate that supports all students, the center provides mentoring and personal and academic advising. AIRC is located on the third floor of the Bay Tree Building in Quarry Plaza. For more information, call (831) 459-2881 or e-mail native@ucsc.edu.

Asian American/Pacific Islander

The Asian American/Pacific Islander Resource Center (AA/PIRC) provides and enhances opportunities for education and dialogue on issues affecting Asian Americans and Pacific Islanders, as well as opportunities for leadership development and community building. AA/PIRC aims to address students' multiple and diverse academic, social, cultural, and other cocurricular needs through programs and services. Programs include Asian American/Pacific Islander Heritage Month, Year-End Ceremony for graduating seniors, leadership skills workshops, graduate school panels, and community receptions. AA/PIRC events also highlight writers, performance artists, scholars, and community leaders. AA/PIRC sponsors academic and paid internships for students interested in gaining professional experience. Through AA/PIRC, students benefit from networking with individuals and resources such as alumni, faculty and staff, off-campus community-based organizations, and on-campus student organizations.

AA/PIRC is located on the third floor of the Bay Tree Building with the African American, American Indian, and Chicano Latino Resource Centers. Add your e-mail address to AA/PIRC's listserv to receive announcements on leadership, scholarship, internship opportunities, events, and community news. For more information,

call (831) 459-5349; e-mail aapirc@ucsc.edu, or visit www2.ucsc.edu/aapirc.

Chicano Latino

The Chicano Latino Resource Center (El Centro) is a hub of organized activities and resources that support Chicano and Latino student transition, retention, and academic advancement at the university. Through collaborative efforts with campus partners, students can participate in a host of activities that encourage intellectual growth, leadership development, preparation for graduate or professional school, and career options. El Centro encourages and supports student and community development through cultural and educational programming. Programs include the following: New Student Welcome Program; Chicana Latina Pipeline Project; César Chavez Convocation; dialogue on academic, social, cultural, and personal issues that affect the Chicano and Latino community; and a weekly online newsletter, *CHISME E-news*. El Centro offers student internships that support leadership-skills development while students help to organize events and activities. For more information or to schedule an appointment, call (831) 459-5449 or e-mail cab@ucsc.edu. Web: www2.ucsc.edu/raza

Gay, Lesbian, Bisexual, Transgender, Intersex

The Lionel Cantú Gay, Lesbian, Bi, Trans, Intersex (GLBTI) Resource Center (aka the Cantú Queer Center), housed in a beautiful redwood building near Crown and Merrill Colleges, is a friendly, welcoming space for the entire community. The center's mission is to provide educational, social, support and advocacy services to students, staff, faculty and alumni on GLBTI issues. The Cantú Queer Center is home to several student organizations that meet weekly; a host of exciting programs; the GALA gallery; and a library offering nearly 3,000 books, magazines, and films. Safer-sex information and other GLBTI-related materials are also on hand. Information and referral to campus and community GLBTI resources is available by phone or in person. Throughout the year, the Cantú Queer Center coordinates student programming with a queer focus. Education of the nonGLBTI campus population is another function of the resource center; professional staff members offer workshops for groups, classes, and dorms about unlearning heterosexism and transphobia. Everyone is welcome to use the center's cozy lounge, full kitchen, and study center to relax, study, socialize, and become involved in the campus's queer community. The

center is open Monday–Friday; usual hours are 9 A.M. to 5 P.M. Stop by and meet the center's friendly staff and find out about internship and volunteer opportunities. You can reach the center at (831) 459-2468 or via e-mail at queer@ucsc.edu. The center's web site, queer.ucsc.edu, provides an overview. Self-subscribe to QConnect, the center's e-newsletter and calendar, on the site's homepage.

Women's Center

Located in Cardiff House, a historic farmhouse near the main entrance to campus, the Women's Center is devoted to helping students maximize their success at UCSC. Resource referrals and informal advising are always available, and weekly events include films, readings, and talks. At least one staff member is a state-certified domestic violence peer counselor. We create or sponsor student-oriented workshops on topics ranging from money management to positive body image and stress reduction.

The Women's Center is home base for a variety of student groups and student-run community-service efforts. Other opportunities for involvement include internships, independent study, and work-study jobs. Students can become involved in such Women's Center projects as the 51% Pipeline Project (leadership), Take Back The Night (anti-violence), Inside Out Writing Project (Women in jail)—or create projects with the support and mentorship of staff.

The Center, a haven located in a picturesque meadow, is also close to the campus police station. The center's meeting rooms, kitchen, and garden are ideal places to study, relax, or connect with students, staff, faculty, and community members. Rotating art exhibits bring the center's walls to life, and students are encouraged to inquire about showing their work.

For more information, visit the center's web site at womenscenter.ucsc.edu, e-mail women@ucsc.edu, or call (831) 459-2072.

Physical Education, Recreation, Sports, and Wellness

The physical education, recreation, sports, and wellness programs provide a variety of interesting and challenging activities intended to attract you to becoming an *active* participant. The emphasis is on giving you an opportunity to develop knowledge, skills, and habits related to wellness to last through a lifetime of enjoyable physical and recreational activity.

Obtain further information about the programs described below from the Office of Physical Education, Recreation, and Sports, located at the

East Field House, (831) 459-2531. Web <http://opers.ucsc.edu>

Physical Education Courses

Regularly scheduled courses, which carry no academic credit but are recorded on your transcript, are available in a broad range of physical activities (see pages 407–409). Many classes are small, and all offer expert instruction and carefully designed practice periods so that you can accomplish much in sessions of two to three hours per week. Most activities have intermediate and advanced sections as well as courses for beginners. Subjects offered include swimming, scuba, sailing, rowing, basketball, racquetball, tennis, volleyball, ballet, folk dance, jazz dance, modern dance, fencing, soccer, aerobics, tai chi chuan, weight training, yoga, aikido, and tae kwon do.

Web: <http://opers.ucsc.edu/homepage/physicaleducation.html>

Intramurals

The intramural sports program includes competitive leagues, tournaments, and special one-day events. Many of the activities are coeducational. The leagues feature basketball, flag football, floor hockey, indoor and outdoor soccer, softball, ultimate frisbee, and volleyball. Some of the leagues are divided into different skill levels. There are tournaments in basketball, racquetball, and tennis. Special events include a 5-k and 10-k run, and an annual triathlon. Prospective participants are encouraged to form their own teams. Individuals looking to be placed on a team are also welcome. Web: <http://www.ucscintramurals.com>

Sports Clubs

The sports club program offers a variety of activities depending on student interest. Currently, active clubs include men's and women's rugby, water polo, and ultimate frisbee; men's soccer, baseball, cross-country, lacrosse, and track and field; and coed Special Olympics, cheerleading, dance, equestrian, triathlon, disc golf, cycling, sailing, badminton, and fencing. Web: <http://www.ucscsportsclubs.com/>

Intercollegiate Teams

UC Santa Cruz offers the only National Collegiate Athletic Association (NCAA) Division III program in the UC system. As a Division III member, the program offers no scholarships or grants in aid that are based on athletic ability. Both men's and women's NCAA intercollegiate teams compete in the following sports: basketball, soccer, swimming and diving, tennis, and volleyball. Women's teams compete in golf and cross-country. For

information on teams, rosters, schedules and Booster Club, go to www.goslugs.com.

Wellness Center

Located within the East Field House complex and overlooking Monterey Bay, the Wellness Center offers two floors of state-of-the-art cardiovascular and strength-training equipment. Classes, workshops, fitness testing, and personal training are available to assist everyone in reaching their fitness goals. Web: <http://wellness.ucsc.edu>

Recreation

The Recreation Program is designed to fulfill the diverse needs and interests of all members of the UCSC community. More than 100 activities, workshops, classes, off-campus outings, and special events are scheduled quarterly. In addition, the program offers a 10-day Wilderness Orientation (WO) prior to the start of school. WO is an invaluable experience for incoming college students, serving as an introduction to mountain travel and the "journey" of college education. The beautiful settings of the Sierra Nevada provide students an opportunity to form new friendships and discuss their hopes and fears about entering college while learning outdoor skills. No previous backpacking experience is necessary.

The Outdoor Equipment Rental Center offers recreational equipment including surfboards, wetsuits, and high-quality backpacking and camping gear. If you are interested in planning your own outing, contact the Recreation Program Office for assistance. The office has extensive files, and staff members act as consultants, planning *with* people as well as *for* them. The office sells international student ID cards, provides bicycle licensing, and offers a free weekly drop-in bicycle maintenance program.

Open recreation hours are scheduled quarterly; you are strongly encouraged to use the facilities. Sports equipment may be borrowed without charge. There are also recreation clubs if you are primarily interested in organized recreation and individual performance. Clubs are coed and feature some combination of recreational participation, advanced instruction, and individual competition. For a list of currently active clubs, go to ucsc recreation.com.

Banana Slug Mascot

The Banana Slug, a bright yellow, indigenous gastropod found in the campus's redwood forest, was the unofficial mascot for UC Santa Cruz's coed teams since the university's early years. In 1981, when some campus teams wanted more organized participation in extramural

competition, UCSC joined Division III of the NCAA. Since the application required an official team name, UCSC's then chancellor polled the student players, and out of this small group emerged a consensus for a new moniker—the sea lions. It was a choice that the chancellor considered more dignified and suitable to serious play than the Banana Slugs. But the new name did not find favor with the majority of students, who continued to root for the Slugs even after a sea lion was painted in the middle of the basketball floor. After five years of dealing with the two-mascot problem, an overwhelming pro-Slug straw vote by students in 1986 convinced the chancellor to make the lowly but beloved Banana Slug UCSC's official mascot.

Facilities

To make it convenient for you to utilize campus physical education, recreation, and sports facilities, field houses are located on the east and west sides of the campus. At both the East Field House and the West Field House, you will find the following: gymnasium, tennis courts, outdoor basketball and volleyball courts, and locker rooms. The East Field House also has a dance studio, martial arts room, handball/racquetball courts, equipment center, fitness center, 50-meter swimming pool, half-mile jogging track, and sports fields. A strength-training and cardiovascular-fitness court is located near the east jogging track.

The UCSC Boating Center is located at the Santa Cruz Small Craft Harbor, about five miles from the campus. The boating program offers instruction and recreation using sailing and rowing vessels, such as Moore-24 sloops, Laser dinghies, C-15 dinghies, rowing dories, and sea kayaks. Web: <http://www2.ucsc.edu/opers/boating/index.html>

All facilities are open daily during academic terms and are available for individual recreation whenever they are not being used for classes or other scheduled activities.

Student Union

The Student Union is a student-governed facility located at the center of campus where students can take a break and lounge, play pool or ping pong, use computers, meet, or watch television. The Student Union is also home to registered student organizations, campuswide student government, the Student Union Governance Board, the Bike Co-op, and Engaging Education.

Located in Quarry Plaza across from the Bay Tree Bookstore, the Union complements college facilities by providing an alternative social, rec-

reational, and educational gathering place for all students and members of the campus community. Student-support offices located at the Union include Student Union administration, Engaging Education, and Student Activities.

The Union is open Monday through Thursday 9 A.M. to 9 P.M., Friday 9 A.M. to 6 P.M., and has limited weekend hours. The Union is closed holidays and quarter breaks. For up-to-date information, call (831) 459-3167.

Student Activities

Campuswide Student Organizations

Expand your horizons and your academic life by joining one of over 150 student organizations. Get involved in one or more cultural, ethnic, religious, Greek, political, service, or social organizations. Gain valuable life experience in leadership and develop rewarding and lifelong friendships.

Student organization membership is open to all UCSC students. Learn more about UCSC's campuswide groups or start your own at the Student Organization Advising and Resources (SOAR) office. Contact SOAR at (831) 459-2934, e-mail soar@ucsc.edu, or visit the web site: www.soar.ucsc.edu. SOAR is located on the second floor of the Student Union.

Sports or recreation organizations can be contacted through the Office of Physical Education, Recreation, Sports, and Wellness (OPERS): sports clubs at (831) 459-4220; recreation clubs at (831) 459-2806. Broadcast or print media clubs can be reached at (831) 459-2840.

Community Service Opportunities

Community service is a vital part of the university's mission. It is possible for individual students, as well as campus-wide student organizations, to develop service projects that link the university with the broader Santa Cruz community. With the financial support of the campus's Community Service Project funding, students have aided local groups such as Students Toward Achievement in Writing Success, the Strange Queer Youth Conference, and renovation of the Siena House.

The Student Volunteer Center, located in the Career Center, connects students with local volunteer opportunities based on skills and interest. Volunteer opportunities range from aiding youth and elderly to addressing homelessness and environmental issues.

Service programs also exist through some colleges. Check with your college office about opportunities. Student resource centers (see pages

112-113) also coordinate volunteer efforts on and off campus.

For more information about service opportunities, see the web site volunteer.ucsc.edu or contact the Student Volunteer Center at (831) 459-3364 or volunteer@ucsc.edu.

UCSC Student Voice

Santa Cruz offers you a unique variety of opportunities to participate in university governance at the college, campus, systemwide, and national levels. Regardless of what level you choose, participating in student government will provide you with a wonderful chance to practice leadership skills, meet others who share your interests, and learn a great deal about yourself and the university.

Advisory Committees

Serving on a campus advisory committee is a recognized channel for student involvement in the university's decision-making processes. Advisory committees, composed of faculty, staff, and student representatives, are established to develop and recommend policies on a wide range of subjects. Annually, the Student Committee on Committees (composed of one student appointed by each college and chaired by the Internal Vice-Chair of the Student Union Assembly) nominates more than 100 students to serve on over 50 administrative and Academic Senate committees. For information about the selection process, contact Student Committee on Committees, (831) 459-5533, or the Student Union Assembly, (831) 459-4838.

College Student Governments

Each college has its own form of student government, enabling students to gain experience in planning, budgeting, executing, and evaluating a wide range of college programs and policies. Like the colleges themselves, each college governing body has its own character, structure, and meeting times and dates. For information, inquire in your college office or talk to our college programs coordinator.

Campuswide Student Government

The Student Union Assembly (SUA) is the undergraduate advocacy organization and the official student voice of UCSC. It comprises three representatives from each college government; six elected officers: chair, internal vice chair, external vice chair, organizing director, commissioner of academic affairs, and commissioner of diversity; and one appointed representative from each of the following student organizations that represent historically underrepresented people within the UC system:

African/Black Student Alliance; Asian Pacific Islander Student Alliance; The Network (Gay, Lesbian, Bisexual, Transgender, and Intersex Students); Movimiento Estudiantil Chicano de Aztlan; Student Alliance of North American Indians; and Ethnic Student Organization Council. The SUA also provides paid part-time internship opportunities for students each year. These internships include but are not limited to field organizers, treasurers, outreach and publicity, and strategy and planning. The SUA conducts open meetings that are held every Tuesday at 6 P.M. throughout the academic year. Students interested in advocacy, activism, and politics, as well as those concerned with their own and their friends' lives, are invited to get involved. The assembly operates via issue-specific campaigns and around general campus concerns. In the past, the SUA has formed campaigns around fighting fee-hikes, defending affirmative action, saving financial aid on a national and state level, striving for reasonable campus growth, and reforming UC Regents' procedures. Current issues have been fighting to make a UC education affordable, fighting to stop balancing budgets on the backs of students, fighting for the rights of UC workers, and working with community groups because UCSC students are also Santa Cruz residents. The SUA also works with the UC Student Association and the United States Student Association on system, state, and national issues and will host the 2006 Statewide Womyn of Color Conference. For more information, contact the SUA at (831) 459-4838, or visit the SUA office on the second floor of the Student Union.

The Graduate Student Association (GSA) provides governance and representation for graduate students, and its Steering Committee coordinates student-life programs and activities for graduate students. For more information, contact the SGSA, (831) 459-3142, or visit the SUA office on the second floor of the Student Union.

Systemwide Student Government

The UC Student Association (UCSA) is the statewide association of graduate and undergraduate student governments from the 10 UC campuses. UCSA is the officially recognized voice of the students to the UC Board of Regents, various UC administrative offices, and the UC Office of the President. Issues covered by UCSA include UC fees and financial aid, comprehensive admissions policies, and academic policies, as well as broader issues of social responsibility such as environmental concerns and civil rights.

UCSA coordinates the yearly selection of the UC Student Regent.

The SUA external office provides grassroots membership and support for the two main UCSA offices in Oakland and Sacramento. The campus office organizes students to run the grassroots campaigns that are adopted each summer during the UCSA Congress. At this session, delegates from the 10 UC campuses come together and choose the critical issues to be worked on for the next year. Issues in the past have included voter registration drives, letter-writing campaigns on particular UC issues, and increases in financial aid. UCSA provides a thorough introduction to UC politics and student representation. Students may also serve on systemwide committees through UCSA and gain a wide knowledge of the entire UC system through their service.

Two officers help to coordinate UCSA activities on our campus. The external vice-chair (EVC) is the official representative to the UCSA Board of Directors. This position has voting rights for UCSC, is the primary contact regarding all UCSA issues, and coordinates all lobbying of UCSA and local, state, and Federal governments on behalf of UCSC students. The organizing director (OD) coordinates with the EVC to effectively run the grassroots campaigns that are sponsored by UCSA every year. These positions are elected for one-year terms during spring quarter every year.

The Student Union Assembly officers in charge of UCSA activities can be reached at (831) 459-4838.

Student Media

UCSC Student Media comprises 20 print publications; KZSC 88.1, the campus radio station serving the campus as well as the tricounty Monterey Bay Area; and campus Student Cable Television (SCTV Channel 28). Over 700 students enrich their cocurricular involvement through internships, academic credit, fellowships, and employment opportunities.

With the greatest broadcasting power of the UC stations, KZSC broadcasts diverse music, news, and public affairs programming. KZSC is a student-governed station with more than 20 students serving in management and leadership positions.

The state and national award-winning student newspaper of record, the weekly *City on a Hill Press*, covers campus, local, national, and international news and offers reviews and commentary. *Fish Rap Live!* publishes twice monthly and provides an alternative forum for free expression of ideas, coverage of local and cam-

pus events, and personal journalism. Campus newsmagazines include *EyeCandy*, *TWANAS*, *Kresge Town Krier*, *Leviathan*, *Disorientation Guide*, and *The Project*.

Annual literary journals offer poetry, prose, photography, and art. Examples include *Chinquapin*, *Big Q*, *Red Wheelbarrow*, *La Revista*, *Alay*, *Las Girlfriends*, *Yellow*, *Matchbox*, and the *Black African Voice*.

SCTV is a student-governed campus cable television station, which programs and broadcasts artistic, narrative, experimental, documentary, and public-service announcement submissions of video and film by 10 broadcasting organizations. These include Banana Slug News, Rainbow TV, Film Production Coalition, Moxie Production Group, Barn TV, SCTV Events, the Community Service Documentation Project, On the Spot, and others. Many of the students are affiliated with the film and digital media major; however, students from all disciplines are encouraged to participate.

If you are interested in contacting any of the Student Media print or broadcast organizations, call the Press Center at (831) 459-2840, KZSC at (831) 459-3811, or SCTV at (831) 459-5630. Visit the web site for links to print and broadcast organizations: studentmedia.ucsc.edu.

Campus Cultural Programs

Throughout the year, UCSC offers frequent and varied cultural opportunities. Students, faculty, and staff have the opportunity to participate as audience members, performers, or behind-the-scenes support crew.

The considerable range of offerings includes art exhibits, lectures, films, concerts, recitals, and dance and drama presentations; programs vary from single performances to weeklong cultural celebrations. The colleges host a number of events, and the departments frequently engage speakers of particular academic interest to address the campus community or present lecture-demonstrations.

The Arts Division serves as a gateway to the entire University, presenting high-quality research and work by faculty, students, and guest artists. Art exhibitions, film screenings, digital arts presentations, music recitals, and several major theater, dance, and music presentations are mounted each quarter in conjunction with the academic programs. In addition, the Arts Division offers regular public lectures and colloquia to introduce audiences to professional practitioners and scholars in the traditional and digital arts.

Recent full-scale mainstage productions by the Theater Arts Department have included the musical *Hair* and Bertolt Brecht's *The Good Person of Sezuwan*. The department also regularly produces classic and contemporary plays such as *Equus* by Peter Shaffer, *In the Blood* by Suzan-Lori Parks, and *Language of Angels* by Naomi Iizuka as well as the annual showcase of student choreography, *Random with a Purpose*. In 2010, Theater Arts produced an original multimedia production in collaboration with the Digital Arts and New Media M.F.A. program entitled *Stop the Press!*

The Music Department presents a variety of classical and contemporary concerts by the University Orchestra and Chamber Singers, as well as fully staged operas. Recent performances have featured works such as Mozart's *Requiem*, Rossini's *Petite Messe Solennelle*, and the opera *L'elisir d'amore* (The Elixir of Love) by Donizetti. The Music Department also presents concerts by the Jazz Ensembles, Big Band, Electronic Music Studios, and ethnomusicology groups such as the West Javanese and Balinese Gamelan Ensembles and Latin American Ensembles. In addition, the department sponsors regular performances of Indian classical music, featuring artists such as sarode player Pandit Aashish Khan, as well as the Pacific Rim Music Festival in alternate years. Student recitals, class open rehearsals, and informal "Friday at Four" showings round out the calendar.

The Sesnon Gallery, located at UCSC's Porter College, operates a museum-oriented program for educational purposes. The gallery organizes an annual schedule of exhibitions that represents a broad range of methods, media and cultures in a local, regional, and national context, with a focus on contemporary practice. The Sesnon Gallery works to integrate these programs and exhibitions into the lives of a broader community. Details on exhibitions are available at arts.ucsc.edu/sesnon and (831) 459-3606.

The Digital Arts and New Media (DANM) M.F.A. program's graduate student exhibition takes place on campus each year in the Digital Arts Research Center. DANM hosted the acclaimed Digital Arts and New Media Festival in 2006 and The Art of Collaboration Symposium in 2009.

All students, not just Arts Division majors, are encouraged to audition for Theater Arts Department and Music Department productions and ensembles. For information about how to get involved, call the Theater Arts Department at (831) 459-2974 and the Music Department at (831) 459-2292.

The Music Center, including the 396-seat Recital Hall and Indonesian gamelan and electronic music studios, houses all Music

Department programs as well as performances by visiting artists.

The Theater Arts Center is the setting for a diverse, year-round program of drama, dance, and special events. The 528-seat Theater Arts Mainstage, 215-seat Second Stage, 400-seat Media Theater, and modular Experimental Theater, provide professional facilities for campus and visiting artists and productions.

Other on-campus performance venues include the 153-seat Barn Theater, the Kresge Town Hall, the outdoor Upper Quarry Amphitheater, and the colleges' dining commons. Ticket information is available from the UCSC Ticket Office, located at the Theater Arts Center, (831) 459-2159 (voice or TDD) and santacruztickets.com.

For additional information about presentations from the Arts Division, contact the Arts Division Events Office at (831) 459-2787 and visit our online calendar at arts.ucsc.edu.

Shakespeare Santa Cruz

Shakespeare Santa Cruz (SSC), recognized by *USA Today* as one of the 10 "most influential" Shakespeare festivals nationally, is a professional theater company in residence at UCSC. Every July and August, SSC produces a summer season that includes two plays by William Shakespeare as well as non-Shakespeare productions carefully chosen by the artistic director to complement the season.

SSC offers courses through the university Summer Session; sponsors lectures in dialogue for scholars, teachers, and passionate theatergoers; and provides opportunities for the community to get involved in the intellectual and theatrical components of Shakespeare. The summer acting company is composed of professional Equity actors and top nonunion talent from throughout the United States, local professionals, and college-age interns. Production crews are made up of regional and local professionals and also include university students as interns.

Every spring, SSC sends out a touring group of 10 student actors and a stage manager to local schools in Santa Cruz, Monterey, and Santa Clara Counties. This program, Shakespeare to Go, performs a 50-minute version of one of the plays to be produced in the summer.

For further information, contact the Shakespeare Santa Cruz Office in the Theater Arts Center, (831) 459-2121, or visit the web site: shakespearesantacruz.org.

Bay Tree Bookstore

UCSC's Bay Tree Bookstore is located in the Quarry Plaza complex in the center of campus,

at the intersection of Hagar Drive and Steinhart Way. The bookstore serves as the campus resource for UCSC course materials, including new and used course books and customized faculty publications, general reading and reference books, a wide variety of school and personal supplies (including computers and computer supplies), and many other items such as backpacks, emblematic apparel, art supplies, posters, gifts, greeting cards, and academic regalia. Services include online reservations for course materials, student debit accounts, special ordering of books, book buyback services, fax services, and limited check cashing. The bookstore also houses the campus's convenience store (the Express Store) and Student ID Card Services. For more information, call (831) 459-4544 or visit the web: slugstore.ucsc.edu.

Child Care and Early Education Services

Child Care and Early Education Services offers programs for children of students currently enrolled in classes at UCSC. All of our centers are conveniently located on campus near the West Entrance. Free or low-cost tuition rates are available for students who meet the eligibility requirements for subsidized care (please see Eligibility for State Funding Chart at <http://housing.ucsc.edu/childcare/>). All meals are included in the program (breakfast, lunch, and afternoon snack).

Our programs are dedicated to providing the highest-quality developmental care possible in a secure, homelike environment characterized by warmth, affection, and support. The classrooms stress the importance of meeting children's needs in all areas of development: social, emotional, physical, cognitive and creative. The curriculum emphasizes play as a learning process and provides environments that are rich and challenging.

Programs are open to all children without regard to religion, color, ethnicity, gender and physical or mental ability. All of our centers are located in the Family Student Housing Complex. Each of our centers is operated during the academic year from September through June, closed during the summer months, administrative and university holidays and staff development days. All of the childcare spaces are provided for children of student families only. The majority of the spaces are reserved for students who meet the qualifications for subsidized care. Fee-for-service spaces at a below market rate may be available for student families whose income exceeds state-subsidy requirements.

Information on all programs, fees, and applications is available at <http://housing.ucsc.edu/childcare/>, and at the Early Education Services Office in the Community Building at Family Student Housing, (831) 459-2967, or e-mail earlyeducation@ucsc.edu.

Infant Center

The Infant Center serves 12 children ages 14 to 24 months. Small groups, low child-to-adult ratios, and primary caregivers ensure consistent and nurturing care. The hours of operation are 8:30 A.M.–5:30 P.M.

Preschool Center

There are three preschool classrooms that serve a total of 36 children from 24 months until they enter kindergarten. Each classroom provides small groups with low child-to-adult ratios, and an environment that provides a stimulating and rich curriculum, which helps prepare children for kindergarten. The hours of operation are 8:30 A.M.–5:30 P.M.

School Age Center

The School Age Program serves 16 children. It operates as an after-school recreation program during the academic year. The program provides developmentally appropriate arts and crafts, life-skills and sports activities, occasional community outings and quiet time for homework. The hours of operation are 12 P.M.–5:30 P.M. for kindergarteners; and 2:30 P.M.–5:30 P.M. on Mondays, Tuesdays, Thursdays and

Fridays for 2nd through 4th graders. On Wednesdays (public school minimum days), care is available from 12–5:30 P.M. for all school-age children. Extended care is available on a sign-up basis on some Santa Cruz City Schools closure days (university closure days excluded).

UCSC Alumni Association

UCSC's graduates—more than 70,000 of them—can maintain a lifelong connection to the campus through the UCSC Alumni Association. Through the dues they pay, Association members contribute to the living-learning environments at each college and the enrichment of the entire campus. Thirty percent of annual membership dues directly support student programs, special activities, and other projects at the colleges and campuswide.

The association promotes excellence at UCSC by making three annual awards. It supports students by offering two types of awards (college service and financial need), and enriches campus and college intellectual life through its Distinguished Visiting Professor program and endowment.

Hundreds of alumni return to campus during the annual Reunion Weekend to enjoy receptions, tours, panel discussions, and other programs through which they reconnect with old friends, faculty, and students. Thousands more reconnect through the Online Community (community.ucsc.edu), which offers an online

alumni directory, association event information and RSVP services, and much more.

Alumni are keenly interested in career issues. More than 1,000 of them act as career mentors online through the Online Community and Career Services' Career Advice Network, and in person at the annual Multicultural Career Conference and similar events. The Alumni Association, in partnership with other UC Alumni Associations, brings politically minded graduates to Sacramento for an annual legislative conference aimed at increasing support for UC.

Alumni reconnect at events offered by regional groups across the nation and by six affinity groups.

Members of the Alumni Association enjoy a range of benefits. These include use of the campus pool and recreation facilities, insurance coverage, use of a UC vacation center, UC Extension discounts statewide, library privileges across the entire UC system, the online Digital Library, invitations to alumni events, and more.

Information about the Alumni Association is available by contacting us at 1156 High Street, Santa Cruz, CA 95064, locally at (831) 459-2530, toll-free at (800) 933-SLUG, via e-mail at alumni@ucsc.edu, and on the web: alumni.ucsc.edu/.



Programs and Courses

Programs are listed alphabetically.

Programs and Courses

The academic programs offered at UC Santa Cruz are described in detail in this section. Curricula, courses, and degrees listed in this catalog are subject to change through normal academic channels. New proposals and changes are initiated by the relevant departments, divisions, or colleges and approved by the appropriate academic dean and by the Committee on Educational Policy or the Graduate Council. The designations F (fall), W (winter), S (spring), or Summer that appear at the end of each course indicate the intentions of the academic units; however, on occasion, the actual scheduling of classes may change.

For changes and additions to courses listed in this catalog, consult the *Schedule of Classes*, published each quarter and available on the web at reg.ucsc.edu/soc/. Students may also view the university catalog on the web at reg.ucsc.edu/catalog/. The Office of the Registrar also provides detailed information on its pages at reg.ucsc.edu.

Course Credit

Unless otherwise specified in the course description, each course earns 5 quarter credits. Therefore, regardless of course format or scheduling, each course makes approximately equal demands on enrolled students.

All physical education courses are noncredit. Other noncredit courses include certain graduate seminars. Laboratory courses, music courses involving individual lessons or ensemble participation, as well as some special-interest seminars and individual studies courses carry less than 5 credits and are designated accordingly.

The normal UCSC undergraduate program of study is three 5-credit courses per quarter or equivalent. In 12 quarters at UCSC, most students complete 180 credits. With a college's approval, a student may be allowed to vary the course load. See also Part-Time Program, page 43.

Course Numbering

Undergraduate courses are classified as lower division or upper division. Lower-division courses (numbered 1–99) are designed for first-year and sophomore students but may be taken by more advanced students. Upper-division courses (numbered 100–199) are designed for junior and senior students but are open to first-year and sophomore students who have sufficient background and the consent of the instructor in charge.

Graduate courses (numbered 200–299) are either restricted to graduate students or open only to students who can show the instructor that they have completed sufficient upper-division course work basic to the subject matter of the course.

Footnotes

Courses marked with an asterisk (*) will not be offered in the 2010–11 academic year. Courses marked with a dagger (†) will be offered, with the quarter as yet to be determined.

General Education Codes

The general education codes that appear in some course descriptions are explained in the section on general education requirements, page 26.

Course Format

Most courses at UCSC are taught as lectures or, when the class is small enough for considerable discussion, as seminars. A large number of courses require enrollment in a secondary discussion section scheduled at a different time from the primary course. Sometimes there is laboratory or fieldwork associated with a course.

Occasionally, a student may wish to do an individual project as part of the work for a course. UCSC instructors are usually quite willing to consider and evaluate such work, time permitting.

Prerequisite Policy

When applicable, prerequisites are listed in this catalog within the course description for each course. There are many courses that meet general education requirements and do not require a prerequisite.

Prerequisites come in many forms—for example, specific courses, placement examinations, or “satisfaction of the Entry Level Writing and Composition requirement” for writing courses. Some course descriptions also specify that students must be declared majors or seniors in order to enroll. Other course descriptions recommend the appropriate background for a course—for example, “ability to use algebra and solve problems.”

Questions concerning prerequisites should be directed to the instructor of the course or the respective department office. Students who have not met all prerequisites may be excluded from a course. Alternatively, the instructor or a department adviser may waive the prerequisite based on demonstrated competence or equivalent academic experience.

Class Size

A student's class level plays a large part in how many small classes are available. Introductory classes tend to be large, although they are usually accompanied by required small sections or laboratories. Many small classes have prerequisite courses that enroll large numbers of students. Also, certain large classes fulfill campuswide general education requirements. First-year students experience at least one small seminar in conjunction with the college core course, and they are likely to experience an increasing proportion of small classes as they progress to senior status.

Individual Study

Especially in the upper division, students are encouraged to devise special courses to pursue independently, under the guidance of faculty members. A study plan should be discussed with a faculty member in the general subject area of interest. This faculty member will ultimately be responsible for evaluating the work done. The study plan must also be approved by the appropriate program and the student's college; it should be noted that not all proposed plans are accepted.

Field Study

Independent, off-campus field study is available through many departments. It is handled in much the same way as individual study. In addition, there are several established field programs that offer a variety of full- or part-time, off-campus, field placements as part of the regular program of academic study. For more information on these programs, see page 46.

Apprentice Teaching

An upper-division or graduate student may apply for approval to teach an undergraduate seminar of his or her own design. The seminar is supervised by a faculty member and carries normal academic credit for the students and the apprentice teacher. Interested students should initiate a proposal with a faculty member in the appropriate subject area.

Credit by Petition

Regularly enrolled students may obtain full academic credit for a course by challenging the course. Challenging the course entails passing an examination or completing an appropriate body of work supervised by a regular instructor for the course. The petition for such credit must be approved by the instructor of the course, the chair of the department offering the course (or provost, if it is a course offered by a college), and the provost of the student's college. Some courses are not considered appropriate for credit by petition.

For foreign language students, credit by petition may not be used by students whose language ability greatly exceeds the course level proposed for challenge. Petitions for credit for levels 4 and 5 cannot be filed in the same quarter. Contact the Language Program, 239 Cowell, 459-2054, for more information.

Auditing of Classes

Instructors may permit nonenrolled students to attend their classes when space is available after all students who wish to enroll officially have done so. An instructor is not obligated to devote time to the work of students who are not officially enrolled in the class.

Additional Courses of Interest

Sometimes, following the official course listings for a program, related courses offered by other academic units are listed under the heading Additional Courses of Interest. Some of these courses may be accepted in partial satisfaction of the major requirements. Students should consult with the chair of the program offering the major about the availability of major credit for enrollment in related courses. The full descriptions of the related courses should also be checked for prerequisites.

American Literature

Students wishing to pursue a course of study in American literature should consult the English-language literatures concentration in national/transnational literatures under Literature, page 361.

American Studies

209 Humanities 1
(831) 459-4658
<http://amst.ucsc.edu>

Faculty and Professional Interests

MICHAEL H. COWAN, Professor Emeritus,
American Studies

JOHN DIZIKES, Professor Emeritus, American
Studies

KIMBERLY J. LAU, Professor American Studies;
Provost Oakes College
*Feminism, discourse, and power; feminist theory; discourse,
analysis, and ethnographic methods; folklore and narrative;
globalization*

AMY LONETREE, Assistant Professor, American
Studies
*Indigenous history, museum studies, memory and American
history, Native American cultural production, public history,
and Ho-Chunk tribal history*

ERIC C. PORTER, Professor, American Studies
*Black cultural and intellectual history; U.S. cultural history
and cultural studies; comparative ethnic studies; popular
music and jazz studies*

CATHERINE S. RAMIREZ, Associate Professor,
American Studies
*Chicana and U.S. Latino literature, culture, and history;
gender studies and feminist theory; visual culture and style
politics; cultural studies; popular and urban youth cultures;
speculative fiction, Afrofuturism, and Chicanafuturism;
science, technology, race, and gender; theories and methods of
American studies*

RENYA K. RAMIREZ, Associate Professor, American
Studies
*Native American studies, Indian identity, Native Americans
and anthropology, urban Indians, Native American women,
cultural citizenship, expressive culture, and anti-racist
education*

JUDITH YUNG, Professor Emerita, American Studies



DAVID H. ANTHONY, Associate Professor, History
*African and African American history, art, music, literature,
and cinema; eastern and southern Africa; African languages;
Indian Ocean world; African and African American
linkages; Islamic civilization; African diaspora studies; world
history*

GABRIELA ARREDONDO, Associate Professor Latin
American and Latino Studies
*Latino studies; U.S. immigration history; U.S. social and
cultural history; Chicano history; critical race and ethnicity
theories; Chicana and Mexicana feminism; "borderlands"
studies; history of modern Mexico*

MARTIN BERGER, Professor, History of Art and
Visual Culture
*American studies and visual studies; construction of gender
and race*

MICHAEL K. BROWN, Professor, Politics
*Inequality, race and African American politics, political
economy, political development of welfare states, theories and
methods of historical social science*

DAVID T. BRUNDAGE, Professor, Community
Studies
*American working-class and immigration history, history of
U.S. social movements, Irish history and politics*

GEORGE BUNCH, Assistant Professor, Education
*Language and education in linguistically diverse settings,
preparation of teachers for linguistically diverse, language
policy, and bilingualism*

BENJAMIN CARSON, Assistant Professor, Music
*Theory and composition; music perception; empiricism and
subjectivity; Schoenberg; popular music; improvisation*

PEDRO G. CASTILLO, Associate Professor, History
*Chicana history and culture; American social and urban
history; race, class, and gender in California history,
immigration history, Latin@s in the U.S.*

JOHN BROWN CHILDS, Professor, Sociology
*Ethnic conflict and transcommunal cooperation; sociology
of knowledge; African American, Native American, Latino
interactions*

GINA DENT, Associate Professor, Feminist Studies,
History of Consciousness, and Legal Studies
*Africana literary and cultural studies, legal theory, popular
culture*

BARBARA L. EPSTEIN, Professor, History of
Consciousness
*Social movements and theories of social movements, 20th-
century U.S. politics and culture, Marxism and related
theories of social change*

ROSA-LINDA FREGOSO, Professor, Latin American
and Latino Studies
*Cultural studies, feminist studies, film and visual culture,
human-rights studies, and gender-based violence*

GRETA GIBSON, Professor, Education
*Immigrants and education; minority status and schooling;
community-school relationships; ethnicity, class, gender, and
educational processes; qualitative research methods*

SUSAN GILLMAN, Professor, American Literature
*Nineteenth-century American literature and culture; theories
of culture, race, and gender; world literature and cultural
studies*

HERMAN S. GRAY, Professor, Sociology
*Cultural studies, media and television studies, black cultural
politics, social theory*

MIRIAM GREENBERG, Assistant Professor, Sociology
*Media studies, cultural studies, globalization, political and
cultural economies of global cities, video production, and
ethnography*

KIRSTEN SILVA GRUESZ, Professor, Literature
*Transnational Americas studies; Chicano/Latino literatures
and cultures; 19th-century U.S. and Latin American
literature; poetry; history of the book; reading and literacy;
bilingualism*

LISBETH HAAS, Associate Professor, History
*U.S.-Mexico borderlands, Chicano and Native American
history; visual culture in the colonial Americas; the U.S. West
and California; historical memory, theory, and historical
methodology*

JUDITH A. HABICHT MAUCHE, Professor,
Anthropology
*Precontact and early contact North American cross-cultural
interaction and trade; ceramic technology; archaeology of
gender, power, and identity; Southwest and Southern Plains*

SUSAN F. HARDING, Professor, Anthropology
*Culture, politics, narrative, gender, local/global studies,
ethnographic writing, fundamentalism, Christianity, state-
making, aging, America, and Spain*

AMELIE HASTIE, Associate Professor, Film and
Digital Media
*Film theory and history, feminist film and television studies,
Chinese cinemas, issues of authorship, interdisciplinary
approaches*

NATHANIEL E. MACKEY, Professor, Literature
*Twentieth-century American literature, Afro-American
literature, creative writing*

OLGA NAJERA-RAMIREZ, Professor, Anthropology
*Folklore theory, ritual, festival, dance, greater Mexican
culture, history and folklore, transnationalism,
identity; expressive culture, ethnomusicology, bilingual
communication, gender, history, and culture of Latin
America, the U.S., and Mexico*

MARCIA OCHOA, Assistant Professor, Community
Studies
*Gender and sexuality, race and ethnicity, Latino/a studies,
media and cultural studies, ethnography of media, feminism,
queer theory, geography, multimedia production, graphic
design, colonialism and modernity, Latin American
studies—Colombia and Venezuela*

TRILOKI NATH PANDEY, Professor, Anthropology
*Native peoples of North America, cultures of India, political
anthropology, anthropological theories and comparisons;
native North America; tribal India; Nepal*

MARY BETH PUDUP, Associate Professor,
Community Studies
*Regional studies, economic justice, public policy, historical
geography of the U.S.*

FORREST G. ROBINSON, Professor, Humanities
*Nineteenth- and 20th-century American literature,
including Mark Twain, the American West, and popular
culture; biography and American culture theory*

SHELLEY STAMP, Associate Professor, Film and
Digital Media
*Film history, theory, and criticism; silent cinema; women's
filmmaking; film censorship; histories of moviegoing; feminist
approaches to cinema*

DANA TAKAGI, Professor, Sociology
*Social inequality and identity, research methods, race
relations, nationalism and social movements*

MARILYN J. WESTERKAMP, Professor, History
*British colonial and revolutionary America, early modern
cultural and religious history, U.S. religious history, women's
history, gender*

DANIEL J. WIRLS, Professor, Politics
*American politics, including national political institutions
(Congress) and the President; public policy (military and
foreign policy) and political history*

MATTHEW WOLF-MEYER, Assistant Professor,
Anthropology
*Medical anthropology; science studies; actor-network theory;
American studies; popular culture, media studies, history of
medicine and public health*

ALICE S. YANG-MURRAY, Associate Professor,
History
*Historical memory, Asian American history, gender history,
race and ethnicity, 20th-century U.S., oral history*

PATRICIA J. ZAVELLA, Professor, Latin American
and Latino Studies
*Chicano/Latino studies, women's work and domestic
labor, poverty, family, sexuality and social networks, feminist
studies, ethnographic research methods, and transnational
migration of Mexicano workers and U.S. capital*

Program Description

American studies gives students an interdisciplinary and historically grounded framework for studying the United States; its political, social, and cultural institutions; its position in the world as a political, economic, and cultural entity; and the diverse peoples who live within or pass through its borders. We encourage frames of analysis that remain within the borders of the nation as well as those that compare aspects of the United States with those of other societies. We seek to build among our majors a critical perspective on the rights, responsibilities, and privileges, of being a citizen of the United States or residing within its borders in the 21st century. We also help students develop critical thinking, research, and writing skills so that they will be able to act effectively in an ever-changing, complicated, and culturally diverse world.

Our major curriculum provides enough flexibility to let students explore the aspects of American studies that interest them most. That said, we believe that all students of American society should possess certain critical thinking and communication skills, should be familiar with fundamental disciplinary theories and concepts, and should have a working knowledge of United States history. Accordingly, all majors are required to take a series of shared foundation courses that reflect the department's particular strengths in historical inquiry, cultural analysis, and critical race and ethnic studies, as well as a course in the History Department. Building on this foundation, our students—in dialogue with their advisers—are required to take at least four upper-division courses that cohere around a particular area of study (e.g., Native American studies, technology and culture, 19th-century literature and culture, immigration and citizenship, etc.). Finally, they are required to take the senior seminar, in which they write a research paper related to their selected area of study.

Because of their broad-based exposure to the history and culture of the United States, collective learning experience, and their ability to focus on topics of particular interest to them, American studies students find the major a useful preparation for careers in education, law, journalism, social work, community organizing, business, and government. Students intending to go on to graduate school, whether in American studies or some other discipline, are advised to bear such plans in mind as they settle on their individual areas of study.

Requirements for the Major

Students wishing to pursue a major in American studies must submit a proposed study plan that meets the major requirements in a coherent manner. In order to apply for the major, students must have taken or currently be enrolled in AMST 10. Students are urged to submit their study plan no later than the third quarter of their sophomore year or, in the case of transfer students, no later than the first quarter of their junior year.

The study plan must be approved by the American Studies Department before the student is formally accepted into the major. The study plan should reflect a commitment to take the required foundation courses as soon as the applicant is admitted to the major. AMST 100 should be taken during the first quarter of foundation-level work; the remaining foundation courses should be taken as soon as possible thereafter. The study plan must also identify a proposed area of emphasis in the remaining upper-division coursework and list eight courses that fall within it. Ultimately, students are expected to take four elective courses within this area of emphasis.

Forms and information about the major are avail-

able from the American Studies Department office and online at <http://americanstudies.ucsc.edu>. After meeting with the undergraduate adviser, students are referred to a faculty adviser for further consultation. The faculty adviser must approve the area of emphasis and courses that fall within it before the student can declare the major. Upon acceptance to the major, each student should meet periodically with both the department undergraduate adviser and the faculty adviser to make appropriate revisions to their plans for the major. Any change to the student's area of emphasis must be approved by the faculty adviser.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in American studies is satisfied by completing courses 100, 102, and 190.

Course Requirements

To graduate with a major in American studies, a student is required to complete 12 courses with the approval of the department:

- **One lower-division foundation course: AMST 10.**
- **Three upper-division foundation courses—AMST 100, 101, and 102.** Students should take these courses as soon as possible after declaring the major. AMST 100 should be taken during the first quarter of foundation coursework. Transfer students may petition to be admitted to AMST 100 if they intend to declare the major and are currently enrolled in AMST 10.
- **One survey course in U.S. history in the History Department (HIS 10A or 10B).** A student may petition to substitute an upper-division History Department course with the approval of his or her adviser. Transfer students may petition to substitute a relevant offering from their previous institution.
- **Four upper-division elective courses that define the student's area of emphasis in the major.** These electives may be taken in American studies or from affiliated departments. The number of courses taken in American studies will depend on the student's area of emphasis. The faculty adviser must approve the area of emphasis, the courses that fulfill it, and any revisions to this emphasis. The department maintains lists of sample areas of emphasis and courses with American studies content offered in other departments on campus.
- **Two additional upper-division elective courses.** Students may substitute 10 credits of Education Abroad Program (EAP), internship, or language study for these upper-division elective courses.
- **One comprehensive exit seminar: AMST 190.** Students may petition to complete a senior thesis project in lieu of the senior seminar course.

Graduate Studies

Graduate students may work toward a designated emphasis in American studies on their doctor of philosophy (Ph.D.) degree documents. Students must initiate the request through their home departments. Guidelines and application forms are available in the American

Studies Department office or online at <http://americanstudies.ucsc.edu>.

The following are required for the designated emphasis:

- a designated graduate adviser who is a faculty member of the American Studies Department and who will serve on the student's qualifying examination or dissertation committee;
- submission of a significant piece of scholarly writing in the area of American studies;
- five graduate courses in American studies. One of these must be in the introductory proseminar offered by the American Studies Department. The remaining courses may be selected from among relevant graduate offerings of any UCSC departments or program with the approval of the American Studies graduate adviser;
- teaching experience as a teaching assistant or instructor in an American studies course.

Lower-Division Courses

10. Introduction to American Studies. F,S

Organized around the themes of democracy and citizenship, explores the many ways the United States of America has been defined and interpreted. Highlights primary questions in American studies, and draws from multiple texts, genres, and methods. Satisfies American History and Institutions Requirement. (General Education Code(s): ER, IH, E.) (F) *K. Lau*, (S) *A. Lonetree*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

80E. U.S. Racial and Ethnic Histories and Formations. W

Introduces key concepts and debates in study of race and ethnicity in U.S. by focusing on a particular ethnoracial group (e.g., Native Americans, Mexican Americans, Asian Americans, African Americans) or by developing a comparative perspective. May be repeated for credit. (General Education Code(s): ER, IS, E.) *R. Ramirez*

80F. Introduction to U.S. Popular Cultures. *

Introduces key concepts and debates in popular culture and media studies and discusses their importance in relation to American studies. Surveys American popular music, from the beginnings of mass media to the late 20th century and beyond. (General Education Code(s): IM, T5-Humanities and Arts or Social Sciences.) *B. Carson*

80G. Introduction to U.S. Political Cultures. F

Introduces key concepts and debates around topics such as political economy, nationalism, globalization, citizenship, class, and social movements and addresses their importance to American studies. Examines these issues through attention to political theory, social transformations, and cultural representations. (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *The Staff*

93. Field Study. F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***100. Key Concepts in American Studies. F,W,S**

Provides majors with an in-depth introduction to American studies and the major at UCSC. Introduces key American studies concepts and highlights the emphases of this major. Careful attention paid to critical reading skills and analytical writing. Required of all American studies majors. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to American studies majors. Enrollment limited to 20. (General Education Code(s): W.) *F. Robinson, The Staff*

101. Power, Identity, and Social Formations. S

Introduces critical conversations regarding social difference and power occurring in American studies and related disciplines and fields. Students address such issues from historical and contemporary perspectives, examining individual groups and taking a comparative approach. Course 100 recommended as preparation. Enrollment restricted to American studies majors. *K. Lau, R. Ramirez*

102. Reading Culture. S

Introduction to theoretical and methodological debates at the center of cultural studies as practiced in American studies. Balances theoretical readings with case studies to explore wide-ranging cultural productions and formations from different disciplinary perspectives and interpretive frameworks. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to American studies majors. Enrollment limited to 25. *K. Lau, C. Ramirez*

102A. Gender and U.S. Society. *

Introduction to the gendered analysis of U.S. society and culture from theoretical and historical perspectives. Particular attention given to the ways in which gender intersects with racial, ethnic, and class differences, focusing on the themes of work, politics, and sexuality. Course 1 or 10 is recommended prior to taking this course. *K. Lau*

102B. Sexuality and Culture. *

Examines how aspects of sexuality (such as sexual identities, preferences, roles, and desires) are fundamentally shaped by social-cultural and psychological factors. Topics include gender formation, the social construction of sexuality, and the historical emergence of the modern "gay" and "lesbian" identity of the U.S. Recommended for senior American studies majors. *The Staff*

105A. Oral History. *

Study and application of the theories, methods, and ethical issues involved in the practice of oral history. Critical readings and writing exercises will culminate in a 20-page oral history project. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to American studies majors. Enrollment limited to 24. (General Education Code(s): W.) *K. Lau*

105B. Understanding "America" through Ethnography. *

Examines ethics and politics of ethnographic research and various methodologies. Students collect their own ethnographic data to be analyzed with relevant theory in a final capstone project. Enrollment restricted to senior American studies majors. Enrollment limited to 20. *R. Ramirez*

107A. U.S. Popular Culture: 1800–1918. *

A survey of major popular cultural forms and texts in the pre-WWI era including Minstrelsy, Uncle Tom's Cabin, P.T. Barnum, Ramona, The Wizard of Oz, and Birth of a Nation, with attention to historical context and theory. *F. Robinson*

107B. U.S. Popular Culture: 1920–Present. *

Major popular cultural forms from the 1920s to the present. Topics include early "race" recordings; Depression radicalism; WWII entertainments; the Cold War; popular film genres; the 1970s and 1980s contemporary music (conjunto, jazz, rock, and rap). Particular attention to multicultural issues. Course 107A recommended. *The Staff*

109A. Technology and American Culture. *

Assesses political conditions under which the U.S. became committed to certain technologies, discusses merits of recent accounts of "crisis" in our politics and environment, and examines alternatives to mainstream politics and technology. Enrollment restricted to sophomores, juniors, and seniors. *The Staff*

109B. Science Fiction in Multicultural America. W

Science fiction by authors and artists of diverse cultural backgrounds, contextualized within the political and economic conditions of the U.S. Enrollment restricted to sophomores, juniors, and seniors. *C. Ramirez*

111A. The West in American Culture. *

Features texts with Western settings and with representative casts of Western characters. The often contradictory patterns that emerge from this regional literature and the qualities that attach to its familiar hero are explored. *F. Robinson*

112. Immigration and Assimilation. F

Examines immigration to U.S. from colonial era to present with special emphasis on issues of citizenship, social identities, and social membership. (General Education Code(s): ER.) *C. Ramirez*

113A. Imagining America. *

Examination of varied and often conflicting ways the ambiguous entity conventionally labeled "America" has been imagined, both positively and negatively, in political speeches, painting, fiction, film, television, music, drama, advertising, parades, and other modes of expression. *The Staff*

114A. Politics and American Culture. *

Examination of major conceptions of citizenship in the context of American society and culture, with particular attention both to the sources of these conceptions in Western political thought and to their elaboration and testing in specific historical situations. Enrollment restricted to juniors and seniors. *The Staff*

114B. Marxist Thought in American Culture. *

Explores history of Marxist thought and activism in the U.S. with special emphasis on uses and effects of Marxism within aggrieved communities of color. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): W.) *The Staff*

114C. Labor in U.S. Society. F

Examines the history of work and class in U.S. society with particular attention to how race and gender inform the constructions of multiple working classes. Drawing upon primary and secondary materials, the course analyzes the formations of labor unions, regional labor patterns, and the development of the capitalist market economy. *The Staff*

121C. Mixed Race in America. *

Examines what it means to be of mixed race in America along historical, social, political, and cinematic lines. Theories on racial and identity formation applied to understanding multiracial experiences of various racial groups in the U.S. (General Education Code(s): E.) *The Staff*

123. Native American Studies.**123F. Native American Women. ***

Introduces students to the history of Native North American women's lives. Topics include the impact of colonization and Christianization on Native women, political activism, the role of Native women in tribal politics, and contemporary artistic production. (General Education Code(s): E.) *R. Ramirez*

123H. Native Americans: Decolonization, Identity, and Resistance. *

This course examines how Native Americans are constructed by the dominant discourse on race, culture, and gender and how they subvert these negative representations through autobiography, novels, and humor. (General Education Code(s): E.) *R. Ramirez*

123M. Celluloid Natives: American Indian History on Film. *

Examines how American Indian history and culture has been portrayed in Hollywood films, with an emphasis on films that represent Native Americans over the broad spectrum of Native American/white relations. (General Education Code(s): IM, E.) *A. Lonetree*

123T. Inventing the Savage. S

Examines how colonialism is at the root cause of cultural trauma in Native American communities; how colonialism affects both the colonizer and the colonized; how Native American scholars have theorized cultural trauma; and using novels, how Native Americans create strategies to heal from the negative effects of colonialism. (General Education Code(s): E.) *R. Ramirez*

123X. American Indian History in the Twentieth Century. *

History of Native peoples of the U.S., from 1900 to present, with emphasis on Indian/white relations and continuing development of federal Indian policy and its impact. Attention also given to the persistence, change, and adaptation of Native cultures to historical and contemporary social conditions. (General Education Code(s): E.) *A. Lonetree*

123Z. Native Americans and Museums. W

Provides an historical overview of the relationship between American Indians and museums. Current issues and practices in museums—primarily those associated with ethics, collecting practices, exhibitions, education/interpretation, and administration/governance—are explored. (General Education Code(s): E.) *A. Lonetree*

125. African American Studies.**125A. Aspects of African American Culture. ***

A seminar examining the dominant and defining characteristics of African American culture, covering such areas as folklore, religion, politics, music, verbal arts, and social ritual, as well as more "everyday" manifestations of the culture. May be repeated for credit. (General Education Code(s): E.) *The Staff*

125E. Jazz Cultures. W

Explores the meaning of jazz in American culture, particularly the social and cultural forces that have produced different jazz styles and the various ways that social conflicts and ideals have been displaced onto jazz. A prior familiarity with the music itself will be helpful but is not required. (General Education Code(s): E.) *E. Porter*

125G. African American Life in the City. *

Examines social and cultural history of three black urban communities: Chicago, Los Angeles, and New York. Focusing primarily on the mid-to-late 20th century; considers black life through sociological, musical, literary, and historical sources. (General Education Code(s): E.) *The Staff*

125H. Black Feminism. *

Explores elements of African American feminist thought and its articulation in writings, music, literature, and practice/activism in 20th-century U.S. Sexuality and reproduction is a primary theme—especially motherhood, politics of reproduction, and sexual narratives. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior American studies majors. Enrollment limited to 25. (General Education Code(s): W, E.) *The Staff*

125X. Hip Hop Music Culture. *

Examines hip hop music and culture since its inception and addresses the contexts for its emergence in U.S. cities: sampling, cultural crossings, market forces, aesthetics, popular culture debates, race, culture, gender, sexuality, and class. (General Education Code(s): E.) *The Staff*

126. Chicano Studies.**126B. Chicana/o Music.** *

Examines Chicana/o music. Topics include corridos and border rebellion, music and social movements, Chicano radio and record industries, Chicanas/os and the emergence of rock and roll, Latin American/Latino music, and contemporary Chicana/o music. (General Education Code(s): E.) *The Staff*

126C. Chicana/o Literature and Film. *

Examines the formations and contestations of social, political, and cultural identities for Chicanas and Chicanos through a critical study of select Mexican American texts and films. (General Education Code(s): E.) *The Staff*

126L. Chicana/o Literature. *

Focuses on Latino literature, including traditional and emergent literary forms. Mostly focuses on Latinas and Latinos in the U.S., although course may also highlight the convergences and divergences of U.S. Latino and Latin American literary production. Students may study traditional literary forms, such as poetry or the novel, or more emergent ones, including blogs, graphic novels, and performance. No previous background in Latino literature is necessary, although some familiarity with literary criticism and theory is useful. (General Education Code(s): TA, E.) *C. Ramirez*

127. Asian American Studies.**127A. Aspects of Asian American Culture.** *

Selected topics on Asian American culture, religion, music, foodways, literature, theater, film, and/or art. May be repeated for credit. (General Education Code(s): E.) *The Staff*

127C. Asian American Literature and Culture: Memories of War. *

Course assumes that war is key element in transpacific formation of Asian America and attempts to examine wars in Asia/Pacific region from Filipino-American through the Pacific, Korean, and Vietnam Wars U.S. has participated in and to ask how war memories have shaped the Asian American experience and reconfigured notion of the homeland. Looks at specific Asian American texts to discuss issues of ethnicity, politics

of memory, immigration, and diaspora in respective war context and considers impact of cold war as transpacific structure of ideological determination. Enrollment limited to 60. (General Education Code(s): E.) *The Staff*

127D. Filipino Americans: History and Culture. *

Examines the history and culture of Filipinos in the U.S. from 1763 to present day within the context of colonial and postcolonial relations between the Philippines and the U.S. Topics include immigration, labor, community, identity, politics, and contemporary issues. (General Education Code(s): E.) *The Staff*

127E. Asian American Women. *

Examines the intersectionality of race, class, gender, and sexuality in the history and lives of Asian American women from a woman-centered perspective. Topics include immigration, work, family, identities, sexploitation, and political and social activism. Students cannot receive credit for this course and History 189. (General Education Code(s): E.) *The Staff*

127F. Chinese Americans: History and Culture. *

Examines the history, culture, and politics of Chinese Americans from the California Gold Rush to present day within the context of socioeconomic and political developments in China and the U.S. Topics include immigration and labor patterns; race, gender, and class dynamics; family and community development; identity politics; and cultural expressions. (General Education Code(s): E.) *The Staff*

127K. South Asian Americans. *

Examines South Asian migration to the U.S., with specific attention to historical and political contexts of immigration and to (re)configurations of culture, politics, and identity in the South Asian American diaspora. (General Education Code(s): E.) *The Staff*

141. The Great Book of America. F

The course will feature texts that were conceived as, or have been widely received as, expressions of themes and values that are especially or essentially American. *Moby Dick*, *Walden*, *Leaves of Grass*, and *Huckleberry Finn* are such books. *F. Robinson*

142. Melville. *

Lectures on a selection of Melville's major writings, including *Moby Dick*, *Pierre*, *The Confidence Man*, *Billy Budd*, and selected short works. Students are required to complete two critical essays. *F. Robinson*

145. Mark Twain and American Culture. W

A survey of Mark Twain's major writings with special attention to biography and historical content. The writer's status as a leading cultural spokesperson is also explored. Satisfies literature major requirement. Students cannot receive credit for this course and American Literature 120B. (General Education Code(s): TA.) *F. Robinson*

146A. U.S. History and Literature. *

Seminar on American historical fiction, including works by Hawthorne, Twain, Faulkner, Cather, Stegner, Doctorow, and Morrison, and with some attention to relevant theoretical texts. Students are required to submit two critical essays. *F. Robinson*

157. Sexual Identities and Communities. F

Examines how gay, lesbian, bisexual, and transgendered people negotiate the intersections of their sexual and gender identities with their racial, ethnic, and class identities in the contemporary U.S. Considers the ramifications of these intersections for notions of "gay issues" and "queer communities." *The Staff*

172. Asian Americans in Film. F

Introduction to the history and relevance of film and video productions within Asian America. Explores reasons why, and ways how, Asian Americans have represented themselves through the visual medium of moving pictures. Emphasis on basic tools of film analysis and appreciation. (General Education Code(s): E.) *The Staff*

180. Special Topics in American Studies. W,S

Highlights important, relevant, and topical themes in American studies and society. By closely examining one topic or theme, students connect larger issues and think across areas of study. Topics include: the prison industrial complex; radical traditions in America; race and cultural exchange; and citizenship in America. May be repeated for credit. *The Staff*

188. 9/11. *

Considers the events of September 11, 2001, and the subsequent changes in U.S. society and in the country's role across the globe. Focuses on three arenas where these transformations have occurred: politics, culture, popular culture, and racial and ethnic relations. *E. Porter*

190. Senior Research Seminars. F,S

As a capstone, this seminar begins by reflecting on the field of American studies or on a topic that defines it. Students then develop a research project relevant to their emphasis in the major. Focus and topics vary by instructor. Satisfies American studies senior comprehensive requirement. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to American studies majors. Enrollment limited to 25. *E. Porter*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) For students with upper-division standing who have submitted a proposal supported by a faculty member willing to supervise. *The Staff*

193. Field Study. F,W,S

Individual studies program undertaken off campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195A. Senior Project. F,W,S

For students continuing work on their senior thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195B. Senior Project. F,W,S

For students continuing work on their senior thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Individual study program off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Up to three such courses may be taken for credit in any one quarter. Approval of student's adviser and certification of adequate preparation required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Proseminar in American Studies. S

Introduces graduate students to current theories and methods in American studies, to the history of the field, and to the faculty in the department. Required introductory seminar for all students wishing to pursue a parenthetical notation in American studies. Enrollment restricted to graduate students. Enrollment limited to 10. *E. Porter*

205. Theorizing American Culture. *

A selective examination of theoretical and methodological issues central to American studies, of the history of attempts to consider the U.S. as manifesting a cultural system, and of contemporary critiques that problematize the focusing of cultural analysis on a nation-state. Enrollment restricted to graduate students. *F. Robinson, H. Berger*

207. Politics of Popular Music. *

Engages a number of the critical theoretical and methodological issues raised in contemporary studies of popular music. Explores these issues while reading case studies that range across scholarly disciplines and musical genres. Enrollment restricted to graduate students. Enrollment limited to 10. *E. Porter*

208. Readings in the History of the U.S. West. *

Explores recent trends in historical scholarship on the U.S. West, including the use of Western resources, the relationship between urban and rural places in the West, and the diversity of Western peoples. In order to reflect on the variety of ways in which scholars communicate their understandings of history, students also read a variety of academic books. Enrollment limited to 20. *The Staff*

210. Studies in Early American Nationality. *

Examines the relationship of the attempts to legitimize U.S. nationhood in the late eighteenth and nineteenth centuries and the construction during this period of the concept of a national culture. Particular stress is given to the ideological functions served by the developing conception of American nation as both polity and culture. Enrollment restricted to graduate students. Enrollment limited to 8. *R. Ramirez*

211. Nativity, Culture, Race, and Space. *

This seminar examines the concept of "nativity" (of being or claiming to be native to a particular location) and how it functions in historical and contemporary conflicts, ranging from historical settler colonialism to contemporary gentrification of urban areas. Enrollment restricted to graduate students. Enrollment limited to 10. *The Staff*

222. Tradition and Modernity in Black Culture. *

Examines the interplay of past and present in expressive culture by, for, and about African Americans, especially in respect to artistic and social innovations and their relationships to history, collective memory, and tradition. Upper-division students may enroll via permission code from instructor. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

223. Cultural Citizenship. *

Seminar examines the right to be different and belong in a participatory, democratic sense. Explores vernacular definitions of what confers political and cultural entitlement, taking into consideration factors ranging from the economic to notions of dignity and respect. Enrollment restricted to graduate students. Enrollment limited to 10. *R. Ramirez*

225. Black Feminist Thought and Practice. *

Explores the development of African American feminist thought and its articulations in writing, music, literature, and practice in the 20th-century U.S. Black women's sexu-

ality a major theme, especially motherhood, politics of reproduction, and sexual narratives. Enrollment restricted to graduate students. Enrollment limited to 10. *The Staff*

226. Comparative American Studies: Race and Difference in Global Perspective. *

Explores race and difference in global perspective. Examines the relationship between democracy and pluralism, with a focus on the movement of people between the global south and global north. Enrollment restricted to graduate students. Enrollment limited to 15. *C. Ramirez*

227. Studies in Black Cultural and Intellectual History. *

Examines key figures and movements in black intellectual and cultural history. Special consideration given to radical and avant-garde thought and expression. Specific focus varies from year to year. Enrollment restricted to graduate students. Enrollment limited to 10. *E. Porter*

295. Directed Reading. F,W,S

Directed reading which does not involve a term paper. Designed for graduate students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S

A seminar study group for graduate students arranged between students and faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Independent study for graduate students who need to establish a research area for their thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Independent thesis research for graduate students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Anthropology

361 Social Sciences 1 Building
(831) 459-3320
<http://anthro.ucsc.edu/>

Faculty and Professional Interests

Professor

DONALD BRENNIS

Linguistic anthropology, folklore, legal anthropology, ethnomusicology, overseas Indians, South Asia, disputing and dispute management, legal language, bureaucratic institutions

NANCY N. CHEN

Medical anthropology, visual anthropology, urban anthropology, Asian American identity, mental health, food, China

MAY N. DIAZ, Emerita

SHELLY ERRINGTON

Globalization of folk art, visual and social semiotics, photography, film, the Internet and digital media, Southeast Asia, and Latin America

ALISON GALLOWAY

Skeletal biology, forensic anthropology, human variation, history and ethics of physical anthropology, reproductive energetics and aging

DIANE GIFFORD-GONZALEZ

Neolithic Africa and Eurasia, colonial New Mexico, origins of food production, pastoralists, zooarchaeology, history of archaeology, interpretive theory, visual anthropology

JUDITH A. HABICHT-MAUCHE

Precontact and early contact North America; cross-cultural interaction and trade; ceramic technology; archaeology of gender, power, and identity; Southwest and Southern Plains

SUSAN HARDING

Culture, politics, narrative, gender, local/global studies, ethnographic writing, fundamentalism, Christianity, state-making, aging, America, and Spain

DIANE K. LEWIS, Emerita

DANIEL T. LINGER, Emeritus

CAROLYN MARTIN SHAW, Emerita

OLGA NÁJERA-RAMÍREZ

Folklore theory, ritual, festival, dance, greater Mexican culture, history and folklore, transnationalism, identity; expressive culture, ethnomusicology, bilingual communication, gender, history, and culture of Latin America, the U.S., and Mexico

TRILOKI NATH PANDEY

Native peoples of North America, cultures of India, political anthropology, anthropological theories and comparisons; native North America; tribal India; Nepal

RICHARD R. RANDOLPH, Emeritus

LISA ROFEL

Critical theory, anthropology of modernity, popular/public culture, gender and sexuality, cultures of capitalism, postcolonial feminist anthropology, China

STUART A. SCHLEGEL, Emeritus

ANNA TSING

Culture and politics; feminist theory; globalization; multi-species anthropology; social landscapes and forest ethnologies; multi-sited ethnography; Indonesia, Southeast Asia, and the U.S.

ADRIENNE L. ZIHLMAN

Primate and human evolution, comparative functional anatomy of monkeys and apes, sex and gender, growth and development, life history and evolutionary theory, history of physical anthropology

Associate Professor

MARK ANDERSON

Racial formation, diaspora, nationalism, transnationalism, culture and power; Latin America, African diaspora

MELISSA L. CALDWELL

Poverty and welfare; charity and philanthropy; religious development work; the politics of food and gardens; socialism and postsocialism; Russia, the former Soviet Union, and Eastern Europe

DANILYN RUTHERFORD

Borders and frontiers, colonialism, nationalism, ethnicity, kinship, performance, Christianity, secularism, sovereignty, publics, affect, technology, governancy, theory and method in anthropology, West Papua, Indonesia, the U.S.

Assistant Professor

CHELSEA BLACKMORE

Pre-Columbian archaeology (Mesoamerican focus), identity formation, complex societies, class and state formation, gender; feminist/queer theory

MAYANTHI FERNANDO

Anthropology of religion, secularism, Islam, multiculturalism/pluralism; colonial and post-colonial France, Europe

ANDREW SALVADOR MATHÉWS

Environmental anthropology, science and technology studies, conservation and development

J. CAMERON MONROE

Historical archaeology, complex societies, political economy, architecture and landscape, Africa and the African diaspora

MEGAN MOODIE

South Asian studies, feminist theory, reproductive and population politics, kinship, development, legal identities, tribal communities

MATTHEW WOLF-MEYER

Anthropology and history of medicine and public health, science studies, American studies, popular culture, the United States and the United Kingdom

**Professor****RAOUL BIRNBAUM (History of Art and Visual Culture)**

Buddhist studies, especially Chinese practices from medieval times to the present; religion and visual culture in China

JOHN BROWN CHILDS, Emeritus (Sociology)

Ethnic conflict and transcommunal cooperation; sociology of knowledge; African American, Native American, Latino interactions

JAMES T. CLIFFORD (History of Consciousness)

History of anthropology, travel, and exoticism; transnational cultural studies, museum studies, indigenous studies

CAROLYN DEAN (History of Art and Visual Culture)

Cultural histories of the native Americas and colonial Latin America

A. RUSSELL FLEGAL (Environmental Toxicology)

Anthropogenic perturbations of biogeochemical cycles, applications of isotopic tracers in anthropology and archaeology

STEPHEN R. GLIESSMAN (Environmental Studies)

Agroecology, sustainable agriculture, tropical land use and development, alternative trade networks, sustainable livelihoods and conservation, community and agroecology

DONNA HARAWAY (History of Consciousness and Feminist Studies)

Feminist theory, cultural and historical studies of science and technology, relation of life and human sciences, human-animal relations, and animal studies

PAUL KOCH (Earth Sciences)

Isotope biogeochemistry, vertebrate paleontology

MARC S. MANGEL (Applied Mathematics and Statistics)

Mathematical modeling of biological phenomena, especially the evolutionary ecology of growth, aging, and longevity; quantitative issues in fishery management; mathematical and computational aspects of disease

PATRICIA ZAVELLA (Latin American and Latino Studies)

Chicana/Latino studies, women's work and domestic labor, poverty, family, sexuality and social networks, feminist studies, ethnographic research methods, and transnational migration of Mexican/lo workers and U.S. capital

Associate Professor**S. RAVI RAJAN (Environmental Studies)**

Environmental history and political ecology, risk and disaster studies, science and technology studies, North-South environmental conflicts, environmental social theory, environmental ethics

RENYA RAMIREZ (American Studies)

Native American studies, Indian identity, Native Americans and anthropology, urban Indians, Native American women, cultural citizenship, expressive culture, and anti-racist

education

Assistant Professor**MARCIA OCHOA (Community Studies)**

Gender and sexuality, race and ethnicity, Latina/o studies, media and cultural studies, ethnography of media, feminism, queer theory, geography, multimedia production, graphic design, colonialism and modernity, Latin American studies—Colombia and Venezuela

CECILIA RIVAS (Latin American and Latino Studies)

Salvadoran transnationalism; media (Internet newspapers; migration; globalization; race, ethnicity, and gender; bilingualism; consumption; El Salvador; Central America

Program Description

Anthropology studies people throughout the world and through time. Because it covers a wide range of topics—physical evolution, material remains of the past, and the world that humans create through their ideas and practices in present-day societies—anthropology is an especially integrative discipline.

The anthropology program at UCSC offers courses that reflect the diversity of the field.

- Cultural anthropology explores the movements of people, objects, and ideas in diverse societies, including our own. Cultural anthropology courses examine such topics as race and ethnicity, medicine, science, gender, sexuality, the environment, religion, law, popular culture, and politics.
- Archaeology uses the material evidence of human activities to understand past human lives. Archaeology at UCSC focuses on past people's interactions with one another at the local level and within their wider social and ecological contexts. Faculty research areas include the pre-colonial and early post-colonial history of East Africa and the American Southwest.
- Physical anthropology traces the human journey from its beginnings in Africa over five million years ago. Physical anthropology courses look at fossil evidence, evolutionary theory, human variation, and the behavior of primate relatives in order to analyze biological, social, and cultural changes over time.

UCSC students have the opportunity to do independent library and field research in cultural anthropology, archaeology, and physical anthropology. Laboratory courses in archaeology and physical anthropology offer practical experience in the analysis of biological and cultural materials. Students may use the social science media laboratory to develop technical and creative skills in visual and audio media. In cultural anthropology courses, students learn to carry out anthropological research through interviews, participant observation, surveys, the collection of oral histories, and the interpretation of archives.

Because anthropology is concerned with understanding human interaction, it is a useful major for anyone planning a career that involves working with people, especially those from diverse cultures. Some UCSC anthropology graduates are in social work, many are in teaching, and others pursue careers in law, city planning, politics, medicine, public health, cultural resource management, and journalism. Students intending to specialize in anthropology usually go on to graduate school because professional employment in the field almost always demands an advanced degree.

Most anthropology faculty have their offices in Social

Sciences 1 Building. Social Sciences 1 also houses the Visual Culture Research Laboratory and laboratories for archaeology and physical anthropology where space is provided for laboratory and individual studies courses and for collections of mammalian skeletal material, casts of fossil hominids, ceramics, stone tools, and other archaeological artifacts.

The Anthropology Society, a campus club, is open to all students interested in anthropology. The Anthropology Colloquium showcases guest speakers and gives faculty and students an opportunity to discuss new approaches to anthropological questions. Students and faculty interested in archaeology also gather informally at the Archaeology/Physical Anthropology Forum to share information on fieldwork and employment opportunities.

Undergraduate Handbook

All undergraduate majors should obtain a copy of the Anthropology Department undergraduate handbook at UCSC from the department office (361 Social Sciences I Building). It outlines information on department procedures and requirements, program planning, independent study, faculty interests, and campus resources for anthropology majors.

Major Requirements

The Anthropology Department urges students to seek faculty advice early in planning for the major. Faculty hold regular office hours weekly and encourage students to come in to talk about their program or coursework. Peer advisers are also available.

To graduate with an anthropology major, students must take courses 1, 2, 3, and either course 4 or an 80s-level course as background for upper-division courses. They must take a minimum of nine upper-division courses, including at least one course selected from each of these four categories listed below. Students must also complete the Disciplinary Communication (DC) Requirement.

Anthropological Theory Courses

- 100 *History and Theory of Physical Anthropology*
- 150 *Communicating Anthropology*
- 152 *Survey of Cultural Anthropological Theory*
- 170 *History of Archaeological Theory*

Sociocultural Anthropology Courses

- 123 *Psychological Anthropology*
- 124 *Anthropology of Religion*
- 126 *Sexuality and Society in Cross-Cultural Perspective*
- 127 *Ethnographies of Capitalism*
- 128 *Contemporary American Evangelical Culture*
- 129 *Other Globalizations: Cultures and Histories of Interconnection*
- 131 *Women in Cross-Cultural Perspective*
- 132 *Photography and Anthropology*
- 133 *Narratives of the Popular*
- 134 *Medical Anthropology*
- 135A *Cities*
- 137 *Consuming Culture*
- 138 *Political Anthropology*
- 139 *Language and Culture*
- 142 *Anthropology of Law*
- 143 *Performance and Power*
- 145X *Special Topics in Socio-Cultural Anthropology*
- 146 *Anthropology and the Environment*

- 151 *Workshop in Ethnography*
- 154 *Multimedia Ethnography*
- 155 *Cultural Encounters*
- 157 *Modernity and Its Others*
- 159 *Race and Anthropology*
- 164 *Anthropology of Dance*
- 165 *Anthropological Folklore*

Ethnographic Area Studies Courses

- 130A *Peoples and Cultures of Africa*
- 130B *Brazil*
- 130C *Politics and Culture in China*
- 130E *Culture and Politics of Island Southeast Asia*
- 130F *African Diasporas in the Americas*
- 130G *Asian Americans in Ethnography and Film*
- 130H *Ethnography of Russia and Eastern Europe*
- 130I *Cultures of India*
- 130L *Ethnographies of Latin America*
- 130M *Inside Mexico*
- 130N *Native Peoples of North America*
- 130O *Postcolonial Britain and France*
- 130R *Provincializing America*
- 130T *Anthropological Approaches to Islam*
- 130X *Special Topics in Ethnography*

Physical Anthropology and Archaeology Courses

- 101 *Human Evolution*
- 102A *Human Skeletal Biology*
- 103 *Forensic Anthropology*
- 104 *Human Adaptability*
- 106 *Primate Behavior and Ecology*
- 107 *Human Functional Anatomy*
- 110 *Comparative Functional Anatomy*
- 111 *Human Ecology*
- 112 *Life Cycles*
- 172 *Archaeological Research Design*
- 173 *Origins of Farming*
- 174 *Origins of Complex Societies*
- 175A *African Archaeology*
- 175B *African Archaeology: Development*
- 175C *African Diaspora Archaeology*
- 176A *North American Archeology*
- 176B *Meso-American Archaeology*
- 178 *Historical Archaeology: A Global Perspective*
- 180 *Ceramic Analysis in Archaeology*
- 183 *Introduction to Quantitative Methods in Archaeology*
- 184 *Zoarchaeology*
- 185 *Osteology of Mammals, Birds, and Fish*

Exit Requirement

Students can fulfill the senior comprehensive requirement in anthropology either by passing an advanced senior seminar (194-series course, 190ABC, or 196AB), by writing an acceptable independent senior thesis, or by passing an approved graduate-level topical seminar in anthropology.

Senior seminars are small, writing-intensive classes focusing on advanced topics in anthropology. The prerequisite for admission to a senior seminar is successful completion of courses 1, 2, and 3; senior seminars are

restricted to anthropology majors.

Students considering an independent thesis must arrange for the sponsorship and support of a faculty member before beginning research. An independent senior thesis (not written within a senior seminar) should be based on original research and reflect the student's understanding of fundamental theories and issues in anthropology. The thesis should be comparable in content, style, and length (generally 25–30 pages) to a professional journal article in its subfield.

Students who intend to satisfy the exit requirement by taking a graduate seminar must first get permission from the department. Not all graduate seminars are appropriate for fulfilling this requirement.

All majors, including double majors, must prepare a program of study in consultation with a member of the Anthropology Department. A combined major in anthropology and Earth and planetary sciences, leading to a bachelor of arts (B.A.) degree, is also offered; for that program description, see Earth and Planetary Sciences. Students going on to graduate school should plan course schedules in close consultation with faculty advisers.

Many anthropology majors whose studies emphasize archaeology have benefited from concurrent study in the Cabrillo College Archaeological Technology Certificate Program. This vocational certification program is sponsored entirely by Cabrillo College, but credit for its summer field survey and excavation component may be transferred for credit at UCSC. Although courses in the Archaeological Technology Certificate Program do not count toward the UCSC anthropology major, students who have obtained the certificate in tandem with their bachelor's degree in anthropology have expanded their employment and advanced degree program opportunities. Students interested in exploring this possibility are encouraged to consult with UCSC archaeology faculty and to visit the program's web site at <http://www.cabrillo.edu/lacademics/archtech/>.

- 190A *Tropical Forest Ecology*
- 190B *Field Methods in Primatology*
- 190C *Independent Field Research*
- 194A *Community*
- 194B *Chimpanzees: Biology, Behavior and Evolution*
- 194C *Food and Medicine*
- 194F *Memory*
- 194G *Politics and Secularism*
- 194I *Consumption and Consumerism*
- 194K *Reading Ethnographies*
- 194L *Archaeology of the African Diaspora*
- 194M *Medical Anthropology*
- 194N *Comparison of Cultures*
- 194P *Space, Place, and Culture*
- 194S *The Anthropology of Sound*
- 194T *Poverty and Inequality*
- 194U *Environmental Anthropology: Nature, Culture, Politics*
- 194V *Picturing Cultures*
- 194X *Women in Politics: A Third World Perspective*
- 194Y *Archeology of Space and Landscape*
- 194Z *Emerging Worlds*
- 196AB *Southwest American Archaeology*

Two-credit courses do not count toward the nine upper-division courses required for the major. Only one 5-credit individual studies course (197, 198, or 199) may be counted toward the nine required upper-division courses. Course 107L does not count toward the nine

upper-division courses required for the major. Theory courses can only be counted toward the theory requirement or an upper-division elective.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. Anthropology's DC Requirement aims especially at cultivating high-level skills in critical and ethnographic writing. The DC Requirement in anthropology is under review. Please refer to updated DC information at <http://reg.ucsc.edu/catalog/html/disciplinary-communicationchart.html>.

Transfer Students

If possible, transfer students should complete lower-division requirements for the major before coming to UCSC by taking classes equivalent to courses 1, 2, and 3. Department policy also allows up to 10 quarter credits (equivalent to two UCSC courses) of upper-division transfer credit toward the major requirement. Transfer students should bring a copy of their UCSC Transfer Credit Summary and an unofficial copy of all pertinent transcripts to the undergraduate adviser in the department office (361 Social Sciences 1 Building) as soon as possible after reaching campus so that prerequisites can be verified and course enrollment can proceed smoothly.

Peer Advisers

The Anthropology Department has instituted a peer adviser program as a supplement to academic advising offered by faculty members. The peer advisers are juniors and seniors who have been trained to help students with questions and general guidance through the anthropology major. Peer advisers hold regularly scheduled office hours in the department office.

Honors

The Anthropology Department awards "honors in the major" based on a ranked departmental grade point average that is calculated using all upper-division courses taken in the major with the exception that only one independent-study course can be used in this calculation. For students who have taken multiple independent-study courses in the department, the independent-study course that has the highest grade is used for the calculation. Approximately 15 percent of the graduating class is considered for honors based on their cumulative grade point average (GPA) through the quarter before graduation.

"Highest honors in the major" is determined by faculty review of all the departmental narrative evaluations for all students considered for honors within a particular quarter. The criteria for awarding highest honors in the major are overall superlative performance in the major and general breadth of excellence across the subfields of anthropology as reflected in the narrative evaluations. Receiving honors on the senior exit requirement is also considered as a factor in awarding highest honors, but is not always determinative.

Minor Requirements

Students earn a minor in anthropology by completing all of the requirements for the major with the following differences:

- The number of upper-division courses is reduced from nine to six. Of these, at least one must be from

each of the following categories: 1) theory, 2) socio-cultural anthropology, 3) ethnographic area studies, and 4) physical anthropology or archaeology.

- Independent study courses cannot be used toward completion of the minor.
- No senior seminar or thesis is required.

For more information regarding department policies, please consult the undergraduate adviser at the Anthropology Department office, 361 Social Sciences 1 Building. A handbook on the anthropology program is available there or on the anthropology web site <http://anthro.ucsc.edu/>.

Graduate Program

The anthropology doctoral program at UCSC consists of two tracks: cultural anthropology and anthropological archaeology. The majority of students are admitted to the cultural anthropology program. Smaller numbers of students are admitted to the in anthropological archaeology program. Admission of students who are interested in the physical anthropology program described below have been suspended indefinitely.

Although applicants are accepted only for the doctor of philosophy (Ph.D.) program, students may obtain a master of arts (M.A.) degree after fulfilling specific requirements during the first two years.

The theme of emerging worlds—culture and power after progress unites the research interests of many faculty in the cultural anthropology graduate program at UCSC. In recent years, anthropology's central concept of culture has been subjected to extraordinary ethnographic and theoretical pressures. Across the social sciences, scholars are responding to emergent scientific and social dilemmas by turning to the concept of culture and the ethnographic method. Such disciplinary turns grow from a challenging new set of social configurations, which affect both scholarly and lay understandings of the present, past, and future: the demise of certainties about progress and modernization and the need to understand newly emergent worlds. Nineteenth- and 20th-century ideas of progress and programs of modernization both created the concept of culture and relegated it to a nostalgic role as backward-looking sentiment. Anthropologists studied "vanishing worlds." In the last 30 years, however, such certainties have been challenged. Grand theories of human behavior that depended on the idea of a universal man have begun to fray around the edges. Heterogeneity and disjuncture have caught the attention of a wide range of social scientists, calling out for ethnographic investigation. In this context, scholarly discussions have turned toward culture, not as "tradition," but as the world-making networks, geographies, innovations, meanings, and assemblages that are carrying us into the future.

Our concentration on "emerging worlds" and on the construction of anthropological knowledge is especially well suited for drawing together diverse scholars and specialists in challenging and enriching conversations. Rather than reproduce the boundaries among the traditional subfields of anthropology, we explore how recombinations of these approaches can elucidate specific anthropological problems.

Working with their faculty advisory committee, students in cultural anthropology have considerable freedom to design their own programs of study after completing the two-quarter core course and the ethnographic practice course during the first year. To achieve Ph.D. candidacy, students are expected to pass a first-year review of their written work, take three additional 5-credit courses in anthropology (excluding independent

study courses), maintain satisfactory academic progress, satisfy the ethnographic writing requirement and the foreign language requirement, pass a qualifying exam at the end of the third year, and meet the specific requirements of the Division of Graduate Studies. After advancing to Ph.D. candidacy, students carry out a sustained ethnographic fieldwork project and are expected to complete their dissertation within a year after returning from the field.

Graduate students in cultural anthropology may obtain a notation on the anthropology Ph.D. diploma indicating that they have specialized in feminist studies or Latin American and Latino studies (LALS) if they meet requirements spelled out by the individual committee composed of anthropology faculty and faculty from the program awarding the notation.

The Ph.D. program in anthropological archaeology is highly selective, focusing on the archaeology of late precolonial societies in East and West Africa and North America, especially the Southwest and California. The program also features an emerging concentration on the archaeology of colonial encounters among peoples of Europe, Africa, and the Americas. It is distinctive in insisting that theories of power, production and exchange, human ecology, gender, ethnicity, and technological practice be explored through rigorous laboratory and field research methods.

The Ph.D. program in physical anthropology combines a strong emphasis on hard and soft tissue anatomy with a broad evolutionary perspective. This highly selective track is characterized by intense mentoring of students, involvement of students in instruction as well as coursework, and interdisciplinary training. Specific training is offered in skeletal biology, comparative primate anatomy, behavior and ecology, forensic anthropology, and evolutionary theory.

Although the areas of study of the archaeology and physical anthropology programs are distinct, their paths toward the Ph.D. are similar. In the first year, students take two foundational theory courses and pass a review of their work. Within the first two years of study, students complete at least two foundational materials/methods courses or laboratory courses in other departments; two advanced laboratory apprenticeship courses or similar courses in other departments; two foundational courses in geographic/temporal areas or, in physical anthropology, topical areas; two graduate seminars with other anthropology or campus faculty; one quantitative methods course; and two terms of supervised teaching experience.

The third-year requirements are three laboratory apprenticeship courses, the grant writing seminar, and tutorials to prepare the student for the qualifying exams. All courses outside the department must be approved by the student's adviser. After advancing to Ph.D. candidacy, the student carries out a sustained laboratory or fieldwork project and is expected to complete the dissertation within a year after finishing research.

Lower-Division Courses

1. Introduction to Human Evolution. F

Study of evolution illustrated by Pleistocene hominid fossils and variation in living human groups. Behavior and evolution of primates examined as they contribute to the understanding of human evolution. Required for all anthropology majors. (General Education Code(s): SI, IN.) *A. Zihlman*

2. Introduction to Cultural Anthropology. S

A number of different peoples are studied and a variety of approaches to the nature of the culture and to the study of

specific cultures presented. Required for all anthropology majors. (General Education Code(s): IS.) *S. Harding*

3. Introduction to Archaeology. W

Overview of ways of learning about the human past beyond the scope of written history. Reviews development of archaeology, fundamental methods and theories, and archaeology's contribution to understanding human origins, the emergence of farming, and the origins of complex societies. (General Education Code(s): SI, IS.) *J. Habicht-Mauche*

4. Public Life and Contemporary Issues. F

How can cultural anthropology help us to understand current events unfolding locally, nationally, and globally? Students learn how to "read" newspapers differently—that is, through the lens of cultural analysis. The world of everyday politics and society, as it unfolds in debates happening right now, forms the topical substance of the course. (General Education Code(s): IS.) *S. Errington*

42. Student-Directed Seminar.

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

80C. Introduction to Forensic Anthropology. *

Introductory level course in basic analysis of human remains for the medico-legal profession. Course covers development of the field of forensic anthropology, introduction to human osteology, how age, sex, ancestry, and stature are determined from skeletal material, and how skeletal trauma is evaluated. (General Education Code(s): T3-Social Sciences.) *The Staff*

80G. Barrio Popular Culture. *

Introduces students to a broad sampling of verbal and nonverbal forms of Mexican folklore. Concentrates on experiencing these forms through texts, film, and if possible, performances. Attention to how these forms have been used by scholars to comment on Mexican culture is an underlying theme. Knowledge of Spanish is useful but not required. (General Education Code(s): T3-Social Sciences, E.) *O. Nájera-Ramírez*

80H. Acoustic Culture. S

Explores relationships between culture and the acoustic worlds, including environmental, verbal, and musical, which humans inhabit. How can paying attention to cultures of listening and sound-making help us think about cultural life and experience in new ways? (General Education Code(s): T3-Social Sciences.) *D. Brenneis*

80I. Culture and Power in Latin America. *

Introduces key issues in the anthropology of Latin America, with emphasis on identity formation, cultural practices, and power. Major themes include race, class, and gender as intersecting forms of oppression, violence, and terror and indigenous social movements. Will be offered in 2011–12 academic year. (General Education Code(s): T3-Social Sciences, E.) *M. Anderson*

80J. Introduction to Visual Culture. *

Introduces current issues in cultural anthropology using film as a medium with which to explore culture. Raises questions about visual representations and the portrayal of cultural difference in the context of global inequalities. Will be offered in 2011–12 academic year. (General Education Code(s): T3-Social Sciences.) *S. Errington*

80K. Culture through Food. S

Examines anthropology of food and politics of eating. Cultural and social uses of food in rituals of solidarity or fasting, identities and meanings of food for individuals, and consumption in the global context are key components of study. (General Education Code(s): T3-Social Sciences.) *N. Chen*

80L. Biology of Everyday Life. *

Addresses cross-cultural attitudes to the human body and its everyday biological concerns—sleeping, eating, breathing, sex, and defecation. (General Education Code(s): T3-Social Sciences.) M. Wolf-Meyer

80N. Anthropology of Globalization. *

Introduces anthropological concepts and approaches to historical and contemporary globalizations. Using ethnographies, films, and other cultural productions, raises questions about the impacts of transnational capitalism, colonialism, migration/movement, and media on "local" and "global" identities, cultures, and communities. (General Education Code(s): T3-Social Sciences.) *The Staff*

80P. India and Indian Diaspora through Films. W

Explores several themes of relevance in contemporary India and Indian diaspora, concentrating on anthropological research and various documentary and popular Bollywood films. Through films and ethnographies, students analyze the nature of anthropological contributions to the study of Indian societies. (General Education Code(s): T3-Social Sciences, E.) A. Pandey

80R. Religion in American Politics and Culture. *

Introduces dominant discourses about Christianity and Islam in the American public sphere, with particular attention paid to race, gender, sexuality, and class in thinking about religion. Visual and textual media, political commentary, and popular ethnographies are analyzed. (Also offered as Feminist Studies 80T. Students cannot receive credit for both courses.) *The Staff*

80Y. Power, Politics, and Protest. *

Examines the many ways in which organized groups engage in political protest against those whom they understand to dominate them. The course first establishes the framework for the discussion of power, politics, and protest, and then examines a variety of forms taken by political protests worldwide. (General Education Code(s): T3-Social Sciences.) *The Staff*

80Z. The Good Life. *

Examines cultural constructions of meaningful living, with emphasis on ethnographic analysis, through comparative studies of how societies assign value to different formations of everyday life. Topics include: cultivation of taste; pleasure; hierarchies of values; social justice; and distinctions between work and leisure. (General Education Code(s): T3-Social Sciences.) M. Caldwell

81A. Mexican Folklórico Dance (2 credits). F

Provides instruction in the aesthetic, cultural, and historical dimensions of Mexican folklórico dance. Students taught choreographed dances from various regions of Mexico and also learn dance techniques (*técnica*) and stage make-up application. Additional workshops and lectures offered to supplement class. Open to all students; no previous experience required. (Also offered as Latin American&Latino Studies 81A. Students cannot receive credit for both courses.) May be repeated for credit. (General Education Code(s): A.) O. Nájera-Ramírez

81B. Mexican Folklórico Dance (2 credits). W

Second course in series. Provides instruction in the aesthetic, cultural, and historical dimensions of Mexican folklórico dance. (Also offered as Latin American&Latino Studies 81B. Students cannot receive credit for both courses.) May be repeated for credit. (General Education Code(s): A.) O. Nájera-Ramírez

81C. Mexican Folklórico Dance (2 credits). S

Third course in series. Provides instruction in the aesthetic, cultural, and historical dimensions of Mexican folklórico dance. (Also offered as Latin American&Latino Studies

81C. Students cannot receive credit for both courses.) Prerequisite(s): course 81A or 81B. May be repeated for credit. (General Education Code(s): PR-C, A.) O. Nájera-Ramírez

81J. Introduction to Visual Culture Lab (2 credits). *

Optional digital photography lab. Students learn to compose shots, download photos, resize them, and put them into a meaningful sequence. Will be offered in 2011–12 academic year. Concurrent enrollment in Anthropology 80J required. Enrollment limited to 36. S. Errington

93. Field Study. F,W,S

Supervised research or organized projects on anthropological topics for lower-division students. Conducted either on or off campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***100. History and Theory of Physical Anthropology. ***

Provides an historical overview from the 18th century to the present of race, ape-human relationships, and human nature. Emergence of an evolutionary framework and of fossil, genetic, and primate information becomes the basis for reformulating ideas about human biology within anthropology. Prerequisite(s): courses 1, 2, and 3 and satisfaction of the Entry Level Writing and Composition requirements. *The Staff*

101. Human Evolution. *

Study of human evolution covering the last five million years. Examines the fossil evidence and emphasizes the reconstruction of behavior from the paleontological and anatomical evidence. Prerequisite(s): course 1. Offered in alternate academic years. *The Staff*

102A. Human Skeletal Biology. F,W

Presents basic human osteology allowing students to identify skeletal material by element. Emphasizes the dynamic nature of bone by integrating anatomy with a discussion of bone physiology within the context of the human life cycle. Prerequisite(s): course 1. Enrollment limited to 16. A. Galloway

103. Forensic Anthropology. F

Covers the basic analysis of human skeletal remains for the medicolegal profession. Assessment of age, sex, ancestry, and general physical characteristics, trauma, and disease are discussed. Legal responsibilities of the anthropologist are addressed. Prerequisite(s): course 1. Enrollment restricted to juniors and seniors. *The Staff*

104. Human Adaptability. *

Explores the major environmental factors (temperature, altitude, diet, and disease); how they are perceived by the human body; the physiological, micro- and macro-anatomical responses; and how behavior and culture can modify the impact of these stresses. Course 1 is highly recommended as preparation. *The Staff*

106. Primate Behavior and Ecology. W

The nature of primate social systems and social bonds is examined in the light of evolutionary and ecological concepts. Students cannot receive credit for this course and course 206. Prerequisite(s): course 1. A. Zihlman

107. Human Functional Anatomy. S

Study of structure and function of the human body through lectures with an evolutionary perspective including regional anatomy and body systems. Students cannot receive credit for this course and Anthropology 207. (Also

offered as Biology: Molecular Cell & Dev 135. Students cannot receive credit for both courses.) Prerequisite(s): course 1; concurrent enrollment in course 107L required. Enrollment restricted to anthropology and Earth sciences/anthropology combined majors. *The Staff*

107L. Human Functional Anatomy Laboratory. S

Study of structure and function of the human body using dissection, comparative vertebrate anatomy, anatomical models, and computer-assisted instruction. Students are billed a materials fee. Students cannot receive credit for this course and Anthropology 207L. (Also offered as Biology: Molecular Cell & Dev 135L. Students cannot receive credit for both courses.) Prerequisite(s): course 1; concurrent enrollment in course 107 required. Enrollment restricted to anthropology and Earth sciences/anthropology combined majors. Enrollment limited to 20. *The Staff*

110. Comparative Functional Anatomy. *

Comparative and evolutionary anatomy of human performance. Examines locomotor systems and their underlying structure and evolution through videos, skeletons, and dissections in a variety of mammals, primates, and humans. Students are billed a \$45 materials fee. Anthropology of Movement.) Will be offered in 2011–12 academic year. Prerequisite(s): courses 102A or 107 or 185; or by interview. Enrollment limited to 20. A. Zihlman

111. Human Ecology. *

Reviews the environmental, physiological, behavioral, and cultural ways that humans interact with their physical surroundings. The effects of human culture on the environment and of the environment on the shape of human culture is emphasized. *The Staff*

112. Life Cycles. *

Examines the human life cycle using an evolutionary framework. Examines key aspects of the human life stages using findings and concepts from developmental biology, physiology, nutrition, evolutionary ecology, and life-history theory. Prerequisite(s): course 1. *The Staff*

120. Culture in Film. *

Introduces current and historical issues in visual anthropology, using film as a medium with which to represent culture. Raises questions about visual representation and advocacy in the context of global inequalities. Prerequisite(s): course 2 or 80J or Film 20A or 20B, or History of Art and Visual Culture 10D, 10E, 10F or 10G. (General Education Code(s): IM.) S. Errington

120L. Culture in Film Laboratory (2 credits). *

This lab in video production is to train students in Culture in Film. The video lab, through lectures, demonstrations, hands-on instruction, and review of students' work will enable students enrolled in Culture in Film to learn the fundamentals of film/video pre-production, production, and post-production skills. Portfolio review prior to enrollment and concurrent enrollment in course 120 required. Enrollment limited to 15. *The Staff*

123. Psychological Anthropology. S

An introduction to some of the central theoretical issues in psychological anthropology. Psychoanalytic, cognitive, and relativist perspectives on the link between person and society are discussed and compared. Prerequisite(s): course 2. D. Linger

124. Anthropology of Religion. W

Study of the phenomenon of religion as manifested in ethnographic literature, with special attention to traditional and recent modes of analysis of religious behavior. Special topics include myth, religious healing, witchcraft and sorcery, ritual, and millenarian movements. A. Pandey

126. Sexuality and Society in Cross-Cultural Perspective. *

The meaning and social processes associated with sexuality in selected societies. Examination of variations in sexual expressions and control of sexuality, and in economic and political organizations, highlights the interrelationship of sex and society. Prerequisite(s): course 2. *C. Shaw*

127. Ethnographies of Capitalism. *

Challenges approaches to capitalism that treat it as socio-economic relations separable from "culture." Readings include ethnographies demonstrating the inextricability of cultural meanings from capitalist practices. Topics include capitalism's relationship to colonialism, nationalism, socialism, gender, and the commodification of aesthetics. *L. Rofel*

128. Contemporary American Evangelical Cultures. **W**

Study of contemporary, American, born-again Protestant discourse using ethnographic materials and interpretive theories. Topics include biblical literalism, Christian conversion and self-fabulation, charismatic gifts, preaching, sacrificial giving, prosperity theology, apocalypticism, creationism, pro-family and pro-life rhetoric, and televangelism. (Formerly *Born-Again Religion and Culture*.) *S. Harding*

129. Other Globalizations: Cultures and Histories of Interconnection. *

The history of social and cultural interconnections at a global scale. Anthropological approaches to the study of cultural encounter are used to investigate topics such as trade, religion, and citizenship and to evaluate shifting concepts of civilization and barbarism. Prerequisite(s): course 2. *A. Tsing*

130. Ethnographic Area Studies.**130A. Peoples and Cultures of Africa.** *

Survey of sub-Saharan societies. Analysis of principles of social organization and factors of cultural unity of selected western, eastern, central, and southern African peoples. (General Education Code(s): CC, E.) *C. Shaw*

130B. Brazil. **W**

Examines Brazilian culture and its link to interpersonal relationships, religion, politics, and psychological experience. Prerequisite(s): course 2. (General Education Code(s): CC, E.) *D. Linger*

130C. Politics and Culture in China. **S**

Joins substantive information "about" Chinese society and culture with debates in social theory and rethinks conventional wisdom about colonialism and modernity. Topics include representations of "Chineseness," class revolution, Chinese diaspora, popular culture, family and kinship, nationalism, history/memory, race and gender. (General Education Code(s): CC, E.) *N. Chen*

130E. Culture and Politics of Island Southeast Asia. *

Southeast Asia includes a variety of societies exhibiting many ecological adaptations, religions, marriage systems, and experiences with colonial powers. Case studies of particular societies, chosen to reveal variety, are examined comparatively. Emphasis on religion and social organization. Prerequisite(s): course 2. (General Education Code(s): CC, E.) *S. Errington*

130F. African Diasporas in the Americas. *

Focuses on African diasporas of the Caribbean, United States, and Latin America. Themes include: theorizing diaspora, historical formations, slavery, analytical ap-

proaches to cultures of the African diaspora, religion, music, comparative identity formation and racism, gender dynamics, social movements, and transnationalism. (General Education Code(s): CC, E.) *M. Anderson*

130H. Ethnography of Russia and Eastern Europe. **F**

Introduces students to the ethnography of Eurasia, with special attention to the lived experience and legacy of state socialism in this region. Topics include new ideas of personhood, changing economic practices, public health, and international development. (General Education Code(s): CC, E.) *M. Caldwell*

130I. Cultures of India. **S**

An examination of anthropological studies of tribal, rural, and urban cultures of India and a look at changes taking place in India. Prerequisite(s): course 2. Offered in alternate academic years. (General Education Code(s): CC, E.) *T. Pandey*

130J. Politics and Statemaking in Latin America. **W**

Introduction to ethnohistory and political anthropology of one or more Latin American countries: Typically Mexico and one other country. Students explore how contested concepts such as indigeneity, nation or state come to gain credibility and are deployed in contemporary politics. (General Education Code(s): CC.) *A. Mathews*

130L. Ethnographies of Latin America. *

A broad introduction to issues and areas of cultural production and transformation in the Caribbean, Mexico, and Central and South America. Colonial, neocolonial, class, ethnic, gender, religious, ecological, and political relations intersect as represented in ethnographies and film. Prerequisite(s): course 2. (General Education Code(s): CC, E.) *The Staff*

130M. Inside Mexico. **F**

Examines various communities within the Republic of Mexico as represented in ethnographic texts and other forms of cultural production, particularly music and dance. Emphasis on the interplay between the concept of regionalism and national identity. Previous coursework in Mexican culture and/or history strongly recommended. Some reading in Spanish is required. (General Education Code(s): CC, E.) *O. Nájera-Ramírez*

130N. Native Peoples of North America. **F**

A survey of Native American cultures and experience during the past century, with emphasis on Pueblo cultures of the American Southwest. (General Education Code(s): ER, E.) *T. Pandey*

130O. Postcolonial Britain and France. *

Examines politics and culture of postcolonial Britain and France. Topics include: immigration from South Asia and North Africa; racism and anti-racism; minority difference and citizenship practices, with special attention to Muslim minorities. Readings include social theory, ethnographies, novels, and films. (General Education Code(s): CC, E.) *M. Fernando*

130R. Provincializing America. *

Addresses matters of postcolonialism, transnationalism, and sovereignty in the context of the U.S.'s changing status at the turn of the 21st century. Will be offered in 2011–12 academic year. Prerequisite(s): course 2. (General Education Code(s): E.) *M. Wolf-Meyer*

130T. Anthropological Approaches to Islam. *

Analyzes post-colonial forms of Islam, with particular attention to Muslim societies and cultures in the Middle East, North Africa, and Europe. Emphasizes the relationship between power, knowledge, and representation in anthropological approaches to Islam and Muslims. (General Education Code(s): CC, E.) *M. Fernando*

130X. Special Topics in Ethnography. **F,W,S**

This course on special topics in ethnography will be taught on a rotating basis by various faculty members. Precise focus of each year's courses will vary according to the instructor and will be announced by the department. May be repeated for credit. *The Staff*

131. Women in Cross-Cultural Perspective. **S**

Examines the diversity of women's as well as men's roles, experiences, and self-conceptions in a number of societies to explore how women and men shape, and are shaped by, particular forms of social life. Prerequisite(s): course 2. Offered in alternate academic years. *The Staff*

131H. Russian-Language Readings Course: Readings in Anthropology of Russia (2 credits). **F**

Contemporary topics and readings in anthropology of Russia and the former Soviet Union. All readings, films, and other materials are in Russian. Discussions are in English. Accompanies course 130H, Ethnography of Russia and Eastern Europe. Prerequisite(s): course 130H and proof of Russian proficiency in reading and writing. Enrollment by permission of instructor. Enrollment limited to 10. *M. Caldwell*

132. Photography and Anthropology. *

Moving historically from woodcuts and paintings to the World Wide Web, but emphasizing the invention and development of documentary photography, this course explores the world of images depicting society and culture. Major theoretical approaches to "reading" pictures will be emphasized, and students must produce a final project incorporating visual images. Will be offered in 2011–12 academic year. Prerequisite(s): course 2 or History of Art and Visual Culture 10D or 10E or 10F or 10G or Art 30. (General Education Code(s): IM.) *S. Errington*

132L. Photography and Anthropology Laboratory (2 credits). *

This still photography lab trains students in the basic operations and techniques of the camera and the creation of a set of still photographs to use for social documentation. It includes lectures, demonstrations, hands-on instruction, and a continuous review of the students' work in progress. It does not include darkroom work. Will be offered in 2011–12 academic year. Concurrent enrollment in course 132 required. Enrollment restricted to anthropology majors. Enrollment limited to 30. *S. Errington*

133. Narratives of the Popular. **F**

Addresses the increasing importance of popular culture as the terrain upon which to address issues of culture and power. Emphasizes an ethnographic approach to popular culture as sociocultural phenomena. Students learn about a variety of activities including television and film viewing, music, fashion, photography, postcards, comic books, and urban spatial relations and architecture. Offered in alternate academic years. *The Staff*

134. Medical Anthropology: An Introduction. **F**

Cross-cultural study of health, disease, and illness behavior from ecological and ethnomedical perspectives. Implications for biomedical health care policy. Prerequisite(s): course 2. *N. Chen*

135A. Cities. *

Examines cities from an anthropological perspective. Reviews pertinent social scientific literature of the 19th and early 20th centuries. Surveys the concepts and methods used by contemporary anthropologists to investigate urban phenomena. *The Staff*

136. The Biology of Everyday Life. S

Addresses cross-cultural attitudes to the human body and its everyday biological concerns: sleeping, eating, breathing, sex, and defecation. Prerequisite(s): course 2. *M. Wolf-Meyer*

137. Consuming Culture. *

Explores consumption as a cultural form. Beginning with theories of capitalism and exchange, it then focuses on sites and modes of consumption and display such as department stores, museums and zoos, advertisements and photography, cultural tourism. *M. Caldwell*

138. Political Anthropology. W

The ideas, in selected non-Western societies, about the nature of power, order, social cohesion, and the political organization of these societies. (Also offered as Legal Studies 138. Students cannot receive credit for both courses.) Offered in alternate academic years. *T. Pandey*

139. Language and Culture. W

Examination of language system and language use in relationship to cultural contexts of communication in Western and non-Western societies. Topics include the Sapir-Whorf linguistic relativity hypothesis; linguistic constructions of gender; speech variation in relation to class, ethnicity, and national identity; and the emergence of self in communicative acts. Prerequisite(s): course 2. *D. Brenneis*

142. Anthropology of Law. *

An ethnographically informed consideration of law, dispute management, and social control in a range of societies including the contemporary U.S. Topics include conflict management processes, theories of justice, legal discourse, and relations among local, national, and transnational legal systems. (Also offered as Legal Studies 142. Students cannot receive credit for both courses.) Enrollment restricted to anthropology and legal studies majors. *D. Brenneis*

143. Performance and Power. W

Explores relationships between power and performance forms and media, both "traditional" and emergent. Links aesthetics with politics, and recent transcultural exchanges with local circumstances and consequences. Prerequisite(s): course 2 or any other Anthropology course. *D. Brenneis*

144. Anthropology of Poverty and Welfare. F

Examines phenomena of poverty and welfare in cross-cultural perspective with an emphasis on critical ethnographies and social analyses of social pathologies, economic systems, and community. Topics include informal economies, labor, household systems, social-support networks, and public policies. *M. Caldwell*

145X. Special Topics in Socio-Cultural Anthropology. F,W,S

Taught annually on a rotating basis by faculty members. Each year's topic varies by instructor and is announced by the department. May be repeated for credit. *The Staff*

146. Anthropology and the Environment. F

Examines recent approaches to study of nature and the environment. Considers historical relationship between nature, science, and colonial expansion as well as key issues of contemporary environmental concern: conservation, environmental justice, and social movements. Prerequisite(s): course 2. (General Education Code(s): PE-E.) *A. Mathews*

148. Gender and Development. *

Uses the critical tools of feminist theory and cultural anthropology to look at how global development discourses and institutions mobilize, reinforce, and challenge systems of gender-based inequality. Topics include non-governmental organizations (NGOs), development practice, microcredit, and technocrat cultures. (Also offered as Feminist Studies 148. Students cannot receive credit for both courses.) *M. Moodie*

150. Communicating Anthropology. F

Encourages anthropology majors to explore different means of communicating anthropology with much attention to individual writing and presentation skills. Intensive work on library research; recognizing, comparing, and making arguments; and analyzing ethnographies, articles, reviews, and films. Prerequisite(s): two of the following courses: 1, 2, or 3; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to sophomore and junior anthropology majors. (General Education Code(s): W.) *D. Rutherford*

151. Workshop in Ethnography. W

Through demonstration, practice, and participation, acquire skills in collecting and analyzing cultural data. Work with members of other cultures and with each other to learn to identify significant cultural patterns. Lectures and readings provide added perspective and a theoretical base. Prerequisite(s): course 2. Enrollment limited to 20. *M. Wolf-Meyer*

152. Survey of Cultural Anthropological Theory. W

Major figures, ideas, and writings in 19th- and 20th-century cultural anthropology surveyed. Prerequisite(s): course 2 and satisfaction of the Entry Level Writing and Composition requirements; enrollment restricted to anthropology majors. (General Education Code(s): W.) *M. Anderson*

153. Medicine and Colonialism. W

Addresses the overlapping relationship between medicine and colonialism in the 19th century, with attention to post-colonial theory and contemporary studies of post-colonial medical pluralism in the 20th century. Prerequisite(s): courses 2 and 134. *M. Wolf-Meyer*

154. Multimedia Ethnography. S

Students learn the fundamentals of photography or video production and audio recording in order to create mini-ethnographies. Prerequisite(s): courses 1, 2, and 3. Concurrent enrollment in course 154L is required. Enrollment restricted to anthropology majors. Enrollment limited to 40. *S. Errington*

154L. Multimedia Laboratory (2 credits). S

Designed to instruct in aesthetics and technical production of a short digital slideshow. Using iMovie3 editing program, produce a digital slideshow incorporating sound (narration, music, and sound effects) and still images. Concurrent enrollment in course 154 required. Enrollment limited to 12. *S. Errington*

155. Cultural Encounters. *

Explores cross-cultural encounters through a combination of theoretical and ethnographic texts. Various faculty members teach on a rotating basis. The focus of each year's course(s) varies according to the instructor and will be announced by the department. Will be offered in 2011-12 academic year. Prerequisite(s): course 2 or permission of instructor. May be repeated for credit. *The Staff*

157. Modernity and Its Others. *

Beginning with the conquest of the Americas, considers how Western thinkers have explained seemingly "irrational"

ways of being and thinking (like witchcraft, human sacrifice, and bodily mutilation), and asks how we interpret beliefs and practices radically different from our own. *M. Fernando*

159. Race and Anthropology. *

Examines concept of race in anthropology. Begins with histories of race in anthropology; turns to contemporary analysis of racism, identity formation, and diaspora; and concludes with current debates on the validity of "race" as an object of analysis. (General Education Code(s): ER.) *M. Anderson*

163. Kinship. F

Provides a critical survey of debates, old and new, in the study of kinship. Readings range from classical treatments to recent reformulations that use kinship as a lens for exploring intimacy, memory, futurity, embodiment, commodification, and power. Students cannot receive credit for this course and course 263. *D. Rutherford*

170. History of Archaeological Theory. F

Historical review of prehistoric archaeology from antiquarianism to the present. Emphasis on development of archaeological theory and its relation to evolutionary and anthropological theory. Students cannot receive credit for this course and course 270. Prerequisite(s): course 3; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to anthropology and Earth sciences/anthropology combined majors. Recommended for juniors. (General Education Code(s): W.) *D. Gifford-Gonzalez*

172. Archaeological Research Design. W

Introduces theories and methods for recovering and analyzing archaeological data. Critically explores the nature of archaeological evidence and how archaeologists know what they know. Strongly recommended for those contemplating further studies in archaeology. Will be offered in 2011-12 academic year. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, course 3, and one upper-division archaeology course. Strongly recommended for those contemplating further studies in archaeology. Enrollment limited to 25. Offered in alternate academic years. (General Education Code(s): W.) *C. Blackmore*

173. Origins of Farming. S

Survey of the ecological and archaeological evidence for the origins of plant and animal domestication in Africa, Eurasia, and the Americas. Discussion will center on the preconditions of this drastic alteration in human ecology and its consequences in transforming human societies. Open to nonmajors. Students cannot receive credit for this course and course 273. Offered in alternate academic years. *D. Gifford-Gonzalez*

174. Origins of Complex Societies. S

Deals with evidence and theories concerning the origins of complex society; the transition from egalitarian, foraging societies to the hierarchical, economically specialized societies often referred to as "civilizations." Focuses on both Old World and New World cultures. Prerequisite(s): course 3. *C. Blackmore*

175A. African Archaeology: 2.5 Million BP to Farming. *

Archaeological history of Africa from the first 2.5 million-year-old artifacts to the emergence of African pastoralism and farming. Disciplinary models and assumptions critically examined in their historic and political contexts. Students cannot receive credit for this course and course 275A. (Formerly *African Archaeology*.) Prerequisite(s): course 3 or by permission of instructor. Enrollment restricted to junior and senior anthropology and Earth sci-

ences/anthropology combined majors. Enrollment limited to 45. *D. Gifford-Gonzalez*

175B. African Complex Societies. *

Introduces the evolution of African kingdoms and states from the emergence of farming communities to initial contact with Europe. Particular attention paid to the origins of social inequality and the evolution of centralized polities. Students cannot receive credit for this course and Anthropology 275B. Prerequisite(s): course 3; course 175A strongly recommended. *J. Monroe*

176A. North American Archaeology. S

Development of Native cultures in North America. Topics include peopling of the New World, early foragers, spread of agriculture and complex societies in the Southwest and Eastern Woodlands, and review of cultural developments in the West and Far North. Prerequisite(s): course 3 or consent of instructor. *J. Habicht-Mauche*

176B. Meso-American Archaeology. F

Review of the archaeological and ethnohistorical evidence for the origins and development of pre-Columbian civilizations in Meso-America including the Olmec, Maya, Zapotec, Mixtec, Teotihuacan, Toltec, Tarascan, and Aztec. Will be offered in the 2009–2010 academic year. Prerequisite(s): course 3. *C. Blackmore*

177. European Conquest of the Americas. *

Uses ethnographic, archaeological, and historical sources to examine the clash of cultures between Native Americans and Europeans during the 15th through 19th centuries. Focuses on the social, political, and demographic impacts of contact on Native American societies. Prerequisite(s): courses 2 and 3. Enrollment limited to 34. *J. Habicht-Mauche*

178. Historical Archaeology: A Global Perspective. W

Introduces archaeology of European colonialism and the early-modern world. Topics include historical archaeological methods; the nature of European colonial expansion in New and Old Worlds; culture contact and change; and power and resistance in colonial societies. Students cannot receive credit for this course and Anthropology 278. Prerequisite(s): course 3 or consent of instructor. *J. Monroe*

180. Ceramic Analysis in Archaeology. *

Focuses on theories and techniques used by archaeologists to bridge the gap between the recovery of ceramic materials and their interpretation within cultural contexts. Topics include the origins of pottery, production methods, classification and typology, seriation, functional analysis, materials analysis and description, organization of production, trade, and the analysis of style. Students are billed a \$25 materials fee. Students cannot receive credit for this course and course 280. Prerequisite(s): course 3. Concurrent enrollment in course 180L required. Enrollment restricted to anthropology majors. *The Staff*

180L. Ceramic Analysis Laboratory (2 credits). *

Practicum in ceramic materials analysis and description. Students perform material experiments in materials selection and processing, hand-building techniques, and open-pit firing. Demonstrations of standard techniques of attribute analysis and the mineralogical and chemical characterization of ceramic materials are presented. Students cannot receive credit for this course and course 280L. Prerequisite(s): course 3. Concurrent enrollment in course 180 required. Enrollment restricted to anthropology majors. Enrollment limited to 16. *The Staff*

182A. Lithic Technology. *

Introduction to lithic and ceramic analysis in archaeology. Includes lab analysis, discussions of classification and

typology, and exploration of the concept of style as it relates to ceramics and lithics in archaeology. Prerequisite(s): course 3. Enrollment limited to 20. *The Staff*

184. Zooarchaeology. F

Lectures and seminar on archaeological faunal analysis. Topics include mammalian evolution and osteology, vertebrate taphonomy, reconstruction of human diet from faunal remains, foraging strategy theory, data collection and management, and methods of quantitative analysis. Students cannot receive credit for this course and course 284. Prerequisite(s): course 3. Offered in alternate academic years. *D. Gifford-Gonzalez*

185. Osteology of Mammals, Birds, and Fish. W

Practicum in archaeological faunal analysis. Students learn to identify bones of all larger mammal species of central California plus selected bird and fish species. Students cannot receive credit for this course and course 285. Prerequisite(s): courses 184 or 102 or Biology 138/L or Earth Sciences 100 or Environmental Studies 105/L, and permission of instructor. Enrollment limited to 16. Offered in alternate academic years. *D. Gifford-Gonzalez*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Students submit petition to sponsoring agency. *The Staff*

193. Field Study. F,W,S

Students submit petition to sponsoring agency. *The Staff*

194. Senior Seminar.

194A. Community. *

Critically considers four concepts of community: community as place, community of interests, community as social relations, and community as intentional goal. Students examine internal dynamics of communities, social relations between communities in complex societies, and the successes and failures of particular intentional communities. Will be offered in 2011–12 academic year. Prerequisite(s): courses 1, 2, and 3, and satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 20. (General Education Code(s): W.) *C. Shaw*

194B. Chimpanzees: Biology, Behavior, and Evolution. *

Explores studies on wild and captive chimpanzees with reference to other apes and humans. Topics include sociality, tool using, locomotion, traditions, and life history; social and physical dimensions of growth and development; language studies, genetics, and applications to human evolution. Prerequisite(s): courses 1, 2, and 3; satisfaction of the Entry Level Writing and Composition requirement. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *A. Zihlman*

194D. Tribes/Castes/Women. *

Examines historical constructions and contemporary deployments of the categories that have structured popular and anthropological understandings of social life in South Asia, particularly those of "tribe," "caste," and "women." Students gain familiarity with the mobilization of these categories in contemporary political movements across India. Prerequisite(s): courses 1, 2, and 3. Satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Moodie*

194F. Memory. *

Intensive and fast-paced seminar focusing on theoretical and ethnographic studies of memory as a means for

dealing with the past. Examines how ordinary people and societies have coped with the past through acts of selective remembering and forgetting. Will be offered in 2011–12 academic year. Prerequisite(s): courses 1, 2, and 3; satisfaction of the Entry Level Writing and Composition requirement. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *D. Linger*

194G. Politics and Secularism. *

Examines secularism as political doctrine and practice of government. Topics include: transformation of religion by secularization; forms of inclusion/exclusion enacted by secularism; relationship between secularism and colonial rule. Case studies drawn from Europe, South Asia, United States, and the Middle East. Prerequisite(s): courses 1, 2, and 3, and satisfaction of the Entry Level Writing and Composition requirements; enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Fernando*

194I. Consumption and Consumerism. *

Investigates cultural analysis of consumer society, commodities, and consumer practices. Students develop their own research projects. Themes include: critiques of consumer society; symbolic analysis of goods, consumption as resistance, anthropologies of marketing, culture jamming; consumption and (post) colonialism. Prerequisite(s): courses 1, 2, and 3; satisfaction of the Entry Level Writing and Composition requirement. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Anderson*

194K. Reading Ethnographies. *

Explores issues in the representation of culture through reading and discussing ethnographies. Recent experimental ethnographies open topics including the relation between fieldwork and writing, textual strategies, and the politics of ethnographic writing and research. Prerequisite(s): courses 1, 2, and 3; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *S. Harding*

194L. Archaeology of the African Diaspora. F

Senior seminar on African diaspora archaeology. Draws on archaeological, historical, and anthropological perspectives to examine the cultural, social, economic, and political lives of Africans and their descendants in the New World and West Africa from the 15th through 19th centuries. Prerequisite(s): courses 1, 2, 3; satisfaction of the Entry Level Writing and Composition requirement. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *J. Monroe*

194M. Medical Anthropology. *

Focuses on critical issues in the social sciences of health and healing. Designed for students pursuing graduate work in medical anthropology and/or public health. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 1, 2, 3, and 134. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Wolf-Meyer*

194N. Comparison of Cultures. S

Seminar for upper-division students interested in theories and methodology of social and cultural anthropology. Devoted to critical discussion of different methods of comparison practiced in anthropology.

Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; courses 1, 2, and 3. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *T. Pandey*

194P. Space, Place, and Culture. *

Examines ways anthropologists have studied relationship between space, place, and culture. Covers early formulations acknowledging people in different cultural contexts ascribe particular meanings to places and to the concept of space and then traces the ways these questions have come to the fore in more recent scholarship. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Wolf-Meyer*

194Q. Race, Ethnicity, Nation. F

Provides students with theoretical and methodological approaches to studying the relationships between race, ethnicity, and nation, with a comparative focus on the United States, Latin America, and Europe. Students use ethnographic methods and/or discourse analysis to develop individual research projects. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and courses 1 and 2 and 3. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Anderson*

194R. Religion, Gender, Sexuality. S

Examines religion in relation to gender and sexuality. Examines how gender, sexuality, and religion intersect in notions of civilization, progress, and modernity in the contemporary and colonial periods. Particular attention paid to Islam, Christianity, and Hinduism. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and courses 1 and 2 and 3. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Fernando*

194S. Hearing Culture: The Anthropology of Sound. *

Explores relationships between culture and acoustic worlds—environmental, verbal, and musical—within which we live. How sound is shaped by human belief and practice and the role sound plays in cultural and social life, both past and present. Will be offered in 2011–12 academic year. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 1, 2, and 3. Enrollment restricted to senior anthropology majors. Enrollment limited to 15. (General Education Code(s): W.) *D. Brenneis*

194T. Poverty and Inequality. *

Through ethnographies about homelessness, food deprivation, and unemployment, examines the institutions through which poverty is recognized, the systems of morality shaping debates about need and appropriate behavior, and the effects of community responses to poverty. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 1, 2, and 3. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Caldwell*

194U. Environmental Anthropology: Nature, Culture, Politics. W

Presents key readings in environmental anthropology focusing on environmental conflicts. Students guided in developing research paper on a society environ-

ment topic of their choice. Class is writing intensive with in-class discussion and final presentations. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *A. Mathews*

194V. Picturing Cultures. F

A historical, analytical, and practical exploration of the uses of still and moving pictures in ethnographic representations, research, and production. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 1, 2, and 3; and course 80J, 120, 132, or 154. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *S. Errington*

194X. Women in Politics: A Third World Perspective. F

Focuses cross-culturally on the status of women in the Third World and their formal and informal participation in politics. Also discussed are organized efforts, through participation in both national and autonomous movements, for women's rights. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 1, 2, and 3. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *The Staff*

194Y. Archaeologies of Space and Landscape. *

Examines contemporary archaeological perspectives on space and landscape. Focuses on how archaeology can contribute to an appreciation of the economic, cultural, and political factors that shape human perception, use, and construction of the physical world. Prerequisite(s): courses 1, 2, 3, and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *J. Monroe*

194Z. Emerging Worlds. S

Addresses encounters and contact zones between cultures that give rise to "emerging worlds." "Emerging worlds" refers to the cultural heterogeneity and diversity created within world-making networks, geographies, innovations, and meanings, moving us beyond ideas about vanishing, autonomous cultures. Prerequisite(s): courses 1, 2, and 3, and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior anthropology majors. Enrollment limited to 20. (General Education Code(s): W.) *L. Rofel*

197. Laboratory Tutorial. F,W,S

Independent laboratory research on selected topics in archaeology and physical anthropology. Interview with appropriate instructor required. May be repeated for credit. *The Staff*

197F. Laboratory Tutorial (2 credits). F,W,S

Independent laboratory research on selected topics in archaeology and physical anthropology. Interview with appropriate instructor required. Enrollment restricted to anthropology majors. May be repeated for credit. *D. Gifford-Gonzalez, A. Zihlman, J. Monroe, A. Galloway, N. Dominy, J. Habicht-Mauche*

198. Independent Field Study. F,W,S

Off-campus field study. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Theoretical Foundations of Physical Anthropological Research. *

Provides historical and theoretical foundation of physical anthropology. Grounds students in the changing frameworks and perspectives during the last 150 years regarding questions in human biology, evolution, nature, and culture, by examining texts and scientific journals. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

200A. Core Graduate Course (10 credits). F

Introduces history, ethnography, and theory of cultural anthropology with emphasis on awareness of construction of anthropological canon and areas of conflict within it, leading up to contemporary debates on a variety of issues. Two-term course: students must enroll in both quarters. Enrollment restricted to anthropology graduate students. Enrollment limited to 12. *D. Brenneis*

200B. Core Graduate Course. W

Introduces history, ethnography, and theory of cultural anthropology with emphasis on awareness of construction of anthropological canon and areas of conflict within it, leading up to contemporary debates on a variety of issues. Multiple-term course; students must enroll in both quarters to receive academic credit. Enrollment restricted to anthropology graduate students. Enrollment limited to 12. *L. Rofel*

201. Human Evolution. *

Provides an overview of the first five million years of human evolution and a framework for studying evolution and reconstructing the human past. Emphasizes that all lines of evidence must be included: hominid fossils, archaeology, paleoecology, and molecular data. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

202A. Skeletal Biology. F,W

Focuses on human skeletal biology, the identification of elements, physiology of hard tissue formation, growth, and maintenance. Students are required to show competence in skeletal identification to pass this class. Prerequisite(s): course 102A or permission of instructor. Enrollment restricted to graduate students. Enrollment limited to 5. *A. Galloway*

206. Primate Behavior. W

An overview of primate evolution and review of the major groups of primates in terms of their ecological, locomotor, dietary, and social adaptations. Theoretical frameworks, such as behavioral ecology, sexual selection, and life history, are evaluated from long-term studies of primate behavior. Students cannot receive credit for this course and course 106. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Zihlman*

207. Human Functional Anatomy. S

Study of the human body from molecules to organ systems, emphasizing evolution and medical applications. Students cannot receive credit for this course, course 107, and Biology 135. Concurrent enrollment in course 207L required. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

207L. Human Functional Anatomy Laboratory. S

Study of the human body using dissection and comparative anatomy exercises for advanced anatomy students. Students are billed a laboratory fee. Students cannot receive credit for this course, course 107L, and Biology 135L. Concurrent enrollment in course 207 required. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

208A. Ethnographic Practice. S

Introduces graduate students to the practice of fieldwork. Students design and carry out a quarter-long research project exploring a range of methods and producing an analytical case study. Readings and discussion emphasize both methodological critique and successful implementation. Enrollment restricted to anthropology graduate students. Enrollment limited to 15. *O. Nájera-Ramírez*

208L. Video Laboratory (2 credits). S

Provides students with hands-on training with a variety of audiovisual equipment. Through lectures, demonstrations, hands-on field exercises, and review of students' media exercises, students learn the fundamentals of photography, video production, and audio recording in the field. Concurrent enrollment in course 208A required. Enrollment restricted to anthropology graduate students. Enrollment limited to 15. *O. Nájera-Ramírez*

211. Human Ecology. *

Reviews environmental, physiological, behavioral, and cultural ways that humans interact with their physical surroundings. Effects of human culture on the environment, and of the environment on the shape of human culture will be emphasized. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

212. The Human Life Cycle. *

Examines the human life cycle using an evolutionary framework. Examines key aspects of the human life stages using findings and concepts from developmental biology, physiology, nutrition, evolutionary ecology, and life history theory. These stages include: gestation, infancy, childhood, juvenile and adolescent periods, and senescence. Each stage of the life cycle is compared and contrasted with the developmental life of nonhuman primates and mammals. Other related topics include developmental plasticity and epigenetics. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

225. The Anthropology of Things: Sign, Gift, Commodity, Tool. S

Examines some approaches used by anthropologists and other thinkers to bring things into focus: as gifts, signs, commodities, and tools. Explores whether, by taking things seriously, anthropologists might learn to be empirical in new ways. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Rutherford*

228. Grant Writing. F

Devoted entirely to writing grant proposals. Students either work on their graduate education fellowships or their doctoral dissertation grants or both. Reading materials consist of granting agency documents plus examples of successful applications. Enrollment restricted to anthropology graduate students. Enrollment limited to 15. May be repeated for credit. *C. Shaw*

229. Constructing Regions. W

Discusses centrality of the idea of "regions" in studies of culture, the history of "locating" social theory, and debates about area studies. Students develop area of transregional bibliographies. Primarily for second- or third-year anthropology graduate students reading "area" literatures. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Anderson*

231. Intimacy and Affective Labor. S

Examines recent work on the role of intimacy and affective labor in value production, political mobilization, and transnational capital linkages. Special attention given to how these terms are invoked to answer methodological and narrative concerns in ethnographic writing. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Moodie*

238. Advanced Topics in Cultural Anthropology. *

Advanced topics in cultural anthropology. Current topics in anthropological theory and ethnography taught on a rotating basis by various faculty members. Precise focus of each seminar varies and will be announced by the department. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Linger*

241. Social Justice. W

Explores theoretical and methodological issues in the field of social justice with an emphasis on ethnographic analysis. Topics include: rights, obligations, justice, equality, compensation, and ethics. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Caldwell*

248. Shadowy Dealings: Anthropology of Finance, Money, and Law. *

Moves from a brief introduction to classic economic anthropology to recent work on histories of money and capitalism and cultures of financial markets, of accounting, and of legal and illegal trading practices. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Mathews*

249. Ecological Discourses. *

Explores narratives of nature and their practical consequences in contests over "wild places" and their resources. Readings focus on the histories of forests and on analytic frameworks—ecology, social history, interpretation, cultural studies—with which to investigate competing constructions of the environment. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Tsing*

252. Survey of Cultural Anthropological Theory. W

Major figures, ideas, and writing in 19th- and 20th-century cultural anthropology surveyed. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Anderson*

253. Advanced Cultural Theory. F

Examines cultural anthropology's interdisciplinary practices of knowledge formation at an advanced level. Drawing on various types of theoretical texts, the course elaborates on the relationship between culture and power, taking up different themes each time it is taught. Enrollment restricted to graduate students. Enrollment limited to 15. *S. Harding*

255. Anthropology of Secularism. *

Examines secularism as a practice of government with a concomitant set of ethics. Topics include: the notion of religion necessary for secularism; forms of moral and political inclusion/exclusion enacted by secular governance; and the kind of ethical subject secularism engenders. Will be offered in 2011–12 academic year. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

256. International Developmental Aid. *

Explores theoretical and methodological issues in the field of international development, with an emphasis on ethnographic analysis. Topics include hierarchies of value, altruism and philanthropy, geographies of dependency and responsibility, ethics of compassion, and public anthropology. Will be offered in 2011–12 academic year. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Caldwell*

257. Cultures of Science, Science as Culture. *

What makes the anthropology of science particular? To pose this question and seek answers, course considers early and contemporary ethnographies of science, medicine, and technology alongside contributions by philosophers of science. Will be offered in 2011–12 academic year. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Wolf-Meyer*

258. Experimental Cultures. *

Addresses the use of experiments in anthropological research, theory, and writing. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Wolf-Meyer*

260. Anthropology of Freedom. *

Examines conceptualizations and practices of freedom across geographical space and historical time. Readings drawn from Greek philosophy, Islamic, Christian, and Buddhist religious traditions. Enlightenment philosophy, liberal and neo-thought, and contemporary ethnographies. Enrollment restricted to graduate students. *M. Fernando*

261. Replication, Mimesis, and Fakeness. W

Replicas, copies, and fakes anchored conceptually by the authentic/original enable the marketing of cultural commodities like arts and crafts, especially since the advent of photography. Course explores these commercial and signifying processes in the global art and culture market. Enrollment restricted to graduate students. Enrollment limited to 15. *S. Errington*

263. Kinship. F

Provides a critical survey of debates, old and new, in the study of kinship. Readings range from classical treatments to recent reformulations that use kinship as a lens for exploring intimacy, memory, futurity, embodiment, commodification, and power. Students cannot receive credit for this course and course 163. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Rutherford*

268A. Rethinking Capitalism. S

Readings include works by speakers at UCSC's "Rethinking Capitalism Initiative." Topics are: (1) financialization versus commodification (how options-theory has changed capitalism); (2) material markets (how this theory performs); and (3) valuation and contingency (how economies make worlds). Enrollment restricted to graduate students. Enrollment limited to 15. *R. Meister*

270. History of Archaeology. F

Historical review of prehistoric archaeology from antiquarianism to the present. Emphasis on the development of archaeological theory, its relation to evolutionary and anthropological theory, and themes ongoing over time. Students cannot receive credit for this course and course 170. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Monroe*

273. Origins of Farming. S

Survey of the ecological and archaeological evidence for the origins of plant and animal domestication in Africa, Eurasia, and the Americas. Discussion will center on the preconditions of this drastic alteration in human ecology and its consequences in transforming human societies. Students cannot receive credit for this course and course 173. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Gifford-Gonzalez*

275A. Seminar on Early African Archaeology. *

Tutorial on archaeology of Africa, from 2.5 million years ago to emergence of African pastoralism and farming. Weekly examination of disciplinary models and assumptions in historic context, emphasizing overarching themes in prehistoric archaeology. Students cannot receive credit for this course and course 175A. (Formerly *Tutorial on African Archaeology*.) Enrollment restricted to graduate students or by consent of instructor. Enrollment limited to 15. *D. Gifford-Gonzalez*

275B. Tutorial in Archaeology of African Complex Societies. *

Graduate tutorial on the archaeology of precolonial African kingdoms and states. Particular attention paid toward

the origins of social inequality and the evolution of centralized polities. Students cannot receive credit for this course and course 175B. Prerequisite(s): Enrollment restricted to graduate students. Enrollment limited to 15. *J. Monroe*

276A. Advanced Topics in North American Archaeology. F

In-depth examination of development of Native cultures in North America from end of last ice age to time of European contact. Focuses on specific regional trajectories and problems of social change. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Habicht-Mauche*

278. Tutorial on Historical Archaeology. W

Tutorial on archaeology of European colonialism and the early-modern world. Focuses on the nature of European colonial expansion in New and Old Worlds; culture contact and change; and power and resistance in colonial societies. Students cannot receive credit for this course and course 178. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Monroe*

280. Advanced Ceramic Analysis. *

Advanced graduate seminar that focuses on techniques and theories used to bridge the gap between the recovery of ceramic remains from archaeological contexts and their interpretation with respect to various anthropological issues and problems. Students cannot receive credit for this course and course 180. Enrollment restricted to graduate students. Concurrent enrollment in Anthropology 280L required. Enrollment limited to 5. *J. Habicht-Mauche*

280L. Advanced Ceramic Analysis Laboratory (2 credits). *

Emphasizes advanced techniques of ceramic analysis, including materials selection and processing, hand-building, and open-pit firings. Standard techniques for describing and measuring formal and technological attributes of pottery also presented. Students cannot receive credit for this course and course 180L. Enrollment restricted to graduate students. Concurrent enrollment in Anthropology 280 required. Enrollment limited to 5. *J. Habicht-Mauche*

284. Tutorial in Zooarchaeology. F

Lectures and seminar on archaeological faunal analysis. Topics include: mammalian evolution and osteology; vertebrate taphonomy; reconstruction of human diet from faunal remains; foraging strategy theory; data collection and management; and methods of quantitative analysis. Students cannot receive credit for this course and course 184. (Formerly *Zooarchaeological Research Design*.) Enrollment restricted to graduate students. *D. Gifford-Gonzalez*

285. Osteology of Mammals, Birds, and Fish. W

Practicum in vertebrate osteology, covering all larger mammal species of central California, plus selected bird and fish species, and topics in evolution and ecology of selected taxa. Students cannot receive credit for this course and course 185. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Gifford-Gonzalez*

286. Zooarchaeological Research Design. *

Seminar on research design in zooarchaeology using archaeological monographs and clusters of related research papers. Students produce a research design in the form of a draft NSF research proposal based on the use of archaeofaunal materials. Will be offered in 2011–12 academic year. Prerequisite(s): course 284; or an equivalent advanced course on zooarchaeological theory and method, and permission of the instructor. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Gifford-Gonzalez*

287. Advanced Topics in Archaeology. W

A graduate seminar on advanced theoretical or methodological topics pertinent to advanced graduate student and faculty interests. Enrollment restricted to graduate students or by consent of instructor. Enrollment limited to 12. *J. Monroe*

292. Graduate Colloquium (2 credits). F,W,S

Designed to offer an institutionalized mechanism for the presentation of research papers and teaching efforts by faculty and advanced graduate students. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

294N. Comparison of Cultures. S

Seminar for students interested in theories and methodology of social and cultural anthropology devoted to critical discussion of different methods of comparison practiced in anthropology. Enrollment restricted to graduate students. Enrollment limited to 15. *T. Pandey*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. *The Staff*

298. Advanced Laboratory Apprenticeship. F,W,S

Supervised tutorial in specialized analytic methods in archaeology or physical anthropology. Students collaborate on laboratory research with a departmental mentor or, with advisor's consent, with researchers on or off campus, preparing a manuscript for publication or an extensive literature review. Permission of instructor required. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Prerequisite(s): petition on file with sponsoring agency. *The Staff*

Applied Mathematics and Statistics

See Engineering, page 225.

Art

Elena Baskin Visual Arts Studios
Room E-104
(831) 459-2272
visart@ucsc.edu
<http://art.ucsc.edu>

Faculty and Professional Interests

Professor

PATRICK AHERNE, Emeritus

JOYCE BRODSKY, Emerita

DOYLE FOREMAN, Emeritus

FRANK GALUSZKA
Painting, book arts

HARDY HANSON, Emeritus

FRED A. HUNNICUTT, Emeritus

NORMAN LOCKS
Photography

DOUGLAS E. MCCLELLAN, Emeritus

JENNIE LIND McDADE, Emerita

KATHRYN E. METZ, Emerita

JASPER A. ROSE, Emeritus

ELIZABETH STEPHENS
Intermedia, electronic art, sculpture, and performance art

DONALD L. WEYGANDT, Emeritus

DAVID YAGER

Photography, design, print media

JACK ZAJAC, Emeritus

Associate Professor

ELLIOT ANDERSON

Electronic art, digital arts/new media

E. G. CRICHTON

Intermedia, electronic arts, photography, installation

MELISSA GWYN

Painting, drawing

DEE HIBBERT-JONES

Public art, sculpture

JIMIN LEE

Etching, lithography, monoprinting, book arts, ukiyo-e

JENNIFER PARKER

Sculpture, installation, video, and performance art

LEWIS WATTS

Photography

Lecturer

KEN ALLEY

Photography

SUSAN FRIEDMAN

Photography

HANNA HANNAH

Drawing, painting

MIRIAM HITCHCOCK

Drawing, painting

KATHLEEN PERRY

Intermedia, photography, sculpture

PAUL RANGELL

Lithography, drawing

RICHARD WOHLFEILER

Printmaking, theory, drawing

Program Description

The Art Department offers an integrated program of study in theory and practice exploring the power of visual communication for personal expression and public interaction. The department provides students with the means to pursue this exploration through courses that provide the practical skills for art production in a variety of media within the contexts of critical thinking and broad-based social perspectives.

The art program at UCSC is composed of courses in drawing, painting, photography, sculpture, print media, intermedia, critical theory, electronic art, public art, and interactive technologies. Baskin visual arts studios provide world-class facilities for art production in these areas. The Art Department is committed to pursuing a continuing dialogue about what constitutes basic preparation in the arts while offering students experience in established practices, new genres, and new technologies. Foundation courses are open to all non-art students after priority enrollment. Art and pre-art majors have enrollment priority in all art courses. Non-art majors may enroll in art courses on the first day of class if space permits.

Students graduating with a major in art may become professional artists or pursue careers in such diverse areas

as arts management, museum and gallery practices, communication technologies, public school teaching, media arts, and publishing. Many students who want to teach at the college level continue their education in graduate school.

Declaring the Pre-Art Major

Students must declare the pre-art major in order to enroll in introductory studio courses. Students should declare their pre-art major in the first quarter of their freshman year to insure their ability to enroll in studio courses. Students who declare early in their sophomore year may not be able to complete the major in three years. Juniors cannot declare pre-art. Students may declare the pre-art major at any time. Please note that students who have declared the pre-art major still need to follow the procedure for acceptance to the full major; a student may not graduate as a pre-art major.

Acceptance to the Art Major—Freshmen

Students may apply for admission to the art major after completing at least three lower-division studio courses at UCSC (not foundation courses) with grades of B or better. If one of these classes is graded B- or lower, the student must take a different lower-division studio course and receive a B to be eligible to declare art. Students cannot take more than four lower-division studio classes to obtain the requisite B grades. Failure to achieve three Bs in four attempts triggers a process of advising whose outcome is either an alternative path to success or exclusion from the major. While completing this lower-division course work, it is critical that each student meet with a faculty adviser regarding the student's potential to proceed to the major level.

Acceptance to the Art Major—Junior Transfer Students

Junior transfer students are accepted into the art major for fall quarter after passing a portfolio review in early April. Their acceptance is contingent upon their acceptance to UCSC. Acceptance to UCSC does not guarantee admittance to the art program, nor does passing the portfolio review guarantee that UCSC will accept the student to the university. Transfer students must identify themselves as potential art majors when applying to the university in order to receive information on the portfolio review deadlines and the materials required for the review. All junior transfers will be required to take Art 160, *Forms and Ideas*, and one art seminar in their junior year at UCSC in lieu of the first-year foundation program requirements. Junior transfer students who do not pass the portfolio review will not be allowed to take art classes at UCSC during the fall, winter, and spring quarters. Consequently, if accepted to UCSC, it is imperative that students realize they must pursue another major. Students will be notified of the results of the review before they need to submit their Statement of Intent to Register for UCSC.

Requirements for the Art Major

The minimum requirements for the art major are completion of six lower-division and eight upper-division courses and satisfaction of the senior comprehensive requirement. A maximum of three courses total from outside the Art Department (including UC Education Abroad Program (EAP) courses) may be substituted for regular art courses with the approval of a major adviser. In these courses, students must have received a grade of B or higher. Students should plan carefully when using this option.

Students plan their course of study in consultation with a faculty adviser.

Lower-Division Requirements

Students complete six courses as follows:

- the foundation series consists of two courses: 80C, *Introduction to Visual Arts* (winter quarter), and 10G, *2-D Foundation* (spring quarter) or 10H, *3-D Foundation* (fall quarter)
- three courses from the following list (with a grade of B or better):
 - 20 *Introduction to Drawing for the Major**
 - 21 *Introduction to Computer Art*
 - 22 *Introduction to Electronics for Intermedia*
 - 23 *Intermedia I*
 - 24A/B *Introduction to Painting. A: Oil, B: Acrylic***
 - 25 *Relief Printmaking*
 - 26 *Introduction to Printmaking*
 - 27 *Monoprinting/Mixed Media Printing*
 - 28 *Figurative Sculpture*
 - 30 *Introduction to Photography for Art Majors*
 - 32 *Beginning Digital/Film Photography*
 - 33 *Introduction to Screen Printing*
 - 37 *Material Metaphor I*
 - 39 *Public Art I: Community, Site, and Place*
 - 40 *Sculpture I*
- One course from either Art 80F, *Introduction to Issues in Digital Media*; Art 80V, *Issues and Artists*; or a history of art and visual culture (HAVC) course.***

* Students may use Advance Placement Courses (AP) in drawing with a score of 4, 5, or 6 in lieu of Art 20.

** Students may apply either 24A or 24B, but not both, toward the lower-division course requirements for declaring the full art major.

*** Students may use Advance Placement (AP) in Art History in lieu of the history of art and visual culture requirement.

Upper-Division Requirements

Students complete eight courses as follows:

- Five upper-division (100+ numbered) studio courses;
- 10 credits of senior studio courses or two upper-division studios in the area of focus;
- One art seminar from: Art 149A or 149B, *Contemporary Visual Media: Issues of Theory and Practice*; 150C, *Issues in Collaboration and Interactivity*; Art 170W, *Writing for Artists*; Art 171W, *Writing in the Arts*; Art 172W, *Writing and Vocabulary Power for Visual Artists*.

The last three quarters of course work for the major must be completed in residence at UCSC.

Art Major Planner

The following is a recommended academic plan for students to complete during their first two years as preparation for the art major.

| Year | Fall | Winter | Spring |
|------------|--------------------------|---------------------------|----------------------------|
| 1st (frsh) | ART 10H* | ART 80C low-div studio | ART 10G* low-div studio |
| 2nd (soph) | low-div studio HAVC** | | |

*Students take only one foundation course of their choice

**Courses from history of art and visual culture

Lower-Division Requirements (Junior Transfers)

- Three lower-division studios (equivalent to those found in the above list) should be taken at the community college, college, or university in preparation for the mandatory portfolio review prior to acceptance to the art major. Please remember that three studios is a minimum requirement and may not be enough studio work undertaken to pass the highly competitive nature of the portfolio review.
- One course from history of art and visual culture may be taken at the community college, college, or university, if available, or at UCSC.

Upper-Division Requirements (Junior Transfers)

Students complete eight courses as follows:

- Art 160, *Forms and Ideas*;
- Four upper-division (100+ numbered) studio courses
- 10 credits of senior studio courses or two upper-division studios in the area of focus;
- One art seminar from: Art 149A or 149B, *Contemporary Visual Media: Issues of Theory and Practice*; Art 150C, *Issues in Collaboration and Interactivity*.

The last three quarters of course work for the major must be completed in residence at UCSC.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in art is satisfied by completing Art 149A or 149B, *Contemporary Visual Media: Issues of Theory and Practice*; 150C *Issues in Collaboration and Interactivity*; Art 170W *Writing for Artists*; Art 171W *Writing in the Arts*, or Art 172W, *Writing for Power Vocabulary for Artists*. (Courses 170W, 171W, and 172W are offered in summer only.)

Comprehensive Requirement

Senior majors should meet with their faculty adviser about this requirement. Students may satisfy the comprehensive requirement with one of the following two options:

1. Completing 10 credits of senior studio course work in the area of focus;
2. Completing 10 credits of upper-division studio course work in the area of focus; and
 - a. Presenting an exhibition and, by appointment, meeting with a faculty member for review and critique of the exhibition; or
 - b. Submitting a portfolio and, by appointment, meeting with a faculty member for review and critique of the portfolio.

Study Abroad

The UC Education Abroad Program (EAP) offers students the opportunity for study abroad. Art majors may participate in EAP in their junior year. Pre-art majors are not approved to study abroad. Art students may not go abroad in their senior year because the last three quarters of course work must be in residence at UCSC. When considering attending EAP, the student should be mindful that only three courses may be substituted in the art major and each must receive a grade of B or better.

Materials Fee

Art students should be aware of the materials fee required for some studio courses. The fee is billed to the student's account for specific course materials purchased by the Art Department through the university. Fees generally range from \$5 to \$150 per course. Students may incur additional expense purchasing individual supplies.

Lower-Division Courses

10. Foundation Series in Art.

Introduces general education students and prospective majors to theory and practice of art and contemporary discourse surrounding it. Courses 10G and 10H comprise large lecture sections that meet once a week and smaller studio sections that meet once or twice a week. Courses include both lecture and studio components and are not intended to be technique-intensive studio classes. Students must register for both lecture and studio sections. *The Staff*

10G. 2D Foundation. S

Introduction to two-dimensional art practice and theory. Readings and lectures address both history and contemporary contexts of 2D art practice. Covers issues of content, representation, communication, and process. In the studio, students apply concepts covered in lecture to art projects. Students are billed a materials fee. Enrollment restricted to pre-art and art majors during priority enrollment. (General Education Code(s): IM, A.) *The Staff*

10H. 3D Foundation. F

Introduction to three-dimensional sculpture, intermedia, performance art, and technologically based contemporary art. Weekly lectures and section discussions introduce historical, theoretical, and critical methods of viewing and understanding contemporary art. Studio assignments introduce students to a range of contemporary techniques and materials used to make sculptural, performative, and technologically based work. Students are billed a materials fee. Enrollment restricted to pre-art and art majors during priority enrollment. (General Education Code(s): IM, A.) *W. Hibbert-Jones, J. Parker, E. Stephens*

20. Introduction to Drawing for the Major. F,W,S

Introduction to the methods, materials, and purposes of drawing to develop perceptual and conceptual skills through a series of assignments, providing various approaches to drawing as a tool for creative exploration. Discussions and critiques facilitate the development of critical skills. Designed for students considering the art major. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *F. Galuszka, M. Guyn, The Staff*

21. Introduction to Computer Art. W

Basic introduction to the use of a computer as a fine art tool and medium. Addresses basic skills, concepts

relevant to contemporary art theories, and practices. Provides a hands-on introduction to fundamentals of graphics, image acquisition, and manipulation and programming with demonstrations of relevant software. Students work independently and in groups. Assignments include digital image acquisition and manipulation, basic scripting, hypertext and web publishing, and computer programming. Lectures, readings, and discussions examine new technology artwork and technology's relationship to contemporary culture. Enrollment restricted to pre-art majors. (General Education Code(s): A.) *E. Anderson, The Staff*

22. Introduction to Electronics for Intermedia. F,W

Provides basic introduction to electronic devices for use in making intermedia art. Provides hands-on experience working with sensors, motors, switches, gears, lights, simple circuits, and hardware store devices to create kinetic and interactive works of art. Produce sculptural or installation-based projects. Demonstrations, lectures, and critical discussion of work given to develop concepts and technical skills. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *E. Anderson, The Staff*

23. Intermedia I. F,W

Introduction to combining media, materials, and forms to explore contemporary art practices such as installation, time based work, performance, collaboration, and interactivity. Assignments encourage an exploration of conscious subject matter, process, and technique. Discussions, reading handouts, and critiques help develop perceptual and conceptual skills. Skill workshops introduce new techniques. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *E. Crichton, E. Stephens, The Staff*

24A. Introduction to Painting: Oil. F,W,S

Introduction to medium of oil painting and to painting process. Assignments develop understanding of potential of this medium as a tool for perceptual and conceptual exploration. Slide lectures introduce assignments and are basis for class discussion of contemporary and historical art activity in the field. Students are billed a materials fee. (Formerly course 24.) Prerequisite(s): course 20, or 80A with consent of instructor. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *M. Guyn, The Staff*

24B. Introduction to Painting: Acrylic. *

Introduction to acrylic painting and to painting process. Assignments develop understanding of this medium's potential as a tool for perceptual and conceptual exploration. Slide lectures introduce assignments and are basis for class discussion of contemporary and historical art activity in this field. Students are billed a materials fee. Prerequisite(s): course 20, or 80A with consent of instructor. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *F. Galuszka*

25. Relief Printmaking. S

Introduction and development of relief printmaking. Course explores the traditions and contemporary issues of relief printmaking with emphasis on color work including reduction process, multiplate and viscosity printing. Students will build a portfolio using a wide spectrum of this complex relief process. Students are billed a materials fee. Prerequisite(s): courses 20, or 80A with consent of instructor. Enrollment restricted to pre-art majors. *J. Lee, P. Rangell*

26. Introduction to Printmaking. *

Survey of print medium: basic terminology, techniques, application of tools, materials, and condensed history of development of printmaking. Assignments consist of individual and collaborative projects aimed at building skills and gathering technical experience. Introduction to relief printing (black and white and color), intaglio, letterpress, and interface between photography/computer and the handmade print. Exploration of print media for communication of issues including formal aesthetics, social/psychological and personal narrative. Students are billed a materials fee. Prerequisite(s): course 20, or 80A with consent of instructor. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *J. Lee, P. Rangell, The Staff*

27. Monoprinting/Mixed Media Printing. W

Explores crossover discipline that combines skills of drawing and painting with printmaking, offering a wide range of possibility for personal expression using both oil-based and water-based inks on a variety of plates. Registration and over-printing methods are demonstrated along with mixed media prints. Students are billed a materials fee. Prerequisite(s): course 20, or 80A with consent of instructor. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *J. Lee*

28. Introduction to Figurative Sculpture. S

Introduction to a wide range of techniques for creating sculpture, based on and about the body/figure, through the exploration of contemporary concepts and ideas. Provides demonstrations, slide lectures, and critical discussion of work to develop concepts and technical skills. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *W. Hibbert-Jones, J. Parker, The Staff*

30. Introduction to Photography for Art Majors. *

Introduction to photography as an art form that explores visual ideas beginning with camera-ready use, negative development, and printing. Prepares for further work in photography or for collaboration with other media in art including computer arts and two- and three-dimensional mixed media. Critically examines photographic works while reading historical and theoretical texts. Students are billed a materials fee. Enrollment restricted to pre-art and history of art and visual culture majors. (General Education Code(s): PR-C, A.) *N. Locks, L. Watts, The Staff*

32. Beginning Digital/Film Photography. F,W,S

Introduction to photography as an art form, exploring visual ideas beginning with analogue and digital camera use, film development, and digital printing. Prepares students for further work in photography or for collaboration with other media in art, including computer arts and two- and three-dimensional mixed media. Students critically examine photographic works while reading historical and theoretical texts. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C.) *N. Locks, L. Watts, The Staff*

33. Introduction to Screenprinting. F

Introduction to a variety of water-based, screenprinting processes including stencil, photographic, and digital techniques. A continuing development of student's content and aesthetic awareness through the rich possibilities that screen printing offers as a fine art medium. Students are billed a materials fee. Prerequisite(s): course 20. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C.) *J. Lee, The Staff*

37. Material Metaphor I. W

Introduction to the basic skills in three-dimensional art and concepts relevant to contemporary art discourses. Challenges and expands the definition of art and its function through exercises in seeing, thinking, and making. Class proceeds through a series of technical demonstrations, slide presentations, and group discussions. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C.) *E. Stephens, The Staff*

39. Public Art I: Community, Site, and Place. F,W

Introduces contemporary public art through studio practice, slides, and readings. Create public art works, design scale models, drawings, and project proposals. Includes a local community-based public art project and an ephemeral landscape project. Students are billed a materials fee. Enrollment restricted to pre-major art majors. (General Education Code(s): PR-C, A.) *W. Hibbert-Jones, The Staff*

40. Sculpture I. F,S

Introduction to a range of concepts and forms used to make contemporary sculpture. Assignments facilitate becoming familiar with sculptural techniques and materials to enable students to visually manifest their sculptural ideas. Combines lectures and demonstrations with work time in class. Students are billed a materials fee. Enrollment restricted to pre-art majors. (General Education Code(s): PR-C, A.) *W. Hibbert-Jones, J. Parker, E. Stephens, The Staff*

42. Student-Directed Seminar. *

Seminars taught by upper-division students under faculty supervision. Does not fulfill major requirement. (See course 192.) *The Staff*

80A. Introduction to Drawing. *

Introductory course for beginners and students not majoring in art. Covers the history of what are considered master drawings from prehistory to the present. Various media are examined and assigned in specific exercises. Course is a balance of historical study and practice through assigned homework exercises. A disciplined performance is expected. Students are billed a materials fee. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80C. Introduction to Visual Arts. W

Surveys the major art forms and critical ideas that have shaped artistic practice globally from the 1980s to the present, including the many cultural forces that have inspired artists to articulate human experience in visual form. Enrollment restricted to pre-art majors during priority enrollment. (General Education Code(s): IM, T4-Humanities and Arts, A.) *D. Murray*

80D. Introduction to Photography. S

Introductory course for beginners and nonmajors. Various techniques examined and assigned in specific exercises. Work on projects using color film; this is a non-darkroom course. Examples given of photography from 1826 to the present. Balances historical study and practice through assigned homework exercises. This is a non-darkroom course and does not satisfy prerequisites for upper-division photography classes. Students are billed a materials fee. (General Education Code(s): IM, T4-Humanities and Arts, A.) *The Staff*

80F. Introduction to Issues in Digital Media. F,S

Digital media is revolutionizing ways in which artists create and exchange information. Introduces digital media through lectures, demonstrations, and exercises. Topics include networks, imaging, MIDI, interactivity, audio/video, and the World Wide Web. (General Edu-

cation Code(s): IM, T6-Natural Sciences or Humanities and Arts, A.) *E. Anderson, The Staff*

80V. Issues and Artists. *

Focuses on key issues in contemporary art, art theory, and curatorial practice through lectures, discussions, and readings. Course consists of weekly series of lectures designed to familiarize students with theories and practice surrounding seven current topics of interest in the larger art world. Instructor introduces each topic theoretically and shows work of relevant artists and curators. Guest artists and curators present their work in relation to the topic. (General Education Code(s): IM, T4-Humanities and Arts, A.) *E. Crichton, E. Stephens, L. Watts, The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***100. Gallery/Museum Practices (2 credits). ***

Focuses on providing practical experience in all phases of exhibition design and implementation. General tasks of program operation supplemented with selective reading and written assignments designed to enhance theoretical understanding of broader issues in art administration. Includes field trips to galleries and museums as well as in-class visits by artists and arts professionals. (Formerly *Gallery/Museum Management and Practices*.) Enrollment restricted to art, pre-art, and history of art and visual culture majors. *S. Graham*

101. Intermediate/Advanced Drawing. F

Work moves toward individual directions in drawing. A variety of media are explored. Each student is expected to do 150 hours of drawing over the quarter. Students are billed a materials fee. Prerequisite(s): course 20. Enrollment restricted to art majors. May be repeated for credit. *F. Galuszka, M. Gwyn, The Staff*

102. Figure Drawing. W

Focuses on drawing from the human figure and exploring the figure for the purpose of personal expression and social communication. Intended for the intermediate/advanced drawing student. Students are billed a materials fee. Prerequisite(s): course 20. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *F. Galuszka, The Staff*

103. Intermediate/Advanced Painting. F,W,S

Continuation of the development of a basic foundation in painting with emphasis on the development of individual, experimental procedures. Students are billed a materials fee. Prerequisite(s): course 24A or 24B. Enrollment restricted to art majors. May be repeated for credit. *F. Galuszka, M. Gwyn, The Staff*

104. Special Topics in Painting. F

Special studies in painting as announced. Students are billed a materials fee. Prerequisite(s): course 24A or 24B, and 103. Enrollment restricted to art majors. May be repeated for credit. *F. Galuszka, M. Gwyn*

105. Special Topics in Drawing. S

Special topics in drawing as announced. Students are billed a materials fee. Prerequisite(s): courses 20 and 101. Enrollment restricted to art majors. May be repeated for credit. *M. Gwyn*

106A. Senior Studio in Drawing and Painting. S

An intensive studio experience for art majors, meeting three full days per week. Major emphasis is on the

development of individual projects in preparation for the senior exhibition. Satisfies senior exit requirement. 106A and 106B must be taken concurrently. Students are billed a materials fee. Course is designed for senior art majors. Portfolio review prior to advance enrollment required; students should complete course 103 as preparation. May be repeated for credit. *F. Galuszka, M. Gwyn*

106B. Senior Studio in Drawing and Painting. S

An intensive studio experience for art majors, meeting three full days per week. Major emphasis is on the development of individual projects in preparation for the senior exhibition. Satisfies senior exit requirement. Course is designed for senior art majors. Portfolio review prior to advance enrollment required; students should complete course 103 as preparation. Courses 106A and 106B must be taken concurrently. May be repeated for credit. *F. Galuszka, M. Gwyn*

107. Mixed Media Works on Paper. *

This course stresses alternative drawing processes, techniques, and materials. Intended for the intermediate or advanced student. Students are billed a materials fee. Prerequisite(s): course 20. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *F. Galuszka, P. Rangell, The Staff*

107A. Outdoor Painter's Project. *

Along with an increasing general concern to preserve our natural environment, there has been the resurgence of interest in celebrating the landscape through painting. This impulse to strengthen the bond between art and nature has provided a degree of urgency, revitalizing a tradition that had once been a simple nostalgia for a romantic and rural past. Explores the potential for meaning in outdoor painting today. Emphasis is placed on group excursions and intensive discussion that includes visiting artists. May be repeated for credit. *The Staff*

109. Intermedia II. F

Further investigation in combining media, materials, and forms to explore a variety of contemporary art practices. Students develop their projects thematically throughout the quarter. Assignments encourage experimentation with time and motion, text and images, collaboration, installation, performance, and interactivity. Discussions, reading handouts, and critiques further the development of perceptual and conceptual skills. Skill workshops introduce new techniques. Students are billed a materials fee. Prerequisite(s): course 22 or 23 or 29 or 37 or 39 or 40. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *E. Crichton, E. Stephens*

110. Special Topics in Intermedia. W

Exploring interactive strategies for making art. Projects experiment with combining forms and mediums to engage an audience. Students are billed a materials fee. Prerequisite(s): course 22 or 23 or 29 or 37 or 39 or 40. Enrollment restricted to art majors. May be repeated for credit. *E. Crichton, E. Stephens*

112. Intaglio I. F

Introduces students to various methods used in making intaglio prints. Encourages individual artistic growth of imagery and technique through assignments designed to explore the medium. Includes discussion and critique of work with equal emphasis on technique and concept. Students are billed a materials fee. Prerequisite(s): course 25, 26, 27, or 33. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *J. Lee*

113. Intaglio II. *

This presentation of advanced intaglio techniques emphasizes a variety of multi-plate color printing and photo etching processes. The course concentrates on individual development in style and concept through the intaglio process. Students are billed a materials fee. Prerequisite(s): course 25, 26, 27, 33, or 112. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *J. Lee*

114. Lithography I. W

Introduction to drawing, processing, and printing of lithographs from stone. Emphasis on discovery of tonal, textural, and expressive potential from the surface of the stone, while establishing individual directions in imagery. Condensed history of the medium, technical theory, and critique in lecture and demonstrations. Students are billed a materials fee. Prerequisite(s): course 20, 25, 26, 27, or 33. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *P. Rangell*

115. Lithography II. *

Continuation of course 114. Introduction of tusche wash, aluminum plates, transfers, photo-lithography (computer interface), and multiple color techniques. Emphasis on experimentation, refinement of craft and approach, defining individual imagery, and expanding scale. Further investigation of the history of the medium and contemporary practice. Students are billed a materials fee. Prerequisite(s): course 114. Enrollment restricted to art majors. May be repeated for credit. *P. Rangell*

116A. Senior Studio in Print Media. S

An intensive studio experience for majors, meeting three full days per week. Provides an opportunity for in-depth practice in all print media in preparation for the senior exhibition. In addition to individual projects, students work collaboratively and in series. Prints incorporating multiple colors and concurrent media, and utilizing a larger scale are encouraged. Readings and research are required. Satisfies senior exit requirement. Students are billed a materials fee. Portfolio review prior to advance enrollment required; students should complete courses 113 and 114, or 112 and 115, as preparation. Courses A and B must be taken concurrently. (Formerly *Senior Studio in Printmaking*.) May be repeated for credit. *J. Lee, P. Rangell*

116B. Senior Studio in Print Media. S

An intensive studio experience for majors, meeting three full days per week. Provides an opportunity for in-depth practice in all print media in preparation for the senior exhibition. In addition to individual projects, students work collaboratively and in series. Prints incorporating multiple colors and concurrent media, and utilizing a larger scale are encouraged. Readings and research are required. Satisfies senior exit requirement. Portfolio review prior to advance enrollment required; students should complete courses 113 and 114, or 112 and 115, as preparation. Courses A and B must be taken concurrently. May be repeated for credit. *J. Lee, P. Rangell*

117. Special Topics in Printmaking. *

Special studies in printmaking, as announced. Students are billed for a materials fee. Prerequisite(s): course 25, 26, 27, or 33. Enrollment restricted to art majors. May be repeated for credit. *J. Lee, P. Rangell, The Staff*

117X. Seminar in Printmaking: 1475-2008. *

Through a chronological overview, this course touches on topics regarding the history of printmaking from

the late medieval period to the present. Covers commerce of art, censorship, propaganda, politics, issues of gender, and the distribution of art and ideas over the centuries. Enrollment restricted to junior and senior art majors. *J. Lee, The Staff*

118. Computer Art: Theories, Methods, and Practices. W

Examines computer interactivity and interface in art making through theory and practice. Students develop interactive installation and sculptural works of art. Assignments may include the acquisition and creation of digital images, two-dimensional animation, programming with MAX/MSP/Jitter, basic electronics and sensors, and digital video and audio. Discussions, readings, and critiques address content, aesthetics, concepts, and expression as well as a practical grasp of relevant software. Students are encouraged to develop research projects and explore experimental practices. Students are billed a materials fee. Prerequisite(s): course 21 or 22 or 109 or prior basic programming experience and permission of instructor. May be repeated for credit. (General Education Code(s): PR-C, A.) *E. Anderson, The Staff*

119. Digital Video. F

An exploration of the video medium including production using the digital video format. Digital video cameras will be used to produce digital source material to be manipulated in a non-linear digital editing system. Image manipulation, effects, and editing will be explored. A variety of video structures, theories, concepts, and forms will be examined through production, discussions, and viewing students' and artists' work. Prerequisite(s): course 21 or 22 or 23 or 80F or 118, or by permission of instructor. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *E. Anderson, The Staff*

120. Advanced Projects in Computer Art I. *

Independent and collaborative creative projects using advanced computer methods. May include networking projects, virtual representations, interactive multimedia, installation, performance, robotics, and three-dimensional modeling. Emphasis on advanced critical and experimental approaches to computers as a unique art medium and contemporary research issues. Students are required to enroll in scheduled lab sections. Students are billed a materials fee. Prerequisite(s): course 118. May be repeated for credit. *E. Anderson*

121. Advanced Projects in Computer Art II. S

Independent and collaborative creative projects using advanced computer methods, which may be a continuation of projects initiated in course 120. May include networking projects, virtual representations, interactive multimedia, installation, performance, 3D modeling and animation, or robotics. Emphasis on advanced critical and experimental approaches to computers as a unique art medium, and contemporary research issues. Students are required to enroll in scheduled lab section. Students are billed for a materials fee. May be repeated for credit. *E. Anderson, The Staff*

123. Digital Printmaking in Contemporary Art Practice. F

Addresses electronic imaging, output, and transferring as means of producing prints. Students gain knowledge and experience in using computer equipment including digital cameras, scanners, printers, and a variety of software. Investigation of conceptual and technical identities between digital image-making and traditional methods, as well as crossing over them to contemporary trends in art practice. Students are billed

a materials fee. Prerequisite(s): course 25, 26, 27, or 33, or permission of instructor. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *The Staff*

125. Print Media in Visual Communication. W,S

Explores a unique approach reviewing the printed images in visual communications. A wide blend of traditional and cutting-edge print media processes with an interdisciplinary focus will be taught for conceptualizing, producing, and presenting the printed image. Students are billed a materials fee. Prerequisite(s): course 25 or 27 or 33, and course 112 or 114. Enrollment restricted to art majors. (General Education Code(s): PR-C.) *J. Lee, The Staff*

126. Art of Bookmaking. *

Introduction to production of small edition books and multiples utilizing sequential visual imaging, narrative content, and mixed media in bookmaking. Provides instruction in conceptualizing, producing, and distributing printed artists' multiples. Ideas encouraged within a broad range of possibilities via the format of artists' books. Students are billed a materials fee. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *The Staff*

127A. Visiting Artist Special Topics: A. F

Students work collaboratively with a professional visiting artist on his/her research to develop their studio skills, discuss current critical and theoretical readings, and learn skills necessary to becoming a professional artist. Enrollment by portfolio review and restricted to junior and senior art majors. Concurrent enrollment in course 127B is required. Students are billed a materials fee. Enrollment restricted to junior art majors. May be repeated for credit. *The Staff*

127B. Visiting Artist Special Topics: B. F

Students develop independent projects under the advice and guidance of a professional visiting artist during weekly studio classes and discussions. Enrollment by portfolio review and restricted to junior and senior art majors. Concurrent enrollment in course 127A required. Enrollment restricted to junior art majors. May be repeated for credit. *The Staff*

129. Photo-Based Printmaking. W

Intermediate/advanced studio course exploring the processes, history, and the recent developments in contemporary photomechanical printmaking. Through experimentation and research students learn how to utilize photographic imagery, blending them in multiple layers and colors, thereby facilitating articulation of their conceptual foundations. Students are billed a materials fee. Prerequisite(s): course 25 or 27 or 33, and course 112 or 114. Enrollment restricted to art majors. (General Education Code(s): PR-C.) *J. Lee*

130. Intermediate Photography. F,W,S

Continuation of courses 30 and 32. Students explore visual ideas, directing their work toward individualized goals. Required work includes making photographic prints, reading historical and theoretical works, and examination of photographs. Students are billed a materials fee. Prerequisite(s): course 30 or 32. Enrollment restricted to art majors. May be repeated for credit. *N. Locks, L. Watts, The Staff*

131. Advanced Photography. W,S

Continuation of course 130. Students produce a portfolio of photographs, read historical and theoretical works, and study photographs and other art works. Students are billed a materials fee. Prerequisite(s): one of the following: course 130 and either course 132 or 134

or by passing 10 credits of 130. Enrollment restricted to art majors. May be repeated for credit. *N. Locks, L. Watts, The Staff*

132. Color in Photography. *

Concentration on making photographic works in color. Students produce a portfolio of color photographs, read historical and theoretical works, and study photographs and other art works. Individualized projects may include work with color transparencies, color xerox, computer-generated imagery, or mixed media. Students are billed for a materials fee. Prerequisite(s): course 130. Enrollment restricted to art majors. May be repeated for credit. *N. Locks, L. Watts, The Staff*

133A. Senior Studio in Photography. S

An intensive studio experience, with major emphasis on the development of individual projects leading to a required senior exhibition. Satisfies senior exit requirement. Students are billed a materials fee. Portfolio review prior to advance enrollment required. Courses 133A and 133B must be taken concurrently. Enrollment restricted to art majors. May be repeated for credit. *N. Locks, L. Watts*

133B. Senior Studio in Photography. S

An intensive studio experience, with major emphasis on the development of individual projects leading to a required senior exhibition. Satisfies senior exit requirement. Portfolio review prior to advance enrollment required. Courses 133A and 133B must be taken concurrently. Enrollment restricted to art majors. May be repeated for credit. *N. Locks, L. Watts*

134. Special Topics in Photography. F,W

Special studies in photography, concentrating on specific subject matter or media. Topics may include documentary photography, landscape, alternative processes, or mixed media. Students are billed a materials fee. Prerequisite(s): course 30 or 32. Enrollment restricted to art majors. May be repeated for credit. *E. Crichton, N. Locks, L. Watts, The Staff*

135. Introduction to Digital Photography. *

Introduction to basic theories behind the digital production, manipulation, and output of photographic images. Through readings and production, students address major issues specific to working with images in an increasingly digital environment. Students are billed a materials fee. Prerequisite(s): course 30 or 32. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *E. Crichton, L. Watts*

136. Advanced Digital Photography. *

A continuation of course 135 to further study the practice, theories, and criticisms of the digital production, manipulation, and output of photographic images. Major issues specific to the production of digital images will be addressed through readings and discussion, including techniques and theories drawn from a course reader and a textbook on advanced Photoshop skills. A final project is required. Students are billed a materials fee. Prerequisite(s): course 135 or portfolio review. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *N. Locks*

138. Darkroom Practices. F,S

Continuation of courses 30 and 32 concentrating on darkroom practices. Students explore visual ideas, directing their work toward individualized goals. Required work includes making photographic prints, reading historical and theoretical works, and examination of photographs. Students are billed a materials fee.

Prerequisite(s): courses 30 or 32. Enrollment restricted to art majors. (General Education Code(s): PR-C.) *N. Locks, L. Watts, The Staff*

139. Intermediate to Advanced Sculpture (Foundry). *

This intermediate/advanced course provides the information and facilities necessary to express ideas through the indirect process of metal casting. The "lost wax" method is used to manifest ideas in sculpture. Lectures and demonstrations are combined with work time in class. Students generate sculpture forms in wax then gate, invest, weld, chase, patina, and present at least one finished piece. Students are billed a materials fee. May be repeated for credit. Prerequisite(s): one of the following: course 23, 28, 29, 37, 39, 40, or 41. Enrollment restricted to art majors. May be repeated for credit. *W. Hibbert-Jones, J. Parker, E. Stephens*

140. Metal Sculpture. F,S

Focus on teaching intermediate to advanced students the processes and techniques of direct metal fabrication for contemporary sculpture. Explores a range of welding, cutting, and forming techniques and processes through demonstrations, slide lectures, field trips, and studio time. Demonstrations, slide lectures, and critical discussion of work help develop technical and conceptual skills. Students are billed a materials fee. Prerequisite(s): one of the following courses: 22, 23, 28, 29, 37, 39, 40, or 41. Enrollment restricted to art majors. May be repeated for credit. *W. Hibbert-Jones, J. Parker, E. Stephens, The Staff*

141. Sculpture II. F

More advanced fabrication techniques in sculpture using wood, metal, industrial, and other materials. Techniques include carpentry and woodshop skills, and an introduction to sculptural forms, processes, and ideas. Demonstrations, slide lectures, and critical discussion of work help develop technical and conceptual skills. Students are billed a materials fee. Prerequisite(s): course 23, 28, 29, 37, 39, or 40. Enrollment restricted to art majors. May be repeated for credit. (General Education Code(s): PR-C, A.) *W. Hibbert-Jones, J. Parker, E. Stephens, The Staff*

145. Material Metaphor II. S

Continuation of course 37. Workshops introduce further investigation of materials and techniques. Students explore diverse methods of visual communication through a series of projects that require individual research and collaborative efforts. Students are encouraged to develop projects according to their motivation, expertise, and self assessment. Emphasis placed on contemporary studio practices of installation, students will integrate a variety of materials and metaphor within the architectural and environmental space. Students are billed a materials fee. Prerequisite(s): course 23, 28, 29, 37, 39, or 40. Enrollment restricted to art majors. *E. Stephens, The Staff*

146. Special Topics in Intermedia: Conceptual and Process-Oriented Approaches. W

Special subjects to be offered by regular staff or visiting artists as announced. Students are billed a materials fee. Prerequisite(s): one of the following courses: 23, 28, 29, 37, 39, or 40. Enrollment restricted to art majors. May be repeated for credit. *E. Crichton, E. Stephens, The Staff*

148. Special Topics in Sculpture. W

Special topics in sculpture as announced, concentrating on specific aspects of subject matter and media. Students are billed a materials fee. Prerequisite(s): course 23 or 28 or 29 or 37 or 39 or 40 or 143 or

145. Enrollment restricted to art majors. Offered in alternate academic years. May be repeated for credit. *W. Hibbert-Jones, J. Parker, E. Stephens, The Staff*

149A. Contemporary Visual Media: Issues of Theory and Practice. W

Examines selected issues in critical theory relevant to contemporary visual practices through writing assignments and class discussions of core readings. Specifically, thematically explores the relationship between visual art and film aesthetics. Prerequisite(s): Satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. (General Education Code(s): W.) *The Staff*

149B. Contemporary Visual Media: Issues of Theory and Practice. S

Examines selected issues in critical theory relevant to contemporary visual practices through writing assignments and class discussions of core readings. Specifically, focuses on the creative process: How do artists work and what informs their production? Prerequisite(s): Satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. (General Education Code(s): W.) *The Staff*

150. Seminar in Contemporary Art.

150C. Critical Issues in Contemporary Art. F,S

This writing-specific course offers a comprehensive overview of contemporary thought within the visual arts from an international perspective. Special emphasis placed on current trends and shifts in artistic production, theory, and criticism. (Formerly *Issues in Collaboration and Interactivity*.) Prerequisite(s): Satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior art majors. (General Education Code(s): W.) *The Staff*

151. Introduction to Gallery Management. *

Provides practical experience in all phases of an exhibition program's design and implementation including curation, registration, preparation, and publicity. The general tasks of program operation are supplemented with selected reading and written assignments designed to enhance theoretical understanding of broader issues in art administration, including an introduction to the political and ethical realities professionals face. Enrollment restricted to art majors. *The Staff*

156. Topics in Public Art II: Memory, Landscape, and Artist as Activist. S

In-depth exploration of art in the public sphere. Students build an understanding of public art sparked by practical experience designing and developing projects. Theoretical aspects of contemporary public art, and an introduction to the range of current public art practices will be introduced through readings, lectures, and artist's talks. The combination of practical hands-on technique and theoretical ideology will enable students to fully develop their own project within the class. Students are billed a materials fee. Prerequisite(s): course 23, 37, 39, 40, or by permission of instructor. Enrollment restricted to art majors. May be repeated for credit. *W. Hibbert-Jones, The Staff*

159A. Senior Studio: Intermedia, Sculpture, Electronic Art, and Public Art. S

An intensive studio experience for art majors concentrating in the areas of intermedia, sculpture, public art, installation art, electronic art, and interactive art. Major emphasis is on development of individual and collaborative projects in preparation for the senior

exhibition. Readings and research required. Class discussions focus on project work and critiques, assigned reading, and the development of a written component by each student. Satisfies senior exit requirement. Students are billed a materials fee. Portfolio review prior to advance enrollment required. Enrollment restricted to art majors. Courses 159A and 159B must be taken concurrently. May be repeated for credit. *E. Anderson, E. Crichton, W. Hibbert-Jones, J. Parker, E. Stephens*

159B. Senior Studio: Intermedia, Sculpture, Electronic Art, and Public Art. S

An intensive studio experience for art majors concentrating in the areas of intermedia, sculpture, public art, installation art, electronic art, and interactive art. Major emphasis is on development of individual and collaborative projects in preparation for the senior exhibition. Readings and research required. Class discussions focus on project work and critiques, assigned reading, and the development of a written component by each student. Satisfies senior exit requirement. Portfolio review prior to advance enrollment required. Enrollment restricted to art majors. Courses 159A and 159B must be taken concurrently. May be repeated for credit. *E. Anderson, E. Crichton, W. Hibbert-Jones, J. Parker, E. Stephens*

160. Forms and Ideas. F

Required for all junior transfer student art majors. Introduction to the art program, emphasizing awareness of contemporary visual practices and theory. Combines studio practice and theory. Students are billed a materials fee. (Formerly course 60.) Enrollment restricted to junior transfer art majors. (General Education Code(s): A.) *The Staff*

161. Picturing Identity: Document and Culture. *

Studio addresses issues of race, gender, culture, personal identity, and visual representation. Examines ways ideas of identity are given visual form and communicated in fine arts and mass media. Students research ways traditionally underrepresented groups in society have been and are being represented in mass media; they then visually interpret that information in forms of visual artifacts. This process and interpretation serve as springboard to examination of expanded ideas of identity, including personal and/or family culture and history, gender, and ethnicity. Encourages use of broad range of mediums available to construct visual representations of identity. Students are billed a materials fee. Enrollment restricted to pre-art, art, film and digital media, and history of art and visual culture majors. (General Education Code(s): PR-C, A.) *L. Watts*

191. Teaching Apprenticeship. F,W,S

Designed for art majors at the upper-division level. Each student assists in a lower-division art course under the direct supervision of a faculty member. Students assist in technical instruction, critiques, and class discussions. May not be repeated for credit. Does not count toward upper-division major requirements. Enrollment restricted to art majors. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Students should have upper-division standing with a proposal supported by a faculty member willing to supervise. Students submit petition to sponsoring agency. Enrollment limited to 5. *The Staff*

193. Field Study. F,W,S

Supervised off-campus study conducted under the im-

mediate and direct guidance of a faculty supervisor. To be used primarily by upper-division students doing part-time off-campus study. Students submit petition to sponsoring agency. Petitions may be obtained in the Art Department Office. May be repeated for credit. *The Staff*

196. Senior Project. F,W,S

Student will concentrate on completing work for comprehensive exhibition under the direction of his or her art adviser, with help from other faculty as needed. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

197. Individual Study. F,W,S

Individual study in areas approved by sponsoring instructors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Provides for department-sponsored independent study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual study in areas approved by sponsoring instructors. Students submit petition to sponsoring agency. Students are billed a materials fee. May be repeated for credit. *The Staff*

Graduate Courses

297. Independent Study. F,W,S

Independent study or research for graduate students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Art History

See History of Art and Visual Culture, page 319.

Arts Division

Porter College, D Building,
(831) 459-4940
<http://arts.ucsc.edu>

The Arts Division offers both creative and critical studies of art and culture at the undergraduate and graduate level. The Division is committed to building a sustainable model for excellence in the arts. Instruction in the arts inspires and develops the capacity for individual and collaborative creative thought, analysis, and action within and beyond the university. Our faculty consists of artists, historians, critics, and theorists working across the arts in a global context. Undergraduate education in the arts includes programs in the departments of Art, Film and Digital Media, History of Art and Visual Culture, Music, and Theater Arts. Established graduate programs include the interdisciplinary digital arts/new media Master of Fine Arts (M.F.A.) program, the music composition Doctor of Musical Arts (D.M.A.), the music Doctor of Philosophy (Ph.D.), the music Master of Arts (M.A.) and the fifth-year certificate in theater arts. New Ph.D. programs in film and digital media and in visual studies will admit their first classes in 2010-11, while graduate programs in art and theater arts are currently in development.

The Arts Division provides students with access

to quality work spaces, including a new digital-arts research facility with two experimental media labs, along with a state-of-the-art music recital hall, practice rooms, electronic music studios, and recording facilities, three theaters for dramatic productions, filmmaking studios and editing suites, surround-sound screening theaters, drama and dance studios, painting and printmaking studios, a foundry, photography and computer laboratories, and specialized lecture and seminar classrooms. McHenry Library houses an extensive collection of books and periodicals on the arts, as well as an analogue and digital slide collection, music scores and recording, and one of the largest collections of films and DVDs in the University of California system. Exhibition space in the arts includes galleries for students and faculty shows; the Sesnon Gallery presents curated exhibitions to the university community and the general public. The Center for Art and Visual Studies, a focus for interdisciplinary exhibitions, conferences, symposia, and seminars is currently in development.

The departments and majors in the Arts Division are listed in detail under Art, Film and Digital Media, History of Art and Visual Culture, Music, Theater Arts, and Digital Arts and New Media.

Among the Division's many performing and fine arts programs, Shakespeare Santa Cruz is an internationally recognized, professional, repertory company. The campus hosts several film festivals each year, including the Women of Color Film and Video Festival and Cine Maiz. Student work is regularly broadcast on SCTV, and *Eyecandy* publishes student writing on film, television, and digital media. The Music Department hosts an annual Festival of Contemporary Music in April and presents a variety of solo and ensemble concert programs throughout the year. The History of Art and Visual Culture Department hosts a series of speakers and seminars each year on rotating topics that are supported by the Rebele Chair. The Art Department sponsors regularly scheduled public presentations as well as quarterly open studios and a print and photo sale in the spring. The digital arts and new media M.F.A. program regularly sponsors digital arts events, such as festivals, symposia, visiting speakers, and exhibitions of student work, both on and off-campus, culminating in an annual exhibition of graduate thesis research.

Asian Studies

See East Asian Studies, page 199.

For language instruction, see Chinese, page 173, and Japanese, page 334.

Astronomy and Astrophysics

Astronomy Department Office
201 Interdisciplinary Sciences Building
(831) 459-2844
<http://www.astro.ucsc.edu>

Faculty and Professional Interests

Professor/Astronomer

PETER H. BODENHEIMER, Emeritus

MICHAEL J. BOLTE
Dynamics of star clusters, ages of star clusters, chemical enrichment history of the galaxy, observations of interacting galaxies

JEAN P. BRODIE
Extragalactic globular clusters, galaxy formation, near-field cosmology

HARLAND W. EPPS
Astronomical optics and instrumentation

SANDRA M. FABER
Galaxies, stellar populations, cosmology, instrumentation

PURAGRA (RAJA) GUHA THAKURTA
Galaxy formation and evolution: resolved stellar populations in the Local Group and distant galaxies. Globular clusters. Interstellar dust.

GARTH D. ILLINGWORTH
High redshift galaxies, galaxy formation/evolution, science policy

BURTON F. JONES, Emeritus

DAVID C. KOO
Cosmology, birth and evolution of galaxies and quasars

ROBERT P. KRAFT, Emeritus

CLAIRE MAX
Adaptive optics and high spatial resolution imaging, colliding galaxies, active galactic nuclei and their supermassive black holes

JOSEPH S. MILLER, Emeritus

JERRY E. NELSON
Design and construction of large telescopes; project scientist for the two Keck telescope and Thirty Meter telescope

JASON PROCHASKA
Damped Ly α systems in quasars, Lyman limit systems, stellar abundances, thick disk imaging of our galaxy

DAVID M. RANK, Emeritus

GRAEME H. SMITH
Stellar populations, chromospheric activity among late-type stars

STEVEN S. VOGT
Extrasolar planets, stellar, spectroscopy, instrumentation

MERLE F. WALKER, Emeritus

Astronomer

LLOYD B. ROBINSON, Emeritus

Associate Professor/Associate Astronomer

REBECCA BERNSTEIN
Galaxy formation and evolution, astronomical instrumentation and optical design

CONSTANCE ROCKOSI
Galactic structure, stellar populations, CCD detectors, astronomical instrumentation

Professor

GEORGE R. BLUMENTHAL
Cosmology, galaxy formation, high-energy astrophysics

FRANK D. DRAKE, Emeritus

JOHN FAULKNER, Emeritus

GREGORY LAUGHLIN
Extra-solar planets, numerical astrophysics

DOUGLAS N. C. LIN
Fluid dynamics, star formation, galactic structure, planetary systems, accretion disks, extra-solar planets

PIERO MADAU
Cosmology, high-energy astrophysics

BRUCE H. MARGON
High-energy astrophysics, space astronomy

WILLIAM G. MATHEWS, Research Professor
High-energy astrophysics, intracluster gas

STEPHEN E. THORSETT
Radio astronomy, high-energy astrophysics, compact objects, relativity

STANFORD E. WOOSLEY
Supernovae, stellar evolution, nucleosynthesis

Associate Professor

ENRICO RAMIREZ-RUIZ
Stellar explosions, gamma-ray bursts accretion physics, near compact stars

Assistant Professor

JONATHAN FORTNEY
Planetary atmospheres and interiors, extrasolar planets

MARK KRUMHOLZ
Star formation, interstellar medium, numerical methods

Adjunct Associate Professor

ADRIANE STEINACKER
Planet formation, MHD simulations



Professor

JOEL R. PRIMACK (Physics)
Cosmology, galaxy, formation and evolution, particle astrophysics, nature of dark matter, gamma ray astronomy

GARY GLATZMAIER (Earth and Planetary Sciences)
Computer simulation of geodynamics and planetary dynamics

STEVEN RITZ (Physics)
Particle physics and astrophysics

Associate Professor

ANTHONY N. AGUIRRE (Physics)
Cosmology of the early and late universe: inflation and the global structure of cosmological models; the intergalactic medium and its enrichment with heavy elements; galaxy formation, evolution, and feedback processes; dark matter; theories of modified gravity

DAVID M. SMITH (Physics)
High-energy astrophysics; X-ray and gamma-ray detectors and instrumentation; solar, terrestrial, and planetary sources of gamma radiation

Assistant Professor

PASCALE GARAU (Applied Mathematics)
Astrophysics, geophysics, fluid dynamics, numerical resolutions of differential equations, and mathematical modeling of natural flows

Research Astronomer

BRUCE BIGELOW
Design, project management for complex optical-mechanical systems, astronomical instrumentation for large telescopes

DONALD GAVEL
Development of next generation adaptive optics for large telescopes, Director of Laboratory for Adaptive Optics

BRAD HOLDEN
Design, development, and oversight of UC Astronomy Data Center (all data obtained by UC astronomers at the Lick and Keck Observatories), early evolution of elliptical galaxies

ROBERT KIBRICK
Development of computer software and wide-area networks in support of remote control and data-acquisition systems for telescopes and complex astronomical instrumentation systems

TERRY MAST
Development of large telescopes and their instrumentation

DREW PHILLIPS
Extragalactic star-formation, gas-phase abundances, galaxy kinematics, and galaxy formation and evolution; development of astronomical optics and instrumentation

RICHARD STOVER
Development and construction of state-of-the-art detector systems for instruments at Lick Observatory and the Keck Observatory

MINGZHI WEI
CCD detectors and CCD controllers

Program Description

The science of astronomy has the universe as its domain. Galaxies, stars, planets, and an ever-increasing variety of phenomena observed from ground- and space-based observatories are among the objects of study. Areas of special interest at UCSC include cosmology, the formation and evolution of planets, stars, and galaxies, high-energy astrophysics, active galaxies, supernovae and nucleosynthesis, extra-solar planets, interstellar medium, intergalactic medium, solar system dynamics, and all aspects of observational optical and infrared astronomy. Astronomers use concepts from and contribute to the development of many other scientific disciplines, including optics, mechanics, relativity, atomic and nuclear physics, applied mathematics, chemistry, geology, and meteorology. The interdisciplinary nature of astronomy, including its historical and philosophical elements, makes its study valuable to those planning careers in a variety of fields.

The Astronomy and Astrophysics Department offers a broad undergraduate curriculum that fulfills the needs of students seeking a general education but also enables students wishing to obtain a minor or major in astrophysics to study the subject in greater depth.

The graduate program is intended for those with a professional interest in the subject. The interests of the faculty embrace a wide range of both theoretical and observational aspects of astronomy. Current research and course offerings include our solar system and other solar systems, stellar structure and evolution, stellar spectroscopy, the interstellar medium, galactic structure, active galaxies and quasars, cosmology, general relativity and gravitational radiation, the origin of the elements, infrared and radio astronomy, advanced astronomical instrumentation, astrobiology, high-energy astrophysics, and X-ray and gamma-ray astronomy.

Graduate students have access to state-of-the-art instrument development and data reduction technology, the UCO/Lick Observatory computer network, and an unusually extensive astronomical library at the Lick Observatory headquarters on campus. Graduate

students may conduct supervised research using selected telescopic facilities of the Lick Observatory on Mount Hamilton, 55 miles from Santa Cruz. The 10-meter Keck Telescope in Hawaii, the world's largest, is administered from the UCSC campus and is used for frontier research by UC astronomers.

The Center for Adaptive Optics (CfAO) is also headquartered at UCSC. Education is central to the CfAO's mission, and a key element of this is the support provided by the center to graduate students. In addition to research, the center provides interdisciplinary access to a nationwide network of scientists in astronomy and vision science.

Undergraduate Courses

Instruction in astronomy for undergraduates at UCSC is designed to meet the needs of several groups of students.

Courses 1, 2, 3, 4, 5, 8, 80A, 80B, and 80D, providing a general survey of the universe as now understood from historical and modern observations, are offered for those not specializing in a scientific discipline.

Courses 11, 12, 13, 14, 15, 16, and 18, emphasizing basic physical laws and theories as applied to astronomy, taken together provide a survey of modern astronomy for students with some facility in mathematics. Taken separately, these courses provide an in-depth introduction to gravitational interaction, stellar evolution, and extragalactic astrophysics. These courses are designed for students intending to major in a scientific subject, although qualified nonscience majors may enroll. A good high school background in mathematics and physics is required.

Prior or concurrent enrollment in a basic calculus course (Mathematics 11A or 19A) and a basic physics course (Physics 5A/L or 6A/L) is helpful but not required.

Finally, a more thorough quantitative treatment of selected topics in astronomy and astrophysics at the upper-division level is provided by courses 111, 112, 113, 117, and 118. Completion of course work in calculus of several variables (Mathematics 22 or 23A-B) and Physics 5B/M or 6B/M and 101A is required for these advanced courses.

Astrophysics Minor

For undergraduate students having a particular interest in the subject, a minor in astronomy and astrophysics is offered. Most students who minor in astronomy and astrophysics are majors in another science, though majors in other fields are also possible. The minor in astronomy and astrophysics requires that students take the Physics 5 or 6 series (with associated laboratories), Physics 101A, a minimum of two courses from the Astronomy 11–18 series, and a minimum of three courses from the following, Astronomy 111–118. A senior thesis on an astronomy-related topic is also encouraged. Interested students should contact the Astronomy and Astrophysics Department office for further information.

Astrophysics Major

The UCSC major in astrophysics is administered by the Physics Department and combines a core physics major with advanced electives in astrophysics, an astrophysics laboratory course, and senior thesis work on a topic in astrophysics. It is a rigorous program designed to prepare students for a broad range of technical careers or for entry into graduate or professional programs. A full description of the major can be found in the physics section of this catalog.

Preparation for Graduate Work in Astrophysics

The UCSC graduate program in astronomy and astrophysics is designed for Ph.D. students seeking a professional career in teaching and research. In view of the thorough preparation in mathematics and physics required for graduate study, most entering astronomy graduate students major in physics or astrophysics as undergraduates.

The suggested minimum requirements for admission to graduate standing at UCSC include the following undergraduate courses:

Basic physics. Mechanics, wave motion, sound, light, electricity and magnetism, thermodynamics, atomic physics, and quantum mechanics (Physics 5A, 5B, and 5C).

Basic mathematics. Calculus (Mathematics 19A-B and 23A-B or equivalent) and statistics (Mathematics and Statistics 5).

Intermediate-level physics. Mechanics (Physics 105); electricity, magnetism, and optics (Physics 110A-B); mathematical methods in physics (Physics 116A-B-C); nuclear and particle physics (Physics 129); and quantum mechanics (Physics 139A-B).

Intermediate-level mathematics. Linear algebra (Mathematics 21), complex analysis (Mathematics 103), and ordinary and partial differential equations (Mathematics 106 and 107).

Graduate Program

Graduate instruction is built upon a two-year cycle of 11 one-quarter courses in astronomy and physics that are required of all students.

Seven courses are specifically required:

Astronomy 202, *Radiative Processes*

Astronomy 204, *Astrophysical Flows*

Astronomy 205, *Introduction to Astronomical Research*

Astronomy 212, *Dynamical Astronomy*

Astronomy 220A, *Stellar Structure and Evolution*

Astronomy 230, *Diffuse Matter in Space*

Astronomy 233, *Physical Cosmology*

and four additional courses are chosen from the list of electives given below. In addition, students must fulfill the following requirements:

Students must meet at least quarterly with an assigned adviser.

Each student must also be a teaching assistant for at least one quarter.

By the end of their second year, students must:

- Complete one quarter of independent study with a faculty member and give a department talk on that work.
- Pass a preliminary examination based on course material, relevant physics, and general astronomical knowledge.
- Submit one lead-author paper to a refereed journal that is based on research conducted at UCSC. A one-year probation and extension will be allowed by department faculty vote at the board review meeting at the end of the second year, but such extension will not be considered unless a reasonable first draft is submitted at the board review and accompanied by a proposed completion strategy which has been approved by the student's adviser.

By the end of the third year, students must complete a qualifying examination that presents and defends a proposed thesis topic.

After passing the board review based on the above-mentioned requirements and the qualifying examination, students pursue independent research leading to the doctoral dissertation. Upon completion of the Ph.D. dissertation, students must pass an oral dissertation defense. A completed draft of the thesis must be submitted to the dissertation committee at least two weeks before the date of the defense, and the defense itself must occur at least two weeks before the campus deadline for thesis submissions in that quarter. Exceptions to this policy will be granted only under exceptional circumstances and must be approved by the department chair, associate chair, and the department graduate advising committee.

The department has established five years as the normative time to degree. Normative times is the elapsed calendar time, in years, that, under normal circumstances, will be needed to complete all requirements for the Ph.D. A one-year extension may be granted if funding is available. Funding support will not, in general, be provided beyond six years. Exceptions for extension beyond six years will be granted only for exceptional extenuating circumstances, and will be decided upon by the department chair, associate chair, and the department graduate advising committee.

Electives (four required) may be drawn from this list:

Astronomy 207, *Future Directions/Future Missions*

Astronomy 214, *Special Topics in Cosmology*

Astronomy 220B, *Star Formation*

Astronomy 220C, *Advanced Stages of Stellar Evolution and Nucleosynthesis*

Astronomy 222, *Planetary Formation and Evolution*

Astronomy 223, *Planetary Physics*

Astronomy 225, *High-Energy Astrophysics*

Astronomy 231, *Diffuse Gas In and Between Galaxies*

Astronomy 235, *Numerical Techniques*

Astronomy 237, *Accretion Processes*

Astronomy 240A, *Galactic and Extragalactic Stellar Systems*

Astronomy 240B, *High Redshift Galaxies*

Astronomy 257, *Modern Astronomical Techniques*

Astronomy 260, *Instrumentation for Astronomy*

Astronomy 289, *Adaptive Optics and Its Applications*

Physics/Astronomy 224, *Origin and Evolution of the Universe*

Physics/Astronomy 226, *General Relativity*

Earth Sciences 275, *Magnetohydrodynamics*

Engineering 206, *Bayesian Statistics*

Engineering 214, *Applied Dynamical Systems*

Engineering 217, *Introduction to Fluid Dynamics*

Physics 210, *Classical Mechanics*

Physics 215, *Introduction to Non-Relativistic Quantum Mechanics*

Physics 216, *Advanced Topics in Non-Relativistic Quantum Mechanics*

Physics 217, *Quantum Field Theory I*

Physics 218, *Quantum Field Theory II*

Physics 227, *Advanced Fluid Dynamics*

Lower-Division Courses

1. Introduction to the Cosmos. F

Overview of the main ideas in our current view of the universe and how these ideas originated. Galaxies, quasars, stars, black holes, and planets. Students cannot receive credit for this course and course 2. (General Education Code(s): SI, IN.) *P. Guba Thakurta*

2. Overview of the Universe. F,W,S

An overview of the main ideas in our current view of the universe, and how they originated. Galaxies, quasars, stars, pulsars, and planets. Intended primarily for nonscience majors interested in a one-quarter survey of classical and modern astronomy. (General Education Code(s): MF, IN, Q.) *A. Steinacker, The Staff*

3. Introductory Astronomy: The Solar System. W

Properties of the solar system, the sun, solar system exploration, the physical nature of the Earth and the other planets, comets and asteroids, origin of the solar system, possibility of life on other worlds, planet formation, and search for planets beyond the solar system. Intended for nonscience majors. Courses 3, 4, and 5 are independent and may be taken separately or sequentially. (General Education Code(s): MF, IN, Q.) *D. Lin*

4. Introductory Astronomy: The Stars. *

Stellar evolution: observed properties of stars, internal structure of stars, stages of a star's life including stellar births, white dwarfs, supernovae, pulsars, neutron stars, and black holes. Planet and constellation identification. Intended for nonscience majors. Courses 3, 4, and 5 are independent and may be taken separately or sequentially. (General Education Code(s): MF, IN, Q.) *The Staff*

5. Introductory Astronomy: The Formation and Evolution of the Universe. S

The universe explained. Fundamental concepts of modern cosmology (Big Bang, dark matter, curved space, black holes, star and galaxy formation), the basic physics underlying them, and their scientific development. Intended for non-science majors. Courses 3, 4, and 5 are independent and may be taken separately. (General Education Code(s): MF, IN, Q.) *J. Brodie, G. Laughlin*

12. Stars and Stellar Evolution. W

An introduction to the observational facts and physical theory pertaining to stars. Topics include the observed properties of stars and the physics underlying those properties; stellar atmospheres; stellar structure and evolution. Intended for science majors and qualified non-science majors. Knowledge of high school physics and an understanding of mathematics at the Mathematics 2 level required. Offered in alternate academic years. (General Education Code(s): MF, IN, Q.) *S. Woosley*

13. Galaxies, Cosmology, and High Energy Astrophysics. W

Introduction to modern cosmology and extragalactic astronomy. Topics include the origin of the universe, Big Bang cosmology, expansion of the universe, dark matter and dark energy, properties of galaxies and active galactic nuclei, and very energetic phenomena in our own and other galaxies. Intended for science majors and qualified non-science majors. Knowledge of high school physics and an understanding of mathematics at the Math 2 level required. (General Education Code(s): MF, IN, Q.) *P. Madau*

15. Dead Stars and Black Holes. *

Course is primarily concerned with the structure, formation, and astrophysical manifestations of compact objects, such as white dwarfs, neutron stars, and black holes, and the astronomical evidence for their existence. Intended for science majors and qualified non-science majors. Knowledge of high school physics and an understanding of mathematics at the Math 2 level required. (General Education Code(s): MF, IN, Q.) *E. Ramirez-Ruiz*

16. Astrobiology: Life in the Universe. *

Topics include the detection of extrasolar planets, planet formation, stellar evolution and properties of Mars, the exploration of our solar system and the search for life within

it, and the evolution of life on Earth. Intended for science majors and qualified non-science majors. Knowledge of high school physics and an understanding of mathematics at the Math 2 level required. Enrollment limited to 50. (General Education Code(s): MF, IN, Q.) *A. Steinacker*

18. Planets and Planetary Systems. F

Our solar system and newly discovered planetary systems. Formation and structure of planets, moons, rings, asteroids, comets. Intended for science majors and qualified non-science majors. Knowledge of high school physics and an understanding of mathematics at the Mathematics 2 level required. Offered in alternate academic years. (General Education Code(s): IN, Q.) *C. Max*

70. Honors Undergraduate Seminar in Astrophysical Research (2 credits). F

Explores current problems in astrophysical research and how they are being solved by practicing scientists. Each presentation-discussion focuses on a different problem or question, explaining how the problem relates to broader astronomical issues, describing the methods used to solve the problem and reviewing the hoped for, or anticipated outcome. Intended for students considering a career in the physical sciences. *S. Faber, G. Smith*

80A. The Space-Age Solar System. W

Scientific study of the Moon, Earth, Mercury, Venus, and Mars by the space program; history of rocket development; the Apollo program and exploration of the Moon; unmanned spacecraft studies of the terrestrial planets; scientific theories of planetary surfaces and atmospheres. Intended for nonscience majors. (General Education Code(s): SI, T-2 Natural Sciences.) *G. Smith*

80D. Historical Astronomy. S

Historical development of astronomical thought, from stone megaliths to the expanding universe; Western astronomy from ancient Greece to the 20th century; pre-historical and non-Western astronomy; role of astronomy in development of modern science; political, social, and cultural aspects of astronomy. Prerequisite(s) satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): T2-Natural Sciences, W.) *A. Steinacker*

*Upper-Division Courses***111. Order-of-Magnitude Astrophysics. F**

Examines the most basic and direct connection between physics and astrophysics in order to derive a better understanding of astrophysical phenomena from first principles to the extent possible. Prerequisite(s): Mathematics 22 or 23A; Physics 5B or 6B; and Physics 101A. Enrollment limited to 25. *E. Ramirez-Ruiz*

112. Physics of Stars. W

The leading observational facts about stars as interpreted by current theories of stellar structure and evolution. Spectroscopy, abundances of the elements, nucleosynthesis, stellar atmospheres, stellar populations. Final stages of evolution, including white dwarfs, neutron stars, supernovae. Prerequisite(s): Mathematics 22 or 23A, Physics 5B or 6B, and 101A. *G. Glatzmaier*

113. Introduction to Cosmology. S

Physical examination of our evolving universe: the Big Bang model; simple aspects of general relativity; particle physics in the early universe; production of various background radiations; production of elements; tests of geometry of the universe; dark energy and dark matter; and formation and evolution of galaxies and large-scale structure. (Formerly *Physical Cosmology*.) Prerequisite(s): Mathematics 22 or 23A, Physics 5B or 6B, and 101A. *P. Madau*

117. High Energy Astrophysics. *

Theory and practice of space and ground-based x-ray and gamma-ray astronomical detectors. High-energy emission processes, neutron stars, black holes. Observations of x-ray binaries, pulsars, magnetars, clusters, gamma-ray bursts, the x-ray background. High-energy cosmic rays. Neutrino and gravitational-wave astronomy. Prerequisite(s): Mathematics 22 or 23A, Physics 5B or 6B, and 101A. *E. Ramirez-Ruiz*

118. Physics of Planetary Systems. *

Determination of the physical properties of the solar system, its individual planets, and extrasolar planetary systems through ground-based and space-based observations, laboratory measurements, and theory. Theories of the origin and evolution of planets and planetary systems. Prerequisite(s): Mathematics 22 or 23A or 23B, Physics 5B or 6B, and 101A. Offered in alternate academic years. *J. Fortney*

135. Astrophysics Advanced Laboratory. *

Introduction to the techniques of modern observational astrophysics at optical and radio wavelengths through hands-on experiments. Offered in some academic years as a multiple-term course: 135A in fall and 135B in winter, depending on astronomical conditions. (Also offered as Physics 135. Students cannot receive credit for both courses.) Prerequisite(s): Physics 133 and at least one astronomy course. Intended primarily for juniors and seniors majoring or minoring in astrophysics. *R. Dewey*

135A. Astrophysics Advanced Laboratory (3 credits). F

Introduction to techniques of modern observational astrophysics at optical and radio wavelengths through hands-on experiments. Intended primarily for juniors and seniors majoring or minoring in astrophysics. Offered in some academic years as single-term course 135 in fall, depending on astronomical conditions. (Also offered as Physics 135A. Students cannot receive credit for both courses.) Prerequisite(s): Physics 133 and at least one astronomy course. *R. Dewey*

135B. Astrophysics Advanced Laboratory (2 credits). W

Introduction to techniques of modern observational astrophysics at optical and radio wavelengths through hands-on experiments. Intended primarily for juniors and seniors majoring or minoring in astrophysics. Offered in some academic years as single-term course 135 in fall, depending on astronomical conditions. (Also offered as Physics 135B. Students cannot receive credit for both courses.) Prerequisite(s): Physics 133 and at least one astronomy course. *R. Dewey*

171. General Relativity, Black Holes, and Cosmology. F

Special relativity is reviewed. Curved space-time, including the metric and geodesics, are illustrated with simple examples. The Einstein equations are solved for cases of high symmetry. Black-hole physics and cosmology are discussed, including recent developments. (Also offered as Physics 171. Students cannot receive credit for both courses.) Prerequisite(s): courses 105, 110A, 110B, and 116A-B-C. *A. Aguirre*

199. Tutorial. F,W,S

May be repeated for credit. *The Staff*

*Graduate Courses***202. Radiative Processes. ***

Survey of radiative processes of astrophysical importance from radio waves to gamma rays. The interaction of ra-

diation with matter: radiative transfer, emission, and absorption. Thermal and non-thermal processes, including bremsstrahlung, synchrotron radiation, and Compton scattering. Radiation in plasmas. (Formerly *Electromagnetism and Plasma Physics*.) Offered in alternate academic years. *E. Ramirez-Ruiz*

204. Astrophysical Flows. *

Explores how physical conditions in astrophysical objects can be diagnosed from their spectra. Discussion topics include how energy flows determine the thermal state of radiating objects and how the physics of radiative transfer can explain the emergent spectral characteristics of stars, accretion disks, Lyman-alpha clouds, and microwave background. (Formerly 204A *Physics of Astrophysics I* and 204B *Physics of Astrophysics II*.) Enrollment restricted to graduate students. Offered in alternate academic years. *G. Laughlin*

205. Introduction to Astronomical Research. F

Lectures by UCSC faculty on current areas of astronomical and astrophysical research being carried out locally. Enrollment restricted to graduate students. *H. Epps*

207. Future Directions/Future Missions. *

Examines possible key science goals for the next decade, such as planet detection, galaxy formation, and "dark energy" cosmology; the means for addressing these goals, such as new space missions and/or ground-based facilities; and the political, technical, and scientific constraints on such research. Looks at the role of the Decadal Survey. Examines a few existing programs (DEEP, ALMA, SNAP, NGST) as examples. Enrollment restricted to graduate students. Offered in alternate academic years. *G. Illingworth*

212. Dynamical Astronomy. W

Surveys dynamical processes in astrophysical systems on scales ranging from the planetary to the cosmological, stability and evolution of planetary orbits, scattering processes and the few-body problem, processes in stellar clusters, spiral structure and galactic dynamics, galactic collisions, and evolution of large-scale structure. Enrollment restricted to graduate students. *G. Laughlin*

214. Special Topics in Galactic and Extragalactic Astronomy. *

Survey of some principal areas of research on the origin and growth of cosmic structures and galaxies: the "dark ages," 21cm tomography; first galaxies; first stars and seed black holes; reionization and chemical enrichment of the intergalactic medium; the assembly of massive galaxies; quasi-stellar sources; interactions of massive black holes with their environment; extragalactic background radiation; numerical simulations and the nature of the dark matter; the dark halo of the Milky Way. (Formerly *Special Topics in Cosmology*) Enrollment restricted to graduate students. *P. Madau*

220A. Stellar Structure and Evolution. F

Survey of stellar structure and evolution. Physical properties of stellar material. Convective and radiative energy transport. Stellar models and evolutionary tracks through all phases. Brown dwarfs and giant planets. Comparison with observations. Enrollment restricted to graduate students. Offered in alternate academic years. *J. Fortney*

220B. Star Formation. S

Theory and observations of star formation. Observational techniques used to study star formation, particularly millimeter line and continuum observations, and infrared, visible, and UV star-formation tracers. Physics of giant molecular clouds and galaxy-scale star formation. Gravitational instability, collapse, and fragmentation. Pre-main sequence stellar evolution. Protostellar accretion disks and jets. Radiative feedback and HII regions. (Formerly *Star*

and Planet Formation) Prerequisite(s): course 220A. Offered in alternate academic years. *M. Krumholz*

220C. Advanced Stages of Stellar Evolution and Nucleosynthesis. S

The evolution of massive stars beyond helium burning; properties of white dwarf stars; physics and observations of novae, supernovae, and other high energy stellar phenomena; nuclear systematics and reaction rates; the origin and production of all the chemical elements. Prerequisite(s): course 220A. Enrollment restricted to graduate students. Offered in alternate academic years. *S. Woosley*

222. Planetary Formation and Evolution. *

Theory and observations of protoplanetary disks. Origin and evolution of the solar nebula. Formation and evolution of the terrestrial planets and the giant planets. (Formerly *Planetary Science*) Enrollment restricted to graduate students. Offered in alternate academic years. *D. Lin*

223. Planetary Physics. W

Survey of interiors, atmospheres, thermal evolution, and magnetospheres of planets, with focus on the astronomical perspective. Course covers exoplanets and solar system planets, both giant and terrestrial, with attention to current and future observations. Enrollment restricted to graduate students. *J. Fortney*

224. Origin and Evolution of the Universe. *

Introduction to the particle physics and cosmology of the very early universe: relativistic cosmology, initial conditions, inflation and grand unified theories, baryosynthesis, nucleosynthesis, gravitational collapse, hypotheses regarding the dark matter and consequences for formation of galaxies and large scale structure. (Also offered as Physics 224. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Offered in alternate academic years. *J. Primack*

225. High-Energy Astrophysics. *

High-energy astrophysics and the final stages of stellar evolution: supernovae, binary stars, accretion disks, pulsars; extragalactic radio sources; active galactic nuclei; black holes. (Formerly *Physics of Compact Objects*) Offered in alternate academic years. *E. Ramirez-Ruiz*

226. General Relativity. *

Develops the formalism of Einstein's general relativity, including solar system tests, gravitational waves, cosmology, and black holes. (Also offered as Physics 226. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Offered in alternate academic years. *A. Aguirre*

230. Diffuse Matter in Space. *

Fundamental physical theory of gaseous nebulae and the interstellar medium. Ionization, thermal balance, theory and observation of emission spectra. Interstellar absorption lines, extinction by interstellar dust. Ultraviolet, optical, infrared, and radio spectra of gaseous nebulae. (Formerly *Low-Density Astrophysics*) Offered in alternate academic years. *M. Krumholz*

231. Diffuse Gas In and In Between Galaxies. *

Examines the observational data and theoretical concepts related to the interstellar medium (gas inside galaxies); intracluster medium (gas in between galaxies in clusters); and intergalactic medium (gas in between field galaxies). Emphases on the inferred physical conditions of this gas and its implications for cosmology and processes of galaxy formation. Enrollment restricted to graduate students. *J. Prochaska*

233. Physical Cosmology. *

Survey of modern physical cosmology, including Newtonian cosmology, curved space-times, observational tests of

cosmology, the early universe, inflation, nucleosynthesis, dark matter, and the formation of structure in the universe. Prerequisite(s): course 202. Offered in alternate academic years. *P. Madau*

235. Numerical Techniques. *

Gives students a theoretical and practical grounding in the use of numerical methods and simulations for solving astrophysical problems. Topics include N-body, SPH and grid-based hydro methods as well as stellar evolution and radiation transport techniques. Enrollment restricted to graduate students. Offered in alternate academic years. *G. Laughlin*

237. Accretion Processes. *

Theories of spherical accretion, structure and stability of steady-state accretion disks, and the evolution of time-dependent accretion disks. Applications of these theories to the formation of the solar system as well as the structure and evolution of dwarf novae and X-ray sources are emphasized. (Formerly *Accretion in Early and Late Stages of Stellar Evolution*) Offered in alternate academic years. *D. Lin*

240A. Galactic and Extragalactic Stellar Systems. *

Structure and evolutionary histories of nearby galaxies. Stellar populations, galactic dynamics, dark matter, galactic structure and mass distributions. Peculiar galaxies and starbursting galaxies. Structure and content of the Milky Way. Evolution of density perturbations in the early universe. Hierarchical clustering model for galaxy formation and evolution. Offered in alternate academic years. *C. Rockosi*

240B. High Redshift Galaxies. *

Galaxy formation and evolution from observations of intermediate-to-high redshift galaxies (z 0.5-5). Complements and builds on 240A. Cluster galaxies and field galaxies. Foundation from classic papers on distant galaxies. Recent discoveries from IR and sub-mm measurements. Impact of AGNs and QSOs. Overview of modeling approaches. Identify theoretical and observational issues. (Formerly *Galactic and Extragalactic Stellar Systems*) Enrollment restricted to graduate students. Offered in alternate academic years. *G. Illingworth*

257. Modern Astronomical Techniques. *

Covers physical, mathematical, and practical methods of modern astronomical observations at all wavelengths at a level that prepares students to comprehend published data and to plan their own observations. Topics include: noise sources and astrophysical backgrounds; coordinate systems; filter systems; the physical basis of coherent and incoherent photon detectors; astronomical optics and aberrations; design and use of imaging and spectroscopic instruments; antenna theory; aperture synthesis and image reconstruction techniques; and further topics at the discretion of the instructor. (Formerly *Modern Observational Techniques*) Offered in alternate academic years. *M. Bolte*

260. Instrumentation for Astronomy. F

An introduction to astronomical instrumentation for infrared and visible wavelengths. Topics include instrument requirements imposed by dust, atmosphere, and telescope; optical, mechanical, and structural design principles and components; electronic and software instrument control. Imaging cameras and spectrographs are described. Offered in alternate academic years. Enrollment restricted to graduate students. *C. Rockosi*

289. Adaptive Optics and Its Application. *

Introduction to adaptive optics and its astronomical applications. Topics include effects of atmospheric turbulence on astronomical images, basic principles of feedback control, wavefront sensors and correctors, laser guide stars,

how to analyze and optimize performance of adaptive optics systems, and techniques for utilizing current and future systems for astronomical observations. (Formerly course 289C.) Enrollment restricted to graduate students. Offered in alternate academic years. *C. Max*

292. Seminar (no credit). F,W,S

Seminar attended by faculty, graduate students, and upper-division undergraduate students. *The Staff*

297. Independent Study. F,W,S

Independent study or research for graduate students who have not yet begun work on their theses. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. *The Staff*

Biochemistry and Molecular Biology

Physical and Biological Sciences Undergraduate Affairs
387 Thimann Laboratories
(831) 459-4143
<http://undergrad.pbsci.ucsc.edu>

Faculty and Professional Interests

MANUEL ARES, Molecular, Cell, and Developmental Biology

RNA processing, structure and function of RNA

ROBERTO A. BOGOMOLNI, Chemistry and Biochemistry

Biophysical chemistry, photobiology, light energy conversion and signal transduction in biological systems

BARRY J. BOWMAN, Molecular, Cell, and Developmental Biology

Membrane biochemistry and genetics, biochemistry and molecular biology of membrane proteins

JOSHUA DEUTSCH, Physics

Condensed matter theory

ÓLÖF EINARSDÓTTIR, Chemistry and Biochemistry

Time-resolved spectroscopy, biophysics and bioenergetics, heme-copper oxidases, electron transfer, application of photolabile NO and O₂ donors

JERRY F. FELDMAN, Emeritus

LINDSAY HINCK, Molecular, Cell, and Developmental Biology

Neurobiology, cell biology, development

THEODORE R. HOLMAN, Chemistry and Biochemistry

Biochemistry and bioinorganic chemistry; lipoxigenase enzymology, protein engineering, inhibitor discovery, computer inhibitor design, mass spectroscopy, and electron paramagnetic resonance

DOUGLAS KELLOGG, Molecular, Cell, and Developmental Biology

Coordination of cell growth and cell division

SCOTT LOKEY, Chemistry and Biochemistry

Organic chemistry; combinatorial synthesis, biotechnology, molecular cell biology

ROBERT A. LUDWIG, Molecular, Cell, and Developmental Biology

Plant-microbe interactions, photorespiration, genetic recombination in plants

PRADIP MASCHARAK, Chemistry and Biochemistry
Bioinorganic chemistry, design of antitumor drugs, modeling of active sites of metalloenzymes, design of catalysts for hydrocarbon oxidation, studies on intermediates in non-heme oxygenase chemistry, design of NO-donors for photodynamic therapy

GLENN L. MILLHAUSER, Chemistry and Biochemistry

Electron spin resonance; nuclear magnetic resonance, melanocortin receptor signaling, agouti proteins, prions, peptide synthesis

HARRY F. NOLLER, Robert L. Sinsheimer Professor, Molecular, Cell, and Developmental Biology

Ribosomes, RNA structure and function, RNA-protein interaction

CLIFTON A. POODRY, Emeritus

SETH M. RUBIN

Biomolecular mechanisms of cell-cycle regulation and cancer; structural biology and biochemistry; macromolecular x-ray crystallography; nuclear magnetic resonance

THOMAS W. SCHLEICH, Chemistry and Biochemistry

Biomedical magnetic resonance spectroscopy, magnetic resonance imaging, nuclear magnetic resonance spectroscopy, biophysical chemistry

WILLIAM G. SCOTT, Chemistry and Biochemistry
Structure and function of RNA, proteins, and their complexes, origin of life

WILLIAM SULLIVAN, Molecular, Cell, and Developmental Biology

Genetics, cell biology, development of the Drosophila embryo

LINCOLN TAIZ, Emeritus

FRANK J. TALAMANTES, Emeritus

JOHN W. TAMKUN, Molecular, Cell, and Developmental Biology

Transcriptional regulation, molecular genetics of Drosophila development, regulation of gene expression

ALAN M. ZAHLER, Molecular, Cell, and Developmental Biology

Molecular biology, splice site selection, and alternative pre-mRNA processing

MARTHA C. ZUNIGA, Molecular, Cell, and Developmental Biology

Molecular, cellular, and developmental biology of the immune system

Program Description

Research at the macromolecular, molecular, and atomic levels is revolutionizing our understanding of the fundamental processes of life. Students interested in joining this search are best prepared by undertaking course work in biology, chemistry, physics, mathematics, and computer science. Toward this end, an undergraduate major in biochemistry and molecular biology (BMB) is offered by faculty who are actively engaged in research on biological systems.

Students who declare the BMB major earn a bachelor of science (B.S.) degree. The BMB major constitutes an integrated curriculum of basic instruction in biology, chemistry, mathematics, and physics, followed by the opportunity to pursue advanced study in specialized areas of interest. In modern, well-equipped laboratories, distinguished faculty are engaged in frontline research at UCSC. The Department of Chemistry and Biochemistry hosts a very active seminar series of national and international scholars in which advanced

undergraduates are encouraged to participate.

The BMB program features close faculty-student interaction, small upper-division classes, stimulating learning environments, and opportunities for independent research and study. Students majoring in BMB are encouraged to become involved in research under the guidance of a faculty sponsor. Many students participating in this aspect of the program have made important contributions to the scientific literature.

Given the wide scope and interdisciplinary nature of this program, a considerable degree of flexibility has been incorporated into the major. All prospective majors should consult the Department of Chemistry and Biochemistry to be assigned a BMB adviser as early as possible. Junior transfer students or others with questions should consult the Department of Chemistry and Biochemistry undergraduate program adviser. To become a BMB major, a student must file a declaration of major petition through the Department of Chemistry and Biochemistry. A double major of BMB with the biological sciences majors or chemistry is not permitted. No minor is offered.

Requirements for the B.S. Degree

Lower-Division Requirements

General Chemistry: CHEM 1A, 1B/M, and 1C/N

Calculus: Mathematics 11A-B and 22; or Mathematics 19A-B and 22

Statistics: Applied Mathematics and Statistics 5 or 7/L

Introductory Biology: Biology: Molecular, Cell, and Developmental (BIOL) 20A and Biology: Ecology and Evolutionary (BIOE) 20B

Physics: Physics 5A/L, 5B/M, and 5C/N; or 6A/L, 6B/M, and 6C/N

Upper-Division Requirements

Organic Chemistry: CHEM 108A/L, 108B/M or 112A/L, 112B/M, and 112C/N

Biochemistry: BIOC 100A, 100B, and 100C and BIOL 100K

Genetics: Biology: Molecular, Cell, and Developmental 105

Cell Biology: BIOL 110

Molecular Biology: BIOL 115

Physical Chemistry: CHEM 163A and 163B

One of the following laboratory courses:

BIOC 110, *Biochemistry Laboratory*

BIOL 100L, *Advanced Biochemistry Laboratory*

BIOL 105L, *Eukaryotic Genetics Laboratory*

BIOL 105M, *Microbial Genetics Laboratory*

BIOL 109L, *Yeast Molecular Genetics Laboratory*

BIOL 110L, *Cell Biology Laboratory*

BIOL 115L, *Eukaryotic Molecular Biology Laboratory*

BIOL 119L, *Microbiology Laboratory*

BIOL 186L, *Undergraduate Research in MCD Biology*

BIOL 187L, *Molecular Biotechnology Laboratory*

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in Biochemistry and Molecular Biology is satisfied by completing one of the following courses: BIOC 110, BIOL 100L, 105L, 105M, 109L, 110L, 115L, 119L, or 187L. Please refer

to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

Biochemistry and Molecular Biology Planner

<http://undergrad.pbsci.ucsc.edu/programs/bioc/biocbs.html>

Comprehensive Requirement

Students have the following options for fulfilling the comprehensive requirement:

- By completing a senior thesis (see Chemistry and Biochemistry for more information);
- By completing a senior essay (see Chemistry and Biochemistry for more information);
- By receiving a passing grade in an independent research laboratory:
 - BIOC 110, *Biochemistry Laboratory*
 - BIOL 100L, *Advanced Biochemistry Laboratory*
 - BIOL 105L, *Eukaryotic Genetics Laboratory*
 - BIOL 105M, *Microbial Genetics Laboratory*
 - BIOL 109L, *Yeast Molecular Genetics Laboratory*
 - BIOL 110L, *Cell Biology Laboratory*
 - BIOL 115L, *Eukaryotic Molecular Biology Laboratory*
 - BIOL 119L, *Microbiology Laboratory*
 - BIOL 186L, *Undergraduate Research in MCD Biology*
 - BIOL 187L, *Molecular Biotechnology Laboratory*
- By achieving a graduate record examination (GRE) score at or above the 50th percentile on the biology subject test or the biochemistry, cell, and molecular biology subject test. Reports of GRE scores must be submitted to the Physical and Biological Sciences Undergraduate Affairs office before the last day of the graduating quarter.
- By obtaining a medical college admission test (MCAT) score at or above the 50th percentile on the biological sciences section. Reports of MCAT scores must be submitted to the biological sciences advising office before the last day of the graduating quarter.

Program Planning Notes

Students who do not begin the lower-division requirements during their first year may have difficulty completing the program within four years. Transfer students may also have problems completing the program within the usual time, depending upon whether they took equivalent courses at their previous institutions. The program adviser works closely with students interested in pursuing the major to insure that they begin the program immediately and follow the appropriate steps toward its completion.

It is strongly recommended that students avail themselves of the opportunities to obtain firsthand research experience through either independent study or senior thesis research. A tutorial course or a senior thesis research course may not be substituted for the required laboratory elective.

A number of graduate courses in biochemistry and molecular biology are offered by the molecular, cell, and developmental (MCD) biology, and chemistry and biochemistry programs. Advanced undergraduates with the necessary background may take one or more of these

courses with the consent of the instructor; however, graduate courses may not be substituted for the required elective courses.

Letter Grade Policy

For all students entering UCSC in fall 2001 and later, all courses used to satisfy any of the major requirements must be taken for a letter grade.

Major Disqualification Policy

All biochemistry and molecular biology majors are subject to the Biological Sciences major disqualification policies.

Materials Fee

Biochemistry and molecular biology students should be aware of the materials fee required for some laboratory courses. The fee is billed to the student's account for specific laboratory materials purchased by the Department of Chemistry and Biochemistry through the university. Fees generally range from \$15 to \$75 per course. Students may incur additional expenses purchasing individual supplies.

Upper-Division Courses

100A. Biochemistry. F

Fundamentals of molecular biology, structure and function of nucleic acids, and protein structure. Designed for students preparing for research careers in biochemistry and molecular biology. Lecture: 3-1/2 hours; discussion: 1-1/4 hours. Prerequisite(s): Chemistry 108B or 112C; Biology 20A; Concurrent enrollment in BIOL 100K is required. *M. Jurica, M. Ares*

100B. Biochemistry. W

Covers enzyme mechanisms, kinetics, regulations, membrane composition and structure, specialized membrane functions, active transport and electro-chemical storage, excitable membranes and neurotransmitters, membrane receptors and sensory transduction mechanisms. Lecture: 3-1/2 hours; discussion: 1-1/4 hours. Prerequisite(s): course 100A *S. Rubin*

100C. Biochemistry. S

Biochemistry: intermediary metabolism and bioenergetics. How enzymatically catalyzed reactions are organized and regulated; how energy from molecules is extracted for chemical work. Lecture: 3-1/2 hours; discussion: 1-1/4 hours. prerequisite(s): course 100B *R. Ludwig*

110. Biochemistry Laboratory. S

An introduction to the major techniques used in the isolation and characterization of biological components. Laboratory: 8 hours; lecture: 1-1/4 hours. Students are billed a materials fee. Prerequisite(s): course 100B and satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): W.) *O. Einarsdóttir*

Bioengineering

See Engineering, page 230.

Bioinformatics

See Engineering, page 234.

Biological Sciences

The biological sciences at UCSC are comprised of two academic departments: Ecology and Evolutionary Biology (courses BIOE) and Molecular, Cell, and Developmental Biology (courses BIOL). The two academic departments collectively sponsor the undergraduate program while each offers its own independent graduate program. Faculty within the biological sciences are affiliated with either Ecology and Evolutionary Biology, or Molecular, Cell, and Developmental Biology.

Physical and Biological Sciences Undergraduate Affairs
387 Thimann Laboratories
(831) 459-4143
<http://undergrad.pbsci.ucsc.edu>

Undergraduate Program Description

The biological sciences have entered into an exciting new era in which phenomena that once seemed insoluble mysteries—such as embryonic development, the functions of the brain, and the dynamics of ecosystems—are now yielding their secrets as the technology to study them becomes more and more sophisticated. From molecular biology, with its potential to revolutionize medicine and agriculture, to ecology, with its lessons for the sustainable management of the environment, biologists are fully engaged in meeting the challenges of the future, helping to improve the quality of human life and to preserve habitats and biodiversity. Thus, it is no surprise that the biological sciences are at the heart of many of today's most pressing intellectual and social concerns.

The Departments of Ecology and Evolutionary Biology (EEB) and Molecular, Cell, and Developmental Biology (MCDB) offer a broad spectrum of courses that reflect the exciting new developments and directions in the field of biology. An outstanding group of faculty, each with a vigorous, internationally recognized research program, is available to teach courses in their specialties as well as core courses for the major. Areas of research strength within the departments include RNA molecular biology, molecular and cellular aspects of genetics and development, neurobiology, immunology, microbial biochemistry, plant biology, animal behavior, physiology, evolution, ecology, and marine biology. UCSC is unique in the UC system in providing exceptional opportunities for undergraduate research, allowing students to interact one-on-one with faculty and other researchers in a laboratory or field setting.

Biological Sciences Majors

Students may plan a program that leads to one of several bachelor of arts (B.A.) or bachelor of science (B.S.) degrees. Students may choose from the following major options:

Majors jointly sponsored by Ecology and Evolutionary Biology (EEB) and Molecular, Cell, and Developmental Biology (MCDB):

- Biology B.A.
- Biology B.S.
- Biology B.A. (bioeducation concentration)

Majors sponsored by Ecology and Evolutionary Biology (EEB):

- Ecology and evolution B.S.
- Marine biology B.S.

Plant sciences B.S.

Environmental studies/biology combined major B.A. (administered in conjunction with the Environmental Studies Department)

Majors sponsored by Molecular, Cell, and Developmental Biology (MCDB):

Human biology B.S.

Molecular, cell, and developmental biology B.S.

Neuroscience B.S.

Biochemistry and molecular biology B.S. (administered in conjunction with the Chemistry and Biochemistry Department)

Bioinformatics B.S. (administered in conjunction with the School of Engineering)

Bioengineering B.S. (administered in conjunction with the School of Engineering)

Advanced undergraduates, with the guidance of faculty mentors, have access to extensive departmental laboratory facilities for independent research. Fieldwork draws on a remarkable variety of terrestrial habitats, as well as ready access to Monterey Bay and the open Pacific. Marine studies are supported by a coastal facility with running seawater, with a research vessel available for offshore work. Año Nuevo Island, north of Santa Cruz, is the site of extensive behavioral studies of marine mammals. Hospitals, convalescent and physical therapy centers, veterinary clinics, and other enterprises in the vicinity of the campus provide the opportunity to pursue field projects and internships comparable to on-the-job training. This array of opportunities for directed independent study enables biological science majors to enhance their upper-division programs to reflect and strengthen their own interests and goals in the sciences.

Prerequisites for the Biological Sciences

The introductory biology sequence is prerequisite to virtually all upper-division biology courses. BIOL 20A has a prerequisite of Chemistry 1A and 1B. Therefore, it is essential for students considering a major in the biological sciences to start chemistry as soon as possible. Students who have not taken Chemistry 1A or 1B but are prepared to begin biology may begin the introductory sequence with BIOE 20C. The entire introductory biology sequence should be taken the first and second year, concurrently with or following the general chemistry sequence (Chemistry 1A, 1B, and 1C/N).

The Mathematics Department offers a placement examination several times a year. Biological science majors are expected to take this examination. If the results indicate a need for precalculus, students need to take Mathematics 3 as soon as possible. Students with even less preparation may need to take college algebra at another institution.

Students intending to major in human biology should take the Spanish placement examination, offered by the language program, to determine with which course they should begin the Spanish sequence.

Course Substitution/Transfer Credit Policy

At least half of the upper-division courses (numbered 100–190) required for each major must be taken through the biological sciences program at UCSC, not as transfer credits from another department or institution. Transfer students are advised to contact the Physical and Biological Sciences Undergraduate Affairs office before enrolling in numerous upper-division courses at other institutions. For more information on

transferring courses to UCSC, please consult the undergraduate web site at <http://undergrad.pbsci.ucsc.edu>.

A maximum of one upper-division course requirement may be met with a research-based independent study or graduate-level UCSC biology course or a course offered by another UCSC department.

Declaration Process for Biological Sciences Majors

Declaration guidelines can be found on the Physical and Biological Sciences Undergraduate Affairs web site at <http://undergrad.pbsci.ucsc.edu>.

Comprehensive Requirement

All majors in the biological sciences require a comprehensive requirement. This requirement can be satisfied in one of the following ways:

- by passing course 190, *Senior Seminar*;
- by receiving a passing grade in an internship, independent research laboratory, or field course:

Biological Sciences-EEB

BIOE 114L, *Field Methods in Herpetological Research*

BIOE 141L, *Behavioral Ecology Field Course*

BIOE 145L, *Field Methods in Plant Ecology*

BIOE 150L, *Ecological Field Methods*

BIOE 151, *Ecology and Conservation in Practice*

BIOE 155L, *Freshwater Ecology Laboratory*

BIOE 158L, *Marine Ecology Laboratory*

BIOE 159, *Marine Ecology Field Quarter*

BIOE 161L, *Kelp Forest Ecology Laboratory*

BIOE 183, *Undergraduate Research in EEB*

Biological Sciences-MCDB

BIOL 100L, *Advanced Biochemistry Laboratory*

BIOL 105L, *Eukaryotic Genetics Laboratory*

BIOL 105M, *Microbial Genetics Laboratory*

BIOL 109L, *Yeast Molecular Genetics Laboratory*

BIOL 110L, *Cell Biology Laboratory*

BIOL 111L, *Immunology Laboratory*

BIOL 115L, *Eukaryotic Molecular Biology Laboratory*

BIOL 119L, *Microbiology Laboratory*

BIOL 120L, *Developmental Biology Laboratory*

BIOL 186L, *Undergraduate Research in MCD Biology*

BIOL 189, *Health Sciences*

- by completing a senior thesis;
- by achieving a graduate record examination (GRE) score at or above the 50th percentile on the biology subject test or the biochemistry, cell, and molecular biology subject test. Reports of GRE scores must be submitted to the biological sciences advising office before the last day of the graduating quarter;
- by obtaining a medical college admission test (MCAT) score at or above the 50th percentile on the biological sciences section. Reports of MCAT scores must be submitted to the biological sciences advising office before the last day of the graduating quarter.

Letter Grade Policy

For all students entering UCSC in fall 2001 and later, all courses used to satisfy any of the biological sciences majors must be taken for a letter grade.

Major Disqualification Policy

The biological sciences departments have adopted a major disqualification policy that is intended to encourage students to take their performance in the introductory requirements seriously and to make a strong effort to pass the introductory courses.

Students who receive more than one No Pass, D, and/or F in the following introductory major requirements will not be permitted to major in any of the biological sciences majors:

BIOL 20A, *Cell and Molecular Biology*

BIOE 20B, *Development and Physiology*

BIOE 20C, *Ecology and Evolution*

Chemistry 1A, *General Chemistry*

Chemistry 1B, *General Chemistry*

Chemistry 1C, *General Chemistry*

Mathematics 11A, *Calculus with Applications*

Mathematics 11B, *Calculus with Applications*

Mathematics 19A, *Calculus for Science, Engineering, and Mathematics*

Mathematics 19B, *Calculus for Science, Engineering, and Mathematics*

Students will be assessed for disqualification after grades are submitted each quarter and at the end of each summer session.

Students may appeal their disqualification within the appeal period by writing a letter to the department chair. This appeal must be submitted to the advising office no later than 15 days from the date the disqualification notification was mailed. The advising office will subsequently notify the student, the college, and the Office of the Registrar of the decision no later than 15 days after the submission of the appeal.

A student who has been disqualified from the major may, no earlier than three months from the date of the disqualification, petition to be reinstated. This application will be considered only if there is substantial new evidence that the student is capable of making normal progress in the major.

Academic Advising

Academic advising is available at the Physical and Biological Sciences Undergraduate Affairs office. Students should take full advantage of this opportunity and should keep in frequent touch with the office to stay informed about late announcements of courses, changes in scheduling, and opportunities for special study.

The undergraduate web site (<http://undergrad.pbsci.ucsc.edu>) serves as the program handbook containing advice and information pertinent to students' most frequently voiced questions. Each student in the major should review the information posted on the web site; for further assistance, contact an academic advisor.

Transfer Students

The faculty encourages applications from transfer students in the biological sciences. It is imperative transfer students complete science prerequisite courses before they transfer, especially a complete sequence of calculus, general chemistry, and introductory biology. Students should also take organic chemistry, if possible. Students

who transfer without having completed the prerequisite coursework may have difficulty enrolling in courses and may require more than two years to complete a biological sciences degree. Prospective transfer students should review the transfer guidelines at <http://undergrad.pbsci.usc.edu> or contact the Physical and Biological Sciences Undergraduate Affairs office for further information.

Honors

Honors in the biological sciences majors are awarded to graduating students whose academic performance demonstrates excellence at a grade point average (GPA) of 3.5 or above. Highest honors are awarded to those students whose performance demonstrates the highest level of excellence and results in a GPA of 3.8 or above.

Medical and Professional School Admission

Medical and professional school admissions requirements vary; students should verify that their coursework will satisfy the admissions requirements of the programs to which they plan to apply.

Education Abroad Opportunities

The UC Education Abroad Program (EAP) offers qualified students unique opportunities to broaden their educational horizons. The biological sciences departments encourage interested students to participate. Many programs are in English-speaking countries or use English for advanced courses. Many programs offer small classes, extensive laboratories, and/or field research experience.

There are excellent programs for biological science students in Costa Rica, Australia, New Zealand, the United Kingdom, Denmark, and Germany, among others. The Costa Rica Tropical Biology Program is of note to students interested in tropical biology and ecology. Held spring and fall quarters at the Monteverde research station, this program gives students experience with hands-on field research, offers a homestay program, and carries credit for two upper-division biology courses. The University of Queensland (Australia) offers an intensive, full-semester marine science program, which includes stays at research stations on the Great Barrier Reef and in sheltered mangrove and seagrass habitats near Brisbane.

Students interested in study abroad need to get an early start on their basic science requirements, including chemistry, mathematics, and introductory biology and must declare their major prior to applying to go abroad. Visit the EAP office as soon as possible to begin planning, and seek advice about your schedule from the biological sciences undergraduate adviser and/or faculty adviser.

General Biology Majors and Minor

The general biology majors permit flexibility, but demand careful attention to a student's own interests and plans. Each student should select courses on the basis of up-to-date information in consultation with a biology faculty adviser whose interests reflect the student's interests.

General Biology B.A. Major Requirements

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C
General Chemistry: Chemistry 1A, 1B and 1C/N
Organic Chemistry: Chemistry 108A/L and 108B
Calculus: Mathematics 11A-B or 19A-B
Statistics: Applied Mathematics and Statistics 5
Physics: Physics 6A/L, and 6B or 6C

Advanced Requirements

A total of eight upper-division biology courses, as follows:

Biochemistry: BIOL 100/K

Genetics: BIOL 105

Evolution: BIOE 109

Students must fulfill the major distribution requirement, which includes one course from each of the following groups:

Cell/Developmental biology:

BIOL 110, *Cell Biology*

BIOL 111, *Immunology*

BIOL 115, *Eukaryotic Molecular Biology*

BIOL 119, *Microbiology*

BIOL 120, *Developmental Biology*

Physiology:

BIOE 131/L, *Animal Physiology/Laboratory*

BIOE 135, *Plant Physiology*

BIOL 113, *Endocrinology*

BIOL 125, *Introduction to Neuroscience*

BIOL 130/L, *Human Physiology/Laboratory*

Ecology:

BIOE 107, *Ecology*

BIOE 108, *Marine Ecology*

Electives

Students must complete two additional upper-division biology electives chosen from Biological Sciences-EEB or Biological Sciences-MCDB.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement for the biology bachelor of arts degree is satisfied by completing courses BIOE 107, *Ecology*, or BIOE 108, *Marine Ecology*, and BIOE 109, *Evolution*.

General Biology B.A. Sample Planners

<http://undergrad.pbsci.usc.edu/programs/biol/biolba-sample.html>

General Biology, Bioeducation Concentration, B.A.

The General Biology, Bioeducation Concentration, B.A. major is designed to meet the needs of students who plan careers as K-12 science teachers. It provides students with a rigorous education in biology through science breadth courses to prepare them for the state credentialing examinations (CSET) in biology/life sciences and general science, and courses covering education theory and practical teaching experience through internships in local schools.

General Biology, Bioeducation Concentration, B.A. Requirements

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C
General Chemistry: Chemistry 1A, 1B, and 1C/N
Organic Chemistry: Chemistry 108A/L and 108B
Calculus: Mathematics 11A-B or 19A-B
Statistics: Applied Mathematics and Statistics 5 or 7/L

Physics: Physics 6A/L, and 6B or 6C

Earth Sciences: Earth Sciences 20/L

Education: Education 50C

Astronomy: Astronomy 2

Advanced Requirements

A total of seven upper-division biology courses, as follows:

BIOL 100/K, *Biochemistry/Laboratory*

BIOL 105, *Genetics*

BIOE 109, *Evolution*

BIOE 107, *Ecology*

Students must fulfill the major distribution requirement, which includes one course from each of the following groups:

Cell/developmental biology:

BIOL 110, *Cell Biology*

BIOL 115, *Eukaryotic Molecular Biology*

BIOL 119, *Microbiology*

BIOL 120, *Developmental Biology*

Physiology:

BIOE 131, *Animal Physiology*

BIOE 135, *Plant Physiology*

BIOL 113, *Endocrinology*

BIOL 130, *Human Physiology*

Biology Laboratory:

One five-credit upper-division biology laboratory course, or

BIOL 130L, *Human Physiology Laboratory*

BIOL 131L, *Animal Physiology Laboratory*

(BIOL 135L cannot be used to satisfy the laboratory requirement in the bioeducation concentration.)

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in the General Biology, Bioeducation Concentration is satisfied by completing courses BIOE 107, *Ecology*, or BIOE 108, *Marine Ecology*, and BIOE 109, *Evolution*.

General Biology, Bioeducation Concentration, B.A. Sample Planners

<http://undergrad.pbsci.usc.edu/programs/biol/biolba-sample.html>

General Biology B.S. Major Requirements

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C
General Chemistry: Chemistry 1A, 1B, and 1C/N
Organic Chemistry: Chemistry 108A/L and 108B
Calculus: Mathematics 11A-B or 19A-B
Statistics: Applied Mathematics and Statistics 5 or 7/L
Physics: Physics 6A/L, and 6B or 6C

Advanced Requirements

A total of nine upper-division biology courses, as follows:

Biochemistry: BIOL 100/K

Genetics: BIOL 105

Evolution: BIOE 109

Students must complete one upper-division biology course that includes regular laboratory or fieldwork. Students must fulfill the major distribution requirement, which includes one course from each of the following groups:

Cell/developmental biology:

BIOL 110, *Cell Biology*
 BIOL 111, *Immunology*
 BIOL 115, *Eukaryotic Molecular Biology*
 BIOL 119, *Microbiology*
 BIOL 120, *Developmental Biology*

Physiology:

BIOE 131/L, *Animal Physiology/Laboratory*
 BIOE 135, *Plant Physiology*
 BIOL 113, *Endocrinology*
 BIOL 125, *Introduction to Neuroscience*
 BIOL 130/L, *Human Physiology/Laboratory*

Ecology:

BIOE 107, *Ecology*
 BIOE 108, *Marine Ecology*

Electives

Students must complete three additional upper-division biology electives chosen from Biological Sciences-EEB courses or Biological Sciences-MCDB courses.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement for the biology bachelor of science degree is satisfied by completing courses BIOE 107, *Ecology*, or BIOE 108, *Marine Ecology*, and BIOE 109, *Evolution*.

General Biology B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/biol/biolbs-sample.html>

General Biology Minor Requirements

In addition to the introductory biology, chemistry, mathematics, and physics (as listed above for the biology B.A.), students are required to take a total of five upper-division biology courses including courses BIOL 100/K, BIOL 105, and the three distribution requirement courses; one course must include a laboratory. There is no senior comprehensive requirement for the minor. Please contact the Physical and Biological Sciences Undergraduate Affairs office for further information.

Degree Programs Sponsored by Ecology and Evolutionary Biology

Ecology and Evolution Major

Program Description

The ecology and evolution major provides students with interdisciplinary skills necessary for understanding and solving complex problems in ecology, evolution, behavior, and physiology. While some of these disciplines focus on molecular or chemical mechanisms, they all address questions on larger spatial and temporal scales that can be applied to important environmental problems, including genetic and ecological aspects of conservation biology and biodiversity.

Students majoring in ecology and evolution will receive a B.S. degree based on an integrated series of courses providing breadth in fundamental areas of biology and allied sciences that enhance understanding of evolutionary and ecological processes. The capstone of this curriculum is a suite of field courses providing students unique opportunities to learn and conduct research in a host of ecological systems. Students are encouraged to take field courses in their areas of specialization. Other opportunities include participation in research projects with faculty sponsors and the intensive Education Abroad Programs (EAP) in Costa Rica (tropical biology) and Australia (marine sciences).

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Ecology and Evolution B.S. Major Requirements

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C
General Chemistry: Chemistry 1A, 1B and 1C/N
Calculus: Mathematics 11A-B or 19A-B
Biostatistics: Applied Mathematics and Statistics 7/L
Physics: Physics 6A/L, and 6B or 6C

Advanced Requirements

A total of eleven upper-division courses; two must include laboratory or fieldwork.

Genetics: BIOL 105
Ecology: BIOE 107
Evolution: BIOE 109

One of the following physiology courses:

BIOE 131/L, *Animal Physiology/Laboratory*
 BIOE 135, *Plant Physiology*

One of the following organism courses:

BIOE 117/L, *Systematic Botany of Flowering Plants/Laboratory*
 BIOE 120/L, *Marine Botany/Laboratory*
 BIOE 122/L, *Invertebrate Zoology/Laboratory*
 BIOL 119/L, *Microbiology/Laboratory*

Elective list for Ecology and Evolution Major

Three topical electives chosen from the following:

BIOE 108, *Marine Ecology*
 BIOE 112/L, *Ornithology/Laboratory*
 BIOE 114/L, *Herpetology/Laboratory*
 BIOE 117/L, *Systematic Botany/Laboratory*
 BIOE 120/L, *Marine Botany/Laboratory*
 BIOE 122/L, *Invertebrate Zoology/Laboratory*
 BIOE 127/L, *Ichthyology/Laboratory*
 BIOE 129/L, *Biology of Marine Mammals/Laboratory*
 BIOE 131/L, *Animal Physiology/Laboratory*
 BIOE 135, *Plant Physiology*
 BIOE 140, *Behavioral Ecology*
 BIOE 141L, *Behavioral Ecology Field Course*
 BIOE 145, *Plant Ecology*
 BIOE 145L, *Field Methods in Plant Ecology*
 BIOE 147, *Community Ecology*
 BIOE 149, *Disease Ecology*
 BIOE 150, *Ecological Field Methods*
 BIOE 150L, *Ecological Field Methods Laboratory*
 BIOE 151ABCD, *Ecology and Conservation in Practice*
 BIOE 155, *Freshwater Ecology*
 BIOE 155L, *Freshwater Ecology Laboratory*
 BIOE 158L, *Marine Ecology Laboratory*

BIOE 159ABCD, *Marine Ecology Field Quarter*
 BIOE 161, *Kelp Forest Ecology*
 BIOE 161L, *Kelp Forest Ecology Laboratory*
 BIOE 163, *Ecology of Reefs, Mangroves, and Seagrasses*
 BIOE 165, *Marine Conservation Biology*
 BIOE 172/L, *Population Genetics/Laboratory*
 BIOL 100/K, *Biochemistry/Laboratory*
 BIOL 110, *Cell Biology*
 BIOL 115, *Eukaryotic Molecular Biology*
 BIOL 119, *Microbiology*
 BIOL 119L, *Microbiology Laboratory*
 BIOL 120, *Development*
 BIOL 120L, *Development Laboratory*
 Ocean Sciences 118, *Marine Microbial Ecology*

Three general electives chosen from the following:

Biological Sciences-EEB

any BIOE course numbered 100-180

Biological Sciences-MCDB

BIOL 100/K, *Biochemistry/Laboratory*
 BIOL 110, *Cell Biology*
 BIOL 115, *Eukaryotic Molecular Biology*
 BIOL 119, *Microbiology*
 BIOL 119L, *Microbiology Laboratory*
 BIOL 120, *Development*
 BIOL 120L, *Development Laboratory*

Chemistry

CHEM 108A, *Organic Chemistry*
 CHEM 108B, *Organic Chemistry*

Earth Sciences

EART 100/L, *Vertebrate Paleontology*
 EART 102, *Marine Geology*
 EART 105, *Coastal Geology*
 EART 122, *Paleoceanography*

Economics

ECON 166A, *Game Theory and Applications I*
 ECON 166B, *Game Theory and Applications II*

Environmental Studies (enrollment by permission of instructor)

ENVS 104A, *Introduction to Environmental Field Methods*
 ENVS 108/L, *General Entomology/Laboratory*
 ENVS 115A/L, *GIS and Environmental Applications/Exercises in GIS*
 ENVS 120, *Conservation Biology*
 ENVS 122, *Tropical Ecology and Conservation*
 ENVS 123, *Animal Ecology and Conservation*
 ENVS 129, *Integrated Pest Management*
 ENVS 130A/L, *Agroecology and Sustainable Agriculture/Laboratory*
 ENVS 130B, *Principles of Sustainable Agriculture*
 ENVS 131/L, *Insect Ecology/Laboratory*
 ENVS 138/L, *Field Ethnobotany/Laboratory*
 ENVS 160, *Restoration Ecology*
 ENVS 161A/L, *Soils and Plant Nutrition/Laboratory*
 ENVS 162, *Plant Physiological Ecology*
 ENVS 163/L, *Plant Disease Ecology/Laboratory*
 ENVS 167, *Freshwater and Wetland Ecology*
 ENVS 168, *Biochemistry and the Global Environment*

Ocean SciencesOCEA 118, *Marine Microbial Ecology*OCEA 130, *Biological Oceanography***Psychology**PSYC 123, *Behavioral Neuroscience*

One of the following may also be used as an upper-division general elective:

Biological Sciences-EEBBIOE 183L, *Undergraduate Research in EEB*BIOE 195, *Senior Thesis*BIOE 198, *Independent Field Study*BIOE 199, *Tutorial***Environmental Studies**ENVS 183, *Environmental Studies Internship***Disciplinary Communication (DC) Requirement**

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in ecology and evolution is satisfied by completing courses BIOE 107, *Ecology*, or BIOE 108, *Marine Ecology*, and BIOE 109, *Evolution*.

Ecology and Evolution B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/eeb/eevbs-sample.html>

Marine Biology Major**Program Description**

UCSC is situated within five miles of Monterey Bay and its great diversity of coastal marine ecosystems; nature reserves; and state, federal, and private marine research institutions and resource management agencies. These resources, combined with on-campus computing and analytical facilities and the Long Marine Laboratory, make UCSC an exceptional campus for the study of marine biology and its application to coastal conservation and management. Descriptions of nearby environments, institutions, and facilities are available through the Ecology and Evolutionary Biology Department web site at <http://www.biology.ucsc.edu/eeb/index.html>.

The marine biology major is designed to introduce students to marine organisms and the biological and physical processes that affect these organisms, their populations, and their coastal and oceanic ecosystems. The emphasis is on basic principles that help in understanding the processes that shape life in marine environments. The marine biology major is a demanding program that offers a B.S. degree and requires several more courses than the general biology B.A. major.

Marine Biology B.S. Major Requirements**Introductory Requirements**

Introductory Biology: BIOL 20A, BIOE 20B, and 20C

General Chemistry: Chemistry 1A, 1B/M and 1C/N

Calculus: Mathematics 11A-B or 19A-B

Biostatistics: Applied Mathematics and Statistics 7/L

Physics: Physics 6A/L, and 6B or 6C

Advanced Requirements

A total of eleven upper-division courses; two must include laboratory or fieldwork.

Genetics: BIOL 105

Evolution: BIOE 109

One ecology course:

BIOE 107, *Ecology*BIOE 108, *Marine Ecology*

One marine-environment course:

Ocean Sciences 101, *Marine Environment*Ocean Sciences 130, *Biological Oceanography*

One marine course:

BIOE 120/L, *Marine Botany/Laboratory*BIOE 122/L, *Invertebrate Zoology/Laboratory*BIOE 127/L, *Ichthyology/Laboratory*BIOE 129/L, *Biology of Marine Mammals/Laboratory***Elective list for Marine Biology Major**

Three topical electives chosen from the following:

BIOE 108, *Marine Ecology*BIOE 120/L, *Marine Botany/Laboratory*BIOE 122/L, *Invertebrate Zoology/Laboratory*BIOE 127/L, *Ichthyology/Laboratory*BIOE 129/L, *Biology of Marine Mammals/Laboratory*BIOE 155, *Freshwater Ecology*BIOE 155L, *Freshwater Ecology Laboratory*BIOE 158L, *Marine Ecology Laboratory*BIOE 159ABCD, *Marine Ecology Field Quarter*BIOE 161, *Kelp Forest Ecology*BIOE 161L, *Kelp Forest Ecology Laboratory*BIOE 163, *Ecology of Reefs, Mangroves, and Seagrasses*BIOE 165, *Marine Conservation Biology*Earth Sciences 102, *Marine Geology*Earth Sciences 105, *Coastal Geology*Earth Sciences 122, *Paleoceanography*Ocean Sciences 118, *Marine Microbial Ecology*Ocean Sciences 130, *Biological Oceanography*

Three general electives chosen from the following:

Biological Sciences-EEB

Any BIOE course numbered 100-180

Biological Sciences-MCDBBIOL 100/K, *Biochemistry/Laboratory*BIOL 110, *Cell Biology*BIOL 115, *Eukaryotic Molecular Biology*BIOL 119, *Microbiology*BIOL 119L, *Microbiology Laboratory*BIOL 120, *Development*BIOL 120L, *Development Laboratory***Chemistry**CHEM 108A, *Organic Chemistry*CHEM 108B, *Organic Chemistry***Earth Sciences**EART 100/L, *Vertebrate Paleontology*EART 102, *Marine Geology*EART 105, *Coastal Geology*EART 122, *Paleoceanography***Economics**ECON 166A, *Game Theory and Applications I*ECON 166B, *Game Theory and Applications II*

Environmental Studies (enrollment by permission of instructor)

ENVS 104A, *Introduction to Environmental Field Methods*ENVS 108/L, *General Entomology/Laboratory*ENVS 115A/L, *GIS and Environmental Applications/ Exercises in GIS*ENVS 120, *Conservation Biology*ENVS 122, *Tropical Ecology and Conservation*ENVS 123, *Animal Ecology and Conservation*ENVS 129, *Integrated Pest Management*ENVS 130A/L, *Agroecology and Sustainable Agriculture/ Laboratory*ENVS 130B, *Principles of Sustainable Agriculture*ENVS 131/L, *Insect Ecology/Laboratory*ENVS 138/L, *Field Ethnobotany/Laboratory*ENVS 160, *Restoration Ecology*ENVS 161A/L, *Soils and Plant Nutrition/Laboratory*ENVS 162, *Plant Physiological Ecology*ENVS 163/L, *Plant Disease Ecology/Laboratory*ENVS 167, *Freshwater and Wetland Ecology*ENVS 168, *Biochemistry and the Global Environment***Ocean Sciences**OCEA 118, *Marine Microbial Ecology*OCEA 130, *Biological Oceanography***Psychology**PSYC 123, *Behavioral Neuroscience*

One of the following may also be used as an upper-division general elective:

Biological Sciences-EEBBIOE 183L, *Undergraduate Research in EEB*BIOE 195, *Senior Thesis*BIOE 198, *Independent Field Study*BIOE 199, *Tutorial***Disciplinary Communication (DC) Requirement**

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in marine biology is satisfied by completing courses BIOE 107, *Ecology*, or BIOE 108, *Marine Ecology*, and BIOE 109, *Evolution*.

Marine Biology B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/eeb/mabibs-sample.html>

Plant Sciences Major**Program Description**

UCSC has a strong program in the plant sciences (sometimes called botany). A fine natural environment, the campus Arboretum, the facilities under the Center for Agroecology and Sustainable Food Systems (especially the Farm and Garden), and an excellent greenhouse collection all enhance the resources that support UCSC's botanical programs.

The plant sciences major is designed for students with an interest in plant biology and its associated curricular fields such as plant ecology, plant physiology, plant pathology, plant molecular biology, soils, and applied plant sciences. After completion of the core courses, students can proceed in one of several directions depending

on their interest. For example, a more in-depth study of physiology and molecular biology courses can serve as preparation for work in the biotechnology field or for graduate school; further studies in plant ecology, tropical ecology, or restoration ecology can lead to careers such as resource ecologist or naturalist or to the pursuit of related fields in graduate school; upper-division training in agroecology can lead to careers in agriculture or food systems. A special feature of this major is a one-quarter internship and/or independent research requirement. There are many opportunities for internships both on the UCSC campus and in the community at large.

Plant Sciences B.S. Major Requirements

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C

General Chemistry: Chemistry 1A, 1B and 1C/N

Calculus: Mathematics 11A-B or 19A-B

Biostatistics: Applied Mathematics and Statistics 7/L

Physics: Physics 6A/L, and 6B or 6C

Advanced Requirements

A total of eleven upper-division courses; two of which must include laboratory or fieldwork.

Genetics: BIOL 105

Ecology: BIOE 107

Evolution: BIOE 109

One plant physiology course from the following:

BIOE 135, *Plant Physiology*

Environmental Studies 162, *Plant Physiological Ecology*

One botany course from the following:

BIOE 117/L, *Systematic Botany*

BIOE 120/L, *Marine Botany/Laboratory*

Elective list for Plant Sciences Major

Three topical electives chosen from the following:

Biological Sciences-EEB

BIOE 117/L, *Systematic Botany/Laboratory*

BIOE 120/L, *Marine Botany/Laboratory*

BIOE 135, *Plant Physiology*

BIOE 145, *Plant Ecology*

BIOE 145L, *Field Methods in Plant Ecology*

BIOE 149, *Disease Ecology*

BIOE 151ABCD, *Ecology and Conservation in Practice*

Biological Sciences-MCDB

BIOL 110, *Cell Biology*

BIOL 115, *Eukaryotic Molecular Biology*

Environmental Studies (enrollment by permission of instructor)

ENVS 104A, *Introduction to Environmental Field Methods*

ENVS 129, *Integrated Pest Management*

ENVS 130A/L, *Agroecology and Sustainable Agriculture/Laboratory*

ENVS 130B, *Principles of Sustainable Agriculture*

ENVS 131/L, *Insect Ecology/Laboratory*

ENVS 138/L, *Field Ethnobotany/Laboratory*

ENVS 160, *Restoration Ecology*

ENVS 161A/L, *Soils and Plant Nutrition/Laboratory*

ENVS 162, *Plant Physiological Ecology*

ENVS 163/L, *Plant Disease Ecology/Laboratory*

Three general electives chosen from the following:

Biological Sciences-EEB

Any BIOE course numbered 100-180

Biological Sciences-MCDB

BIOL 100/K, *Biochemistry/Laboratory*

BIOL 110, *Cell Biology*

BIOL 115, *Eukaryotic Molecular Biology*

BIOL 119, *Microbiology*

BIOL 119L, *Microbiology Laboratory*

BIOL 120, *Development*

BIOL 120L, *Development Laboratory*

Chemistry

CHEM 108A, *Organic Chemistry*

CHEM 108B, *Organic Chemistry*

Earth Sciences

EART 100/L, *Vertebrate Paleontology*

EART 102, *Marine Geology*

EART 105, *Coastal Geology*

EART 122, *Paleoceanography*

Economics

ECON 166A, *Game Theory and Applications I*

ECON 166B, *Game Theory and Applications II*

Environmental Studies (enrollment by permission of instructor)

ENVS 104A, *Introduction to Environmental Field Methods*

ENVS 108/L, *General Entomology/Laboratory*

ENVS 115A/L, *GIS and Environmental Applications/Exercises in GIS*

ENVS 120, *Conservation Biology*

ENVS 122, *Tropical Ecology and Conservation*

ENVS 123, *Animal Ecology and Conservation*

ENVS 129, *Integrated Pest Management*

ENVS 130A/L, *Agroecology and Sustainable Agriculture/Laboratory*

ENVS 130B, *Principles of Sustainable Agriculture*

ENVS 131/L, *Insect Ecology/Laboratory*

ENVS 138/L, *Field Ethnobotany/Laboratory*

ENVS 160, *Restoration Ecology*

ENVS 161A/L, *Soils and Plant Nutrition/Laboratory*

ENVS 162, *Plant Physiological Ecology*

ENVS 163/L, *Plant Disease Ecology/Laboratory*

ENVS 167, *Freshwater and Wetland Ecology*

ENVS 168, *Biochemistry and the Global Environment*

Ocean Sciences

OCEA 118, *Marine Microbial Ecology*

OCEA 130, *Biological Oceanography*

Psychology

PSYC 123, *Behavioral Neuroscience*

One of the following may also be used as an upper-division general elective:

Biological Sciences-EEB

BIOE 183L, *Undergraduate Research in EEB*

BIOE 195, *Senior Thesis*

BIOE 198, *Independent Field Study*

BIOE 199, *Tutorial*

Environmental Studies

ENVS 183, *Environmental Studies Internship*

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in plant sciences is satisfied by completing courses BIOE 107, *Ecology*, and BIOE 109, *Evolution*.

Plant Sciences B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/eeb/plntbs-sample.html>

Degree Programs Sponsored by Molecular, Cell, and Developmental Biology

Human Biology Major

Program Description

The B.S. major in human biology is designed for students interested in careers in medicine or biomedical research and satisfies the admission requirements for most U.S. medical schools. It is based on the existing B.S. degree in molecular, cell, and developmental biology, with similar course requirements in chemistry, physics, and mathematics. Students are required to take five courses directly relevant to human health in addition to genetics, biochemistry, and cell biology. Students in this program must also fulfill Spanish language and health care internship requirements.

*Human Biology B.S. Major Requirements**

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and BIOL 20L

General Chemistry: Chemistry 1A, 1B/M and 1C/N

Organic Chemistry: Chemistry 108A/L and 108B/M, 108C recommended for pre-med students, or 112A/L, 112B/M, and 112C/N

Calculus: Mathematics 11A-B or 19A-B; and 22 (three quarters)

Statistics: Applied Mathematics and Statistics 5 or 7/L

Physics: Physics 6A/L, 6B/M, and 6C/N

Advanced Requirements

A total of eight upper-division biology courses, as follows:

Four core courses:

Biochemistry: BIOL 100/K or BIOC 100A, 100B, 100C, and BIOL 100K

Genetics: BIOL 105

Cell Biology: BIOL 110

Human Physiology with Laboratory: BIOL 130/L

Three of the following lecture courses:

BIOL 111, *Immunology*

BIOL 113, *Mammalian Endocrinology*

BIOL 114, *Cancer Cell Biology*

BIOL 115, *Eukaryotic Molecular Biology*

BIOL 119, *Microbiology*

BIOL 120, *Development*

BIOL 125, *Neuroscience*

BIOL 126, *Advanced Neural Development*
 BIOL 127, *Neurodegenerative Disease*
 BIOL 135/L, *Anatomy of the Human Body/Laboratory*
 BIOL 178, *Stem Cell Biology*
 BIOL 179, *Biotechnology and Drug Development*

Internship Requirement: BIOL189, *Health Sciences Internship*. The student must participate in a community health care service activity approved by the health sciences internship coordinator. Credit may be earned over multiple quarters.

Language Requirement: Spanish 1–4 or the equivalent and one quarter of Spanish for health-care workers (Spanish 5M).

* Note: Medical and professional school admissions requirements vary; students should verify that their coursework will satisfy the admissions requirements of the programs to which they plan to apply.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in human biology is satisfied by completing courses BIOL 130L, *Human Physiology Laboratory*, and BIOL 189, *Health Sciences Internship*.

Human Biology B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/eeb/plntbs-sample.html>

Molecular, Cell, and Developmental Biology Major

Program Description

The molecular, cell, and developmental (MCD) biology major is designed for students interested in medical or other professional graduate programs and those preparing for careers in biotechnology industries. This major is more structured than the general biology major and requires that students pay careful attention to the prerequisites required for upper-division biology courses.

Molecular, Cell, and Developmental Biology B.S. Major Requirements

Introductory Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C
General Chemistry: Chemistry 1A, 1B/M and 1C/N
Organic Chemistry: Chemistry 108A/L and 108B
Calculus: Mathematics 11A-B or 19A-B
Biostatistics: Applied Mathematics and Statistics 5 or 7/L
Physics: Physics 6A/L and 6B or 6C

Advanced Requirements

A total of nine upper-division biology courses, as follows:

Four core courses:

Biochemistry: BIOL 100/K or the series BIOC 100A, 100B, 100C, and BIOL 100K (Upon completion of the series, BIOC 100C may be used to satisfy one lecture elective)

Genetics: BIOL 105

Cell Biology: BIOL 110

Eukaryotic Molecular Biology: BIOL 115

Three of the following lecture courses:

BIOC 100C, *Biochemistry*
 BIOC 110, *Biochemistry Laboratory*
 BIOL 111, *Immunology*
 BIOL 113, *Mammalian Endocrinology*
 BIOL 114, *Cancer Cell Biology*
 BIOL 118, *Biology of Disease*
 BIOL 119, *Microbiology*
 BIOL 120, *Development*
 BIOL 125, *Neuroscience*
 BIOL 126, *Advanced Neural Development*
 BIOL 127, *Neurodegenerative Disease*
 BIOL 130/L, *Human Physiology/Laboratory*
 BIOL 178, *Stem Cell Biology*
 BIOL 179, *Biotechnology and Drug Development*
 BIOL 180/L, *Research Programming for Biologists and Biochemists/Laboratory*
 BIOL 181, *Computational Biology Tools*
 BIOE 109, *Evolution*
 BIOE 135, *Plant Physiology*

One of the following laboratory courses:

BIOL 100L, *Advanced Biochemistry Laboratory*
 BIOL 105L, *Eukaryotic Genetics Laboratory*
 BIOL 105M, *Microbial Genetics Laboratory*
 BIOL 109L, *Yeast Molecular Genetics Laboratory*
 BIOL 110L, *Cell Biology Laboratory*
 BIOL 111L, *Immunology Laboratory*
 BIOL 115L, *Eukaryotic Molecular Biology Laboratory*
 BIOL 119L, *Microbiology Laboratory*
 BIOL 120L, *Development Laboratory*
 BIOL 178L, *Protocols in Stem Cell Biology*
 BIOL 186L, *Undergraduate Research in MCD*
 BIOL 187L, *Molecular Biotechnology Laboratory*

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in molecular, cell, and developmental biology is satisfied by completing one of the following courses: BIOC 110, BIOL 100L, 105L, 105M, 109L, 110L, 111L, 115L, 119L, 120L, 178L, or 187L. Please refer to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunication-chart.html>.

Molecular, Cell and Developmental Biology B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/mcdb/mcdbbs-sample.html>

Neuroscience Major

Program Description

Neuroscience, the study of the nervous system and behavior of animals, is a frontier area in biology, touching psychology on the one hand and computer science on the other. The neuroscience major provides students with rigorous preparation for graduate studies and research in the field of neuroscience. Rigorous course work is supplemented by opportunities for hands-on research.

Neuroscience B.S. Major Requirements

Introductory Course Requirements

Introductory Biology: BIOL 20A, BIOE 20B, and 20C
General Chemistry: Chemistry 1A, 1B and 1C/N
Organic Chemistry: Chemistry 108A/L and 108B
Calculus: Mathematics 11A-B or 19A-B; and 22
Biostatistics: Applied Mathematics and Statistics 7/L
Physics: Physics 6A/L, and 6C

Advanced Course Requirements

Five upper-division core courses to include:

Biochemistry: BIOL 100/K

Genetics: BIOL 105

Cell Biology: BIOL 110

Neuroscience: BIOL 125

Advanced Neuroscience: BIOL 126

Three of the following lecture electives:

BIOE 131/L, *Animal Physiology/Laboratory*

BIOE 140, *Behavioral Ecology*

BIOL 113, *Mammalian Endocrinology*

BIOL 115, *Eukaryotic Molecular Biology*

BIOL 118, *Biology of Disease*

BIOL 120, *Development*

BIOL 127, *Neurodegenerative Disease*

BIOL 130/L, *Human Physiology/Laboratory*

BIOL 180/L, *Research Programming for Biologists and Biochemists/Laboratory*

BIOL 181, *Computational Biology Tools*

Psychology 121, *Perception*

Psychology 123, *Behavioral Neuroscience*

One of the following laboratory electives:

BIOE 141L, *Behavioral Ecology Field Course*

BIOE 183L, *Undergraduate Research in EEB*

BIOL 105L, *Eukaryotic Genetics Laboratory*

BIOL 109L, *Yeast Molecular Genetics Laboratory*

BIOL 110L, *Cell Biology Laboratory*

BIOL 111L, *Immunology Laboratory*

BIOL 115L, *Eukaryotic Molecular Genetics Laboratory*

BIOL 120L, *Development Laboratory*

BIOL 178L, *Protocols in Stem Cell Laboratory*

BIOL 186L, *Undergraduate Research in MCD*

BIOL 187L, *Molecular Biotechnology Laboratory*

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in neuroscience is satisfied by completing one of the following: BIOE 141L, BIOL 105L, 109L, 110L, 111L, 115L, 120L, 178L, or 187L. Please refer to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunication-chart.html>.

Neuroscience B.S. Sample Planners

<http://undergrad.pbsci.ucsc.edu/programs/mcdb/neurobs-sample.html>

Ecology and Evolutionary Biology

Ecology and Evolutionary Biology
A308 Earth and Marine Sciences
(831) 459-5358
<http://www.eeb.ucsc.edu/>

Faculty and Professional Interests

GIACOMO BERNARDI

Fish biology, phylogenetics, evolution

MARK H. CARR

Marine ecology, applied marine ecology

DANIEL P. COSTA

Physiological ecology of marine mammals and birds

DONALD CROLL

Ecology and conservation of islands and seabirds

NATHANIEL J. DOMINY

Ecology and foraging behavior of humans and non-human primates; sensory ecology; color vision; primate evolution; tropical forests

LAUREL R. FOX

Terrestrial population and community ecology, plant-animal interactions

KATHLEEN M. KAY

Plant evolutionary ecology

A. MARM KILPATRICK

Disease ecology, population biology

BRUCE E. LYON

Behavioral ecology, evolutionary ecology, avian ecology

RITA MEHTA

Comparative marine physiology

JONATHAN MOORE

Freshwater ecology, conservation biology

INGRID M. PARKER

Plant ecology, plant-pathogen interactions, biological invasions

JARMILA PITTMANN

Plant physiology

GRANT H. POGSON

Molecular population genetics, ecological genetics, marine invertebrates and fishes

DONALD C. POTTS

Coral reef ecology, genetics, evolution, and geological history; marine biodiversity; tropical biology, global change, and remote sensing

PETER T. RAIMONDI

Marine ecology, evolutionary ecology, experimental design, applied ecology

BARRY SINERVO

Animal behavior, evolution, physiological ecology

JOHN N. THOMPSON

Coevolution, evolutionary ecology and genetics of species interactions, organization of biodiversity

TERRIE M. WILLIAMS

Large mammal physiology, bioenergetics, exercise and environmental physiology

Ecology and Evolutionary Biology Emeritus Faculty

RALPH BERGER

WILLIAM JACKSON DAVIS

WILLIAM DOYLE

LYNDA J. GOFF

RALPH HINEGARDNER

JEAN LANGENHEIM

BURNEY LEBOEUF

CHARLES (LEO) ORTIZ

A. TODD NEWBERRY

JOHN PEARSE

Ecology and Evolutionary Biology Lecturers

BALDO MARINOVIC

JILL THOMPSON



Adjuncts and Affiliates

JAMES ESTES (Ecology and Evolutionary Biology)

Marine sciences, community ecology, species interactions

SAMANTHA FORDE (Ecology and Evolutionary Biology)

Experimental evolutionary ecology

GREG GILBERT (Environmental Studies)

Disease ecology, conservation biology, tropical forest ecology, microbial ecology

KAREN D. HOLL (Environmental Studies)

Restoration ecology, conservation biology, landscape ecology

PAUL L. KOCH (Earth Sciences)

Isotope biogeochemistry, vertebrate paleontology

RAPHAEL KUDELA (Ocean Sciences)

Ecological modeling and remote sensing, satellite oceanography, phytoplankton ecology and harmful algal blooms

R. BRUCE MAC FARLANE (Ecology and Evolutionary Biology)

Physiological ecology of marine, estuarine, and anadromous fishes

MARC S. MANGEL (Applied Mathematics and Statistics)

Mathematical modeling of biological phenomena, especially the evolutionary ecology of growth, aging, and longevity; quantitative issues in fishery management; mathematical and computational aspects of disease

DEVON PEARSE (Ecology and Evolutionary Biology)

Evolutionary and ecological genetics, conservation biology

BERNIE TERSHY (Ecology and Evolutionary Biology)

Ecology and conservation of seabirds and island ecosystems

M. TIM TINKER (Ecology and Evolutionary Biology)

Foraging ecology and demography of the southern sea otter

ROBERT VRIJENHOEK (Ecology and Evolutionary Biology)

KERSTIN WASSON (Ecology and Evolutionary Biology)

Evolutionary ecology, invasion biology, conservation science

JONATHAN ZEHR (Ocean Sciences)

Aquatic microbial ecology, biological oceanography

Graduate Program Description

The Ecology and Evolutionary Biology (EEB, courses BIOE) Graduate Program at UCSC reflects the remarkable local and global diversity of species and environments studied by the EEB faculty and students. The vision of the EEB graduate program is to provide a nurturing, creative, and intellectual environment conducive to the development of world-class scientists. The small size of the EEB graduate program encourages close working relations between students and faculty in an informal atmosphere conducive to rapid learning and professional growth. Interdisciplinary collaborations with oceanographers, geologists, mathematicians, toxicologists, and others enable students to explore the conceptual connections between related fields as they acquire mastery in their areas of specialization.

The graduate program in Ecology and Evolutionary Biology at UCSC is one of the premier EEB programs in the country. EEB-UCSC graduate students regularly win prestigious awards for their presentations at international meetings and publish their work in the best journals of their fields. In addition to taking advantage of local field sites and state-of-the-art departmental laboratories, more than two-thirds of the EEB faculty also participates in field studies throughout the world, especially in Africa, Latin America, and around the Pacific Rim.

A special strength of the EEB program is the integration of terrestrial and aquatic perspectives across all research tracks. The course requirements and examinations emphasize both breadth and depth.

Research in EEB comprises four core tracks

1. Ecology
2. Evolutionary biology
3. Physiology
4. Behavior

Degree Requirements

Doctor of Philosophy (Ph.D.) Requirements Courses

BIOE 200A, *Scientific Skills*

BIOE 200B, *Advanced Organismal Biology*

BIOE 279, *Evolutionary Ecology*

BIOE 293, *Readings in Ecology and Evolution* (or equivalent)

BIOE 294, *Ecology, Evolutionary Biology Seminar* (taken each quarter when in residence)

BIOE 295, *Advanced Ecology and Evolutionary Biology Seminar* (may substitute for BIOE 293)

Each Ph.D. student should expect to complete at least two quarters as a teaching assistant during their graduate career.

During fall of the second year, students take a comprehensive examination. This is a two-part examination, written and oral, the goal of which is to examine the student's breadth and depth of knowledge of evolution, ecology, physiology, behavior, organismal, and general biology.

Later in the second or third year, the student submits a dissertation proposal to the proposal committee and must defend it in an oral examination, followed by a seminar on his/her proposed research. The student advances to candidacy only after having completed all coursework, the comprehensive examination, the proposal defense, and the proposal seminar.

No sooner than 30 days after submitting the dissertation to a dissertation reading committee, the student defends the dissertation to the committee, followed by a public seminar. At least one chapter of the dissertation must be submitted to a refereed journal for publication before receipt of the Ph.D.

Master of Arts (M.A.) Requirements

Courses

BIOE 200B, *Advanced Organismal Biology*

BIOE 279, *Evolutionary Ecology*

BIOE 293, *Readings in Ecology and Evolution* (or equivalent): two quarters

BIOE 294, *Ecology and Evolutionary Biology Seminar* (taken every quarter)

Thirty days after submitting the master's thesis to a thesis reading committee, the student defends the thesis to the committee, followed by a public seminar.

Lower-Division Courses

20B. Development and Physiology. F,W,S

Topics in morphology, physiology, development, genetics, and endocrinology selected to exemplify current issues and perspectives in organismic biology. Prerequisite(s): BIOL 20A. *The Staff*

20C. Ecology and Evolution. F,W,S

Introduction to ecology and evolution covering principles of evolution at the molecular, organismal, and population levels. Evolutionary topics include genetic and phenotypic variation, natural selection, adaptation, speciation, and macroevolution. Also covers behavioral, population, and community ecology including applied ecological issues. *B. Marinovic*

75. Scientific Diving Certification (2 credits). F,S

Prerequisite for course 161/L, Kelp Forest Ecology, and all research diving performed under the auspices of UCSC or other academic institutions. Course work includes lectures and scuba diving. Topics include subtidal sampling techniques, navigation, low visibility diving, search and recovery, rescues, small boat use, oxygen administration for divers, technical blue water deep diving, physics, and physiology. Apply online at <http://www2.usc.edu/sci-diving>. Students are billed a course materials fee that covers costs for equipment use, materials, and transportation. Prerequisite(s): skill level equal to Advanced Scuba Diver Certification, pass scuba physical, provide own scuba gear, be certified in CPR and First Aid; and interview: pass swim test and scuba skills test. Enrollment limited to 16. *The Staff*

80N. Biology of Human Health and Nutrition. W,S

An introduction to the biology of human nutrition and its effects on human health. The course explores how nutrient balance, exercise, and age interact in their effects on human health, fitness, and disease. (General Education Code(s): T2-Natural Sciences.) *J. Thompson*

80P. Infectious Diseases and Human Populations. W,S

An overview of the biology of infectious diseases in human societies including why diseases vary in severity, how human bodies defend themselves, and how public health efforts cope with the problem of rapidly evolving pathogens. (General Education Code(s): T2-Natural Sciences.) *J. Thompson*

99. Tutorial. F,W,S

Individual, directed study for undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

107. Ecology. W,S

Focuses on physiological, behavioral, and population ecology, and on linking ecological processes to evolution. It includes basic principles, experimental approaches, concepts of modeling, and applications to ecological problems. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, and BIOE 20C. (W) *J. Estes*, (W) *A. Kilpatrick*, (S) *D. Potts*

108. Marine Ecology. W

Paradigms and designs in marine ecology. A review of the paradigms that have shaped our understanding of marine ecology; analysis and discussion of experiments with these paradigms. Students cannot receive credit for this course and course 208. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, and BIOE 20C; BIOE 107 or 140 recommended. Enrollment restricted to juniors and seniors. *M. Carr*

109. Evolution. F,W

An examination of the history and mechanisms of evolutionary change. Topics include molecular evolution, natural and sexual selection, adaptation, speciation, biogeography, and macroevolution. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, BIOE 20C, and BIOL 105. (F) *G. Pogson*, (W) *K. Kay*

112. Ornithology. *

Introduction to the evolution, ecology, behavior, and natural history of birds, using exemplary case histories to illustrate key concepts in evolution, ecology, and behavior. Prerequisite(s): BIOE 107, BIOE 109, or BIOE 140. Concurrent enrollment in BIOE 112L is required. Enrollment limited to 20. *B. Lyon*

112L. Ornithology Field Studies (2 credits). *

Field trips introduce students to field identification skills and field investigation of census, foraging behavior, migration, social behavior, and communication. Examination of specimens in the laboratory will be used to highlight the diversity and taxonomy of birds. Students are billed a materials fee. Some field trips may require students to provide their own transportation. Prerequisite(s): BIOE 107, BIOE 109, or BIOE 140. Concurrent enrollment in BIOE 112 is required. Enrollment limited to 20. Offered in alternate academic years. *B. Lyon*

114. Herpetology. *

Lectures introduce students to evolution, development, physiology, behavior, ecology, and life history of reptiles and amphibians. The materials integrate with conceptual and theoretical issues of ecology, evolution, physiology, and behavior. Prerequisite(s): BIOE 107, BIOE 109, BIOE 110, or BIOE 140. Concurrent enrollment in BIOE 114L required. Enrollment limited to 25. Offered in alternate academic years. *B. Sineruo*

114L. Field Methods in Herpetological Research (2 credits). *

Field trips introduce students to natural history, censusing techniques, physiological ecology, and behavioral analysis of reptiles and amphibians. Laboratories introduce students to techniques for analyzing behavior and physiology. Field studies culminate with a group project in a natural setting. Some field trips may be held on weekends due to weather considerations. Some field trips may require students to provide their own transportation, some transportation will be provided by UCSC. Students are billed a materials fee. Prerequisite(s): BIOE 107, 109, 110, or 140. Concurrent enrollment in BIOE 114 is required. Offered in alternate academic years. *B. Sineruo*

117. Systematic Botany of Flowering Plants. S

An examination of the taxonomy and evolution of flowering plants. Special topics include phylogenetics and cladistics, plant species concepts, and modern methods of systematic research. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. Must be taken concurrently with BIOE 117L. *K. Kay*

117L. Systematic Botany of Flowering Plants Laboratory (2 credits). S

Weekly laboratory concerned primarily with California flora and plant families. Several field trips. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. Must be taken concurrently with BIOE 117. *K. Kay*

120. Marine Botany. S

An introduction to the biology of marine algae, fungi, and angiosperms with regard to form and function. Major boreal, temperate, and tropical marine plant communities. Lecture format. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. Must be taken concurrently with BIOE 120L. *The Staff*

120L. Marine Botany Laboratory (2 credits). S

One laboratory weekly and several field trips. Focuses on marine algae, fungi, and angiosperms. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. Must be taken concurrently with BIOE 120. Enrollment limited to 20. *The Staff*

122. Invertebrate Zoology. W

An examination of invertebrates and their habitats. Lecture format. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. BIOE 122L must be taken concurrently. Enrollment limited to 96. *B. Marinovic*

122L. Invertebrate Zoology Laboratory (2 credits). W

An examination of invertebrates and their habitats. Weekly laboratories or field trips. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. BIOE 122 must be taken concurrently. Enrollment limited to 96. *B. Marinovic*

127. Ichthyology. *

An introduction to the biology of jawless, cartilaginous, and bony fishes—their classification, evolution, form, physiology, and ecology. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. BIOE 127L must be taken concurrently. Offered in alternate academic years. *G. Bernardi*

127L. Ichthyology Laboratory (2 credits). *

One laboratory session a week and several field trips to study the biology of fish. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. BIOE 127 must be taken concurrently. Offered in alternate academic years. *G. Bernardi*

129. Biology of Marine Mammals. S

A survey of cetaceans, pinnipeds, sirenians, and sea otters, including natural history, systematics, physiology, behavior, anatomy, and conservation. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C; BIOL 110 is recommended. *D. Costa*

129L. Biology of Marine Mammals Laboratory (2 credits). S

Covers the basics of marine mammal taxonomy, anatomy, and field methods with an emphasis on local field identification and understanding of local species. Will include field trips to Long Marine Lab, Ano Nuevo, and Monterey Bay. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. Must be taken concurrently with BIOE 129. *D. Costa*

*Not offered in 2010–11

131. Animal Physiology. S

Principles and concepts underlying the function of tissues and organ systems in animals with emphasis on vertebrate systems. Students cannot receive credit for this course and BIOL 130. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. *T. Williams*

131L. Animal Physiology Laboratory (2 credits). S

Experiments conducted with primary focus on quantitative physiological principles of organ systems and intact organisms. Students cannot receive credit for this course and course 130L. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. Concurrent enrollment in BIOE 131 is required. Enrollment limited to 25. *T. Williams*

135. Plant Physiology. W

Cellular and organismal functions important in the life of green plants. Prerequisite(s): BIOL 20A and BIOE 20B; BIOL 100 and BIOL 110 are highly recommended as preparation. *J. Pittermann*

140. Behavioral Ecology. F

An introduction to social and reproductive behavior. Emphasis on studies of vertebrates in their natural habitat. Ideas concerning the evolution of social behavior, mating systems, and individual reproductive strategies. Case histories of well-studied animals that illustrate key principles in courtship and mating, parental behavior, and food-getting behavior. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. *B. Sinervo*

141L. Behavioral Ecology Field Course. W

A field-based course introducing students to concepts and methods for studying behavioral ecology in nature. Students will conduct observations and field experiments on various local model organisms including elephant seals, hummingbirds, sparrows, lizards, ants, bees, frogs, and salamanders. Students are billed a materials fee. Prerequisite(s): BIOE 107 or BIOE 140 or BIOE 110; satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 25. Offered in alternate academic years. (General Education Code(s): W.) *B. Sinervo, B. Lyon*

145. Plant Ecology. F

An exploration of the ecology of plant form, function, distribution, abundance, and diversity. Topics include plant adaptations to environmental conditions, life history variation, competition, reproductive ecology, herbivory, and patterns of diversity. Lecture with discussions of original papers and independent field project. Students cannot receive credit for this course and course 245. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. BIOE 107 is recommended. Enrollment limited to 30. *I. Parker*

145L. Field Methods in Plant Ecology. F

Hands-on exploration of the concepts and techniques of plant ecology. A combination of lab, greenhouse, and field-based exercises (irrespective of weather conditions). Statistical analysis and scientific writing. One required weekend field trip. Students cannot receive credit for this course and course 245L. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, and BIOE 20C. Concurrent enrollment in BIOE 145 is required. BIOE 107 is recommended. Enrollment limited to 30. (General Education Code(s): W.) *I. Parker*

147. Community Ecology. S

Develops the major themes of community biology: structure, trophic dynamics, succession, complex interactions among species, herbivory, evolution and coevolution. Uses case histories of well-studied marine and terrestrial systems. Students cannot receive credit for this course and

course 247. Prerequisite(s): BIOE 107, 108, 145, 155 or 159A; or Environmental Studies 24 by permission of instructor. Enrollment limited to 50. *L. Fox*

148. Quantitative Ecology. S

Quantitative treatment of the central concepts and applications of theoretical ecology. Emphasis on the mathematical modeling of single populations and species interactions, and the integration of models with data. Topics include stochastic and deterministic processes of extinction; discrete- and continuous-time models of growth and population viability analysis relevant to small and harvested populations; numeric and analytical investigations of dynamics and stability; introduction to model-fitting in information theoretic framework using R and/or MATLAB. Prerequisite(s): BIOE 107. *M. Tinker*

149. Disease Ecology. W

Focuses on the ecological and evolutionary processes that drive the transmission of pathogens between hosts; the impact of disease on host populations; and what causes the emergence of an infectious disease. Includes theoretical framework, description of field techniques, and discussion of wildlife and human diseases including malaria, West Nile virus, Lyme disease, HIV, avian influenza (bird flu), Chikungunya, tuberculosis, chytridiomycosis, and Ebola. Prerequisite(s): BIOL 20A, and BIOE 20B and 20C and 107. *A. Kilpatrick*

150. Ecological Field Methods. S

Lectures and laboratory computer exercises designed to familiarize students with research methods, study design, statistical approaches, and analysis tools for ecological research. Students cannot receive credit for this course and Environmental Studies 104A. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C; concurrent enrollment in BIOE 150L is required. BIOE 107, 108, 140, or 147 recommended. Enrollment limited to 25. *D. Croll*

150L. Ecological Field Methods Laboratory. S

Field-oriented course in the study of animal ecology and behavior. Combines overview of methodologies and approaches to field research with practical field studies. Students are billed a materials fee. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C; concurrent enrollment in BIOE 150 is required. BIOE 107, 108, 140, or 147 recommended. Enrollment limited to 25. (General Education Code(s): W.) *D. Croll*

151A. Ecology and Conservation in Practice Super-course: Ecological Field Methods. *

An intensive, on-site learning experience in terrestrial field ecology and conservation, using the University of California Natural Reserves. Students study advance concepts in ecology, conservation, and field methods for four weeks, then experience total immersion in field research at the UC Natural Reserves. Lectures, field experiments, and computer exercises familiarize students with research methods, study design, statistical approaches, and analytical tools for ecological research. Enrollment by application. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151B-C-D or ENVS 109B-C-D is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 107, 107L, ENVS 104A or 196A. (Also offered as Environmental Studies 109A. Students cannot receive credit for both courses.) *D. Croll, The Staff*

151B. Ecology and Conservation in Practice Super-course: Ecological Field Methods Laboratory. *

Field-oriented course in ecological research. Combines

overview of methodologies and approaches to field research with practical field studies. Students complete field projects in ecology and also learn the natural history of the flora and fauna of California. Students are billed a materials fee. Enrollment by application. Prerequisite(s): Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151A-C-D or ENVS 109A-C-D is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 150, 150L, ENVS 104A or 196A. (Also offered as Environmental Studies 109B. Students cannot receive credit for both courses.) (General Education Code(s): W.) *D. Croll, The Staff*

151C. Ecology and Conservation in Practice Super-course: Functions and Processes of Terrestrial Ecosystems. *

From lectures and discussion of terrestrial community and ecosystem ecology, students work individually or in small groups to present an idea for a project, review relevant literature, develop a research question/hypothesis, design and perform an experiment, collect and analyze data, and write a report. The instructor evaluates the feasibility of each student's project before it begins. Enrollment by application. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151A-B-D or ENVS 109A-B-D is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 150, 150L, ENVS 104A or 196A. (Also offered as Environmental Studies 109C. Students cannot receive credit for both courses.) *D. Croll, The Staff*

151D. Ecology and Conservation in Practice Super-course: Conservation in Practice. *

Focuses on current issues in environmental and conservation biology and the emerging field methods used to address them. From field-oriented lectures about current issues in environmental and conservation biology, students pursue research project as individuals and small groups to develop hands-on experience with field skills in conservation research and resource management. Enrollment by application. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151A-B-C or ENVS 109A-B-C is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 150, 150L, ENVS 104A or 196A. (Also offered as Environmental Studies 109D. Students cannot receive credit for both courses.) *D. Croll, The Staff*

155. Freshwater Ecology. F

Provides an overview of the physical, chemical, and biological processes that characterize inland waters such as lakes, streams, rivers, and wetlands. Also addresses relationships between humans and freshwater, and discusses these challenges in conservation. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. *J. Moore*

158L. Marine Ecology Laboratory. *

Supervised individual research projects in experimental marine biology. Students carry out a complete research project, including (1) the formation of hypotheses; (2) the design and implementation of experiments; (3) collection, analysis, and interpretation of data; and (4) write-up of an oral presentation. Students are billed a materials fee. Prerequisite(s): BIOE 108; satisfaction of the Entry Level

Writing and Composition requirements. Enrollment limited to 20. Offered in alternate academic years. (General Education Code(s): W.) *M. Carr, P. Raimondi*

159A. Marine Ecology Field Quarter: Marine Ecology with Laboratory. F

Total immersion in marine ecology for very motivated students. Students develop a research project during first five weeks on campus and then spend five weeks of immersion in directed research without distraction in isolated locations off campus (past locations include the Gulf of California in Mexico and Moorea in French Polynesia). Not available through University Extension. No other courses may be taken during this quarter. Students must sign a contract agreeing to standards of behavior outlined in the *UCSC Student Policies and Regulations Handbook* and by the instructors. Students are billed a materials, transportation (not airfare), and room and board fee. Paradigms and designs in marine ecology. A review of the paradigms that have shaped our understanding of marine ecology and analysis and discussion of experiments with these paradigms. Students carry out a complete research project, including the formation of hypotheses; the design and implementation of experiments; the collection, analysis, and interpretation of data; and the write-up and oral presentation of results. Admission by interview during previous winter quarter. BIOE 159A, 159B, 159C, and 159D are equivalent to BIOE 127, 127L, 108, and 158L for major requirements. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; BIOE 159A, 159B, 159C, and 159D must be taken concurrently. Enrollment limited to 26. Offered in alternate academic years. (General Education Code(s): W.) *P. Raimondi*

159B. Marine Ecology Field Quarter: Ichthyology with Laboratory. F

An introduction to the biology of jawless, cartilaginous, and bony fishes—their classification, evolution, form, physiology, and ecology. Admission by interview during previous winter quarter. BIOE 159A, 159B, 159C, and 159D are equivalent to BIOE 127, 127L, 108, and 158L for major requirements. BIOE 159A, 159B, 159C, and 159D must be taken concurrently. Enrollment limited to 26. Offered in alternate academic years. *G. Bernardi*

159C. Marine Ecology Field Quarter: Methods in Field Ecology. F

Students learn quantitative methods for field experiments and surveys. Emphasis will be on marine environments, but there will also be exposure to terrestrial systems. This is the lecture component to course 159D. No text is required for this course; instead, readings from the current literature will be assigned. Students are evaluated on written independent field project proposals and class participation. Admission by interview during previous winter quarter. BIOE 159A, 159B, 159C, and 159D are equivalent to BIOE 127, 127L, 108, and 158L for major requirements. BIOE 159A, 159B, 159C, and 159D must be taken concurrently. Enrollment limited to 26. Offered in alternate academic years. *P. Raimondi*

159D. Marine Ecology Field Quarter: Methods in Field Ecology Laboratory. F

This is laboratory portion of course 159C. Students carry out independent field projects under the supervision of course instructors. All work is done during the 5–6 week off-campus portion of course 159. Students are evaluated on field techniques, the final write-up of their independent field projects, and class participation. Admission by interview during previous winter quarter. BIOE 159A, 159B, 159C, and 159D are equivalent to BIOE 127, 127L, 108, and 158L for major requirements. BIOE 159A, 159B, 159C, and 159D must be taken concurrently. Enrollment limited to 26. Offered in alternate academic years. *G. Bernardi*

ment limited to 26. Offered in alternate academic years. *G. Bernardi*

161. Kelp Forest Ecology. *

Study of organization of kelp forests as models for examining biological communities. The physical and biotic factors responsible for community organization of kelp forests are explored using original literature and data collected in BIOE 161L. Class meets one full morning each week. Prerequisite(s): by interview only; BIOL 20A, BIOE 20B, and BIOE 20C are required. Students must pass the University Research Diving Certification (contact the diving safety officer, Institute of Marine Sciences, for further information). Enrollment restricted to seniors. BIOE 161L must be taken concurrently; BIOE 107, 120/L, 122/L are recommended. Enrollment limited to 24. Offered in alternate academic years. *M. Carr, P. Raimondi*

161L. Kelp Forest Ecology Laboratory. *

Fieldwork using SCUBA to quantitatively and qualitatively examine the abundance and distribution of organisms in kelp forests, with additional laboratory work. Culminates with a directed individual research project. Class meets one full morning each week. Students are billed a materials fee. Admission by interview. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C; satisfaction of the Entry Level Writing and Composition requirements; BIOE 161 must be taken concurrently; BIOE 107, 120/L, 122/L are recommended. Students must pass the University Research Diving Certification (contact the Diving Safety Officer, Institute of Marine Sciences, for further information). Enrollment limited to 24. Offered in alternate academic years. (General Education Code(s): W.) *M. Carr, P. Raimondi*

163. Ecology of Reefs, Mangroves, and Seagrasses. W

Integrated treatment of coral reefs, sea grasses, and mangroves emphasizing interactions and processes through time. Major topics: biological and geological history, biogeography, evolution and ecology of dominant organisms, biodiversity, community and ecosystem ecology, geology, biogeochemistry, global change, human impacts. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C. *D. Potts*

165. Marine Conservation Biology. F

Initially undertakes an in-depth comparison of the biology and conservation of marine versus terrestrial ecosystems. With this foundation, course examines marine biodiversity loss resulting from overexploitation, habitat loss, species introduction, and pollution, with particular emphasis on the resulting trophic cascades, biodiversity losses, and climate change. Students cannot receive credit for this course and Environmental Studies 120. Prerequisite(s): BIOL 20A, BIOE 20B, and BIOE 20C; OCEA 101 recommended. *D. Croll*

172. Population Genetics. W

Basic population genetics and selected topics will be covered, including genetics of speciation, tempo and mode of evolution, genetics of social behavior, natural selection in human populations, and the impact of molecular studies on evolutionary theory. Students cannot receive credit for this course and BIOE 272. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C, and BIOL 105. Concurrent enrollment in BIOE 172L is required. Offered in alternate academic years. *G. Pogson*

172L. Population Genetics Laboratory (2 credits). W

A companion course to 172, Population Genetics, that applies the theory developed in that course to related disciplines including conservation biology, ecology, agricul-

ture, and population biology. Original scientific literature relating to the theory developed in BIOE 172 is read, and applied problem sets are solved by the students. Students cannot receive credit for this course and BIOE 272L. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C, and BIOL 105. Concurrent enrollment in BIOE 172 is required. Offered in alternate academic years. *G. Pogson*

183F. Undergraduate Research in Ecology and Evolutionary Biology (2 credits). F,W,S

Supervised undergraduate research on a project with an ecology and evolutionary biology faculty member for students considering a career based on biological research. Class reviews the philosophy of science, basic statistics, and library searches, and emphasizes how to input data, create graphs, and prepare results for publication, posters, and talks. Enrollment restricted to junior and senior EEB majors conducting research project with EEB faculty member. *The Staff*

183L. Undergraduate Research in Ecology and Evolutionary Biology. F,W,S

Supervised undergraduate research on a project with an ecology and evolutionary biology faculty member for students considering a career based on biological research. Class reviews the philosophy of science, basic statistics, and library searches, and emphasizes how to input data, create graphs, and prepare results for publication, posters, and talks. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; enrollment restricted to junior and senior EEB majors conducting research project with EEB faculty member. (General Education Code(s): W.) *The Staff*

188. Introduction to Science Writing. S

A rigorous examination and practice of the skills involved in writing articles about science, health, technology, and the environment for the general public. Covers the essential elements of news writing and explanatory journalism, including developing a story idea, interviewing scientists, fact checking, composition, and editing of multiple drafts about scientific research. (Also offered as Science Communication 160. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and C1, C2 requirements. Enrollment restricted to junior and senior biological sciences majors. Enrollment limited to 18. (General Education Code(s): W.) *The Staff*

190. Senior Seminar (2 credits). S

Satisfies the senior exit requirement for all biological sciences majors. (Also offered as Biology: Molecular Cell and Developmental 190. Students cannot receive credit for both courses.) *The Staff*

195. Senior Thesis. F,W,S

An individually supervised course, with emphasis on independent research, to culminate in a senior thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Provides for individual programs of study (a) by means other than the usual supervision in person, or (b) when the student is doing all or most of the course work off campus. With permission of the department, may be repeated for credit, or two or three courses taken concurrently. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Provides for two units of independent field study (a) by means other than the usual supervision in person, or (b) when the student is doing all or most of the course work off campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Not offered in 2010–11

199. Tutorial. F,W,S

Reading, discussion, written reports, and laboratory research on selected biological topics, using facilities normally available on campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Two-unit Tutorial. Reading, discussion, written reports, and laboratory research on selected biological topics, using facilities normally available on campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**200A. Scientific Skills. F**

Exposes graduate students to teaching skills, understanding the scientific method, searching and organizing literature, grant proposal and scientific writing, data management and presentation, and scientific speaking. Students are evaluated on their participation and the quality of a written research proposal. Enrollment restricted to graduate students. *M. Carr*

200B. Advanced Organismal Biology. F

Consists of lectures focusing on pivotal topics in ecology and evolution. Relevant background material is developed followed by a critical analysis of readings from the primary literature. Designed to give graduate (and advanced undergraduate) students direct contact with the major areas of research that are currently at the forefront of organismal biology. Enrollment restricted to graduate students. *B. Lyon, D. Costa, L. Fox*

208. Marine Ecology. W

Paradigms and designs in marine ecology. A review of the paradigms that have shaped our understanding of marine ecology; analysis and discussion of experiments with these paradigms. Students cannot receive credit for this course and course 108. Enrollment restricted to graduate students. *M. Carr*

245. Plant Ecology. F

An exploration of the ecology of plant form, function, distribution, abundance, and diversity. Topics include plant adaptations to environmental conditions, life history variation, competition, reproductive ecology, herbivory, and patterns of diversity. Lecture with discussions of original papers and independent field project. Students cannot receive credit for this course and course 145. Prerequisite(s): BIOE 107 or ENV5 24 or permission of instructor. Concurrent enrollment in BIOE 245L is required except by permission of instructor. Enrollment restricted to graduate students. *I. Parker*

245L. Field Methods in Plant Ecology Laboratory. F

Hands-on exploration of the concepts and techniques of plant ecology. A combination of lab, greenhouse, and field-based exercises (irrespective of weather conditions), statistical analysis, and scientific writing. One required weekend field trip. Students cannot receive credit for this course and course 145L. Concurrent enrollment in BIOE 245 is required. Enrollment restricted to graduate students. Enrollment limited to 2. *I. Parker*

247. Community Ecology. S

Develops the major themes of community ecology: structure, trophic dynamics, succession, complex interactions among species, herbivory, evolution, and coevolution. Uses case histories of well-studied marine and terrestrial systems. Students cannot receive credit for this course and course 147. Enrollment restricted to graduate students. *L. Fox*

258L. Experimental Marine Ecology. *

Supervised individual research projects in experimental marine biology. Students carry out a complete research project, including (1) the formation of hypotheses, (2) the design and implementation of experiments, (3) collection, analysis, and interpretation of data, and (4) the write-up of an oral presentation. Prerequisite(s): BIOE 208; and interview to assess ability to carry out field project. Enrollment limited to 20. Offered in alternate academic years. *M. Carr, P. Raimondi*

272. Population Genetics. W

Basic population genetics and selected topics are covered including genetics of speciation, tempo and mode of evolution, genetics of social behavior, natural selection in human populations, and the impact of molecular studies on evolutionary theory. Students cannot receive credit for this course and Biology 172. Concurrent enrollment in BIOE 272L is required. Enrollment restricted to graduate students. Offered in alternate academic years. *G. Pogson*

272L. Population Genetics Laboratory (2 credits). W

A companion course to 272, *Population Genetics*, that applies the theory developed in that course to related disciplines including conservation biology, ecology, agriculture, and population biology. Original scientific literature relating to the theory developed in course 272 is read, and applied problem sets are solved by the students. Students cannot receive credit for this course and course 172L. Must be taken concurrently with BIOE 272. Enrollment restricted to graduate students. Offered in alternate academic years. *G. Pogson*

274. Evolutionary Game Theory. *

Reviews static equilibrium concepts, games of incomplete information, and the traditional theory of dynamic games in discrete time. Develops recent evolutionary game models, including replicator and best reply dynamics, and applications to economics, computer science, and biology. Prerequisite(s): upper-division math courses in probability theory are strongly recommended. Cannot receive credit for this course and Economics 166B or Computer Science 166B. (Also offered as Computer Science 272 and Economics 272. Students cannot receive credit for both courses.) *B. Sinervo, The Staff*

279. Evolutionary Ecology. W

Analysis of the ways in which ongoing evolution and coevolution shape the ecological structure and dynamics of populations, species, and species interactions across geographic landscapes. Enrollment restricted to graduate students. *J. Thompson*

281A. Topics in Basic and Applied Marine Ecology. F,W,S

Seminar focusing on concepts in basic and applied ecology. Structure rotates quarterly between graduate student research and readings of journal articles and textbooks. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. *M. Carr*

281B. Topics in Molecular Evolution (2 credits). F,W,S

A discussion of current research and literature review on the subject of molecular evolution. Primary focus on recent results on molecular phylogenetics and molecular population genetics. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *G. Bernardi*

281C. Topics in Physiological Ecology. F,W,S

An intensive seminar focusing on the interaction between physiological constraint and life history options and solutions employed by animals. Topics vary from comparative physiology to ecological theory. Participants are required to present results of their own research or review papers of interest. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *D. Costa*

281E. Ecological Research Topics. F,W,S

Intensive research and discussions on plant-animal interactions. All students undertake a research project and meet weekly with the faculty sponsor to monitor progress. The group meets weekly to discuss experimental design and analysis, specific problems related to the students' research, relevant research papers, or manuscripts that the group members are writing. Each student gives a formal presentation of research plans or progress each quarter. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *L. Fox*

281I. Topics in Disease Ecology, Population Biology, and Conservation. F,W,S

Selected topics in population biology and disease ecology. Students present results from their own research and discuss recent advances from the literature. (Formerly *Topics in Plant Population and Disease Ecology*.) Enrollment restricted to graduate students; qualified undergraduates may enroll by permission of instructor. Enrollment limited to 18. May be repeated for credit. *A. Kilpatrick*

281J. Topics in Research on Biochemical Ecology. F,W,S

Seminar in which students give critically evaluated presentations regarding current research on selected topics in plant ecology with an emphasis on biochemical ecology. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 12. May be repeated for credit. *J. Langenheim*

281K. Topics in Plant Evolution. F,W,S

Intensive seminar on selected topics in plant evolution. Students present results from their own research and discuss recent advances from the literature. Enrollment restricted to graduate students; qualified undergraduates may enroll by permission of instructor. Enrollment limited to 18. May be repeated for credit. *K. Kay*

281L. Topics in Behavioral and Evolutionary Ecology. F,W,S

An intensive seminar on selected topics in behavioral and evolutionary ecology. Students are expected to discuss the current literature and present literature reviews, research proposals, and preliminary results from their ongoing research. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. *B. Lyon*

281M. Topics in Aquatic Ecology (2 credits). F,W,S

Seminar focusing on the ecology of freshwaters. Discussion focuses on recent literature or on student presentations of their own research. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. May be repeated for credit. *J. Moore*

281N. Topics in Marine Vertebrate Ecology. F,W,S

Seminar on the ecology of marine vertebrates. Topics vary from the factors that explain the distribution of marine predators to island biogeography and the ecosystem effects of introduced vertebrates on islands. Enrollment

restricted to graduate students. Enrollment limited to 12. May be repeated for credit. *D. Croll*

281O. Topics in Plant-Water Relations. F,W,S

Intensive seminar focusing on fundamental and evolutionary concepts in plant-water relations. Students present results from their own research and discuss recent advances from the literature. Enrollment restricted to graduate students; qualified undergraduates may enroll by permission of instructor. Enrollment limited to 18. May be repeated for credit. *J. Pittermann*

281P. Topics in Plant Population Ecology. F,W,S

An intensive seminar on selected topics in plant ecology and population biology. Students present results from their own research and discuss recent advances from the literature. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 12. May be repeated for credit. *I. Parker*

281Q. Topics in Molecular Evolutionary Genetics. F,W,S

An intensive seminar on selected topics in molecular evolutionary genetics. Students are required to present results from their own research projects, present a critical review paper at least once during the quarter, and submit a written research proposal. Enrollment restricted to graduate students; qualified undergraduate students may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *G. Pogson*

281R. Topics in Marine Ecology and Evolutionary Biology. F,W,S

An intensive seminar series focusing on fundamental concepts in marine ecology. Emphasis changes quarter to quarter. At least one quarter per year is devoted to discussion of graduate student research. Other quarters involve reading and evaluating current and classic literature on marine ecology and evolutionary biology. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *P. Raimondi*

281T. Species Interactions and Coevolution. F,W,S

The genetics and ecological structure of species interactions, and the role of coevolution between species in shaping biodiversity. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *J. Thompson*

281U. Topics in Invertebrate Biology. F,W,S

An intensive study about concepts, theory, and techniques for graduate students conducting research on the ecology, genetics, evolution, systematics, or biodiversity of marine invertebrates. Enrollment restricted to graduate students; advanced undergraduates may enroll with permission of instructor. Enrollment limited to 15. May be repeated for credit. *D. Potts*

281V. Topics in Behavioral Ecology. F,W,S

A discussion of current topics and methods in behavioral ecology and life history evolution. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *B. Sinerio*

281W. Topics in Exercise and Environmental Physiology. F,W,S

A weekly seminar discussion on current research and techniques in mammalian exercise and environmental physiology. Areas covered include locomotor physiology, exercise testing and cardiovascular monitoring, and biomechanics. Oral presentation of ongoing research or current literature required from each student. Enrollment

restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *T. Williams*

286. Experimental Design and Data Analysis. W

Focuses on problems and designs in ecology and population biology. Topics include basic experimental design; exploratory data analysis—from a graphical perspective; hands-on statistics; and graphical theory. Structured around a statistical analysis and graphics computer program to teach students to design their own surveys and experiments and analyze their data correctly. Students cannot receive credit for this course and course 186. Prerequisite(s): one course in statistics or by permission of instructor. Enrollment restricted to graduate students. *P. Raimondi*

286L. Experimental Design and Data Analysis Lab (2 credits). W

Required lab that accompanies Biology 286. Lab will focus on hands-on statistical problem solving, graphical presentations and experimental design issues. Concurrent enrollment in course 286 is required. Enrollment restricted to graduate students. *P. Raimondi*

293. Readings in Ecology and Evolution (2 credits). W,S

Weekly readings and discussions of recent research papers in ecology, evolution, and related topics from organismal biology. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

294. Ecology, Evolutionary Biology Seminar (no credit). F,W,S

Selected topics of current interest to ecologists and evolutionary biologists presented by weekly guest speakers. Enrollment restricted to graduate students. *The Staff*

295. Advanced Ecology and Evolutionary Biology Seminar (no credit). F,W,S

Course consists of extended weekly meetings organized around an advanced theme in theoretical or applied evolutionary biology, ecology, physiology, behavior, or other aspect of organismal biology. Course is targeted at students who already have reached a professional level of expertise in their field and advanced master students. Enrollment restricted to graduate students. Enrollment limited to 24. *The Staff*

297. Independent Study. F,W,S

Independent study for graduate students who have not yet settled on a research area for their thesis. Students submit petition to sponsoring agency. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. *The Staff*

NEEDHI BHALLA

Meiotic chromosome dynamics

HANNS H. BOEGER

Chromatin structure and the regulation of transcription

BARRY BOWMAN

Membrane biochemistry and genetics, biochemistry and molecular biology of membrane proteins

BIN CHEN

Mammalian brain development

DAVID FELDHEIM

Developmental neuroscience

GRANT HARTZOG

Biochemistry, genetics, chromatin and transcriptional regulation

LINDSAY HINCK

Breast development and cancer, cell biology, development

MELISSA JURICA

Structural analysis of ribonucleoprotein macromolecules

ROHINTON T. KAMAKAKA

Gene repression and insulators

DOUGLAS R. KELLOGG

Coordination of cell growth and cell division

ROBERT A. LUDWIG

Plant-microbe interactions, photorespiration, genetic recombination in plants

HARRY F. NOLLER

Ribosomes, RNA structure and function, RNA-protein interaction

AMY RALSTON

Origins and regulation of mammalian stem cells

MICHAEL REXACH

Structure and function of nuclear pore complex, nuclear transport

JEREMY SANFORD

Genomic analysis of protein-RNA interactions

WILLIAM M. SAXTON

Cytoskeletal motors and active transport processes

SUSAN STROME

*Chromatin and RNA regulation in *C. elegans**

WILLIAM T. SULLIVAN

*Genetics, cell biology, development of the *Drosophila* embryo*

JOHN W. TAMKUN

*Transcriptional regulation, molecular genetics of *Drosophila* development, regulation of gene expression*

ALAN M. ZAHLER

Molecular biology, splice site selection, and alternative pre-mRNA processing

MARTHA C. ZÚÑIGA

Molecular, cellular, and developmental biology of the immune system

YI ZUO

Glia-synapse interaction and synaptic plasticity in vivo

Molecular, Cell, and Developmental Biology Emeritus Faculty

CHARLES DANIEL

ROBERT EDGAR

JERRY F. FELDMAN

HENRY HILGARD

KIVIE MOLDAVE

Molecular, Cell, and Developmental Biology

225 Sinsheimer Laboratories
(831) 459-4986
<http://www.mcd.ucsc.edu/>

Faculty and Professional Interests

MANUEL ARES JR.

RNA processing, structure and function of RNA

CLIFTON A. POODRY

LINCOLN TAIZ

FRANK J. TALAMANTES

HOWARD H. WANG

Molecular, Cell, and Developmental Biology Lecturers

MICHAEL DALBEY

JEREMY LEE

LINDA OGREN

MARY ZAVANELLI



VICTORA AUERBACH-STONE (Microbiology and Environmental Toxicology)

The interaction between the gut pathogen Yersinia pseudotuberculosis and the mammalian immune system

CAMILLA FORSBERG (Biomolecular Engineering)

Hematopoietic stem cells; transcriptional regulation; chromatin; blood cell development; cell surface receptors; genomics

DAVID HAUSSLER (Biomolecular Engineering)

Molecular evolution, neurodevelopment, genomics, bioinformatics, computational molecular biology, statistical models, machine learning, neural networks

SCOTT LOKEY (Chemistry and Biochemistry)

Organic chemistry; combinatorial synthesis, biotechnology, molecular cell biology

TODD M. LOWE (Biomolecular Engineering)

Experimental and computation genomics, ncRNA gene finders, DNA microarrays to study the biology of Archaea

KAREN OTTEMANN (Environmental Toxicology)

Environmental responses of pathogenic bacteria

SETH RUBIN (Chemistry and Biochemistry)

Biomolecular mechanisms of cell-cycle regulation and cancer; structural biology and biochemistry; macromolecular x-ray crystallography; nuclear magnetic resonance

WILLIAM G. SCOTT (Chemistry and Biochemistry)

Structure and function of RNA, proteins, and their complexes

ALEXANDER SHER (Physics)

Development of experimental techniques for the study of neural function

MICHAEL STONE (Chemistry)

Single-molecule Biophysics and Enzymology; Structure, function, and assembly of the telomerase ribonucleoprotein, Fluorescence Resonance Energy Transfer (FRET), optical magnetic trapping, sub-diffraction optical imaging of telomeres and the nucleus

FITNAT YILDIZ (Environmental Toxicology)

*Microbiology, molecular genetics, genomics; the mechanism of persistence of survival of Vibrio cholerae***Graduate Program Description**

The program in molecular, cell, and developmental (MCD) biology (courses BIOL) leads to either the doctor of philosophy (Ph.D.) or the master of arts (M.A.) and is designed to prepare students for careers in research, teaching, and biotechnology. Current research in MCD biology focuses on such topics as the structure and function of RNA, gene expression, signaling, cell division, development, and pathogenesis. A unique focus of the department is the center for the molecular biology of RNA.

Degree Requirements

Ph.D. and master's students complete the graduate core courses, BIOL 200A, 200B, and 200C, and 200D in the first year. Additional undergraduate courses required to strengthen the student's background may be assigned by the advisory committee during the initial advising meeting. Typically, these courses are Biochemistry 100A and BIOL 115. Students are required to participate in laboratory research meetings and departmental seminar series every quarter.

First-year Ph.D. students complete three 10-week laboratory rotations. Students choose their rotation laboratories in consultation with the Graduate Advisory Committee. The laboratory rotations give students a chance to learn about the diverse fields and methods of inquiry and to interact with members of the department. At the end of each quarter, students present a short talk to the department on their rotation project. At the end of spring quarter, students consult with rotation faculty to identify a permanent thesis laboratory.

Second-year Ph.D. students are required to submit two proposals—one on their proposed thesis work and a second on an unrelated MCDB research topic. The Ph.D. qualifying examination, taken in spring quarter of the second year, is an oral examination before a committee comprised of three internal reviewers and one external reviewer.

Once the qualifying examination is passed, a student, with her/his faculty adviser, selects a thesis committee to consult with in the development of the student's thesis. This committee monitors the student's progress and ultimately approves the final draft of the student's dissertation. The student must meet with the thesis committee at least once a year after passing the qualifying examination.

A student is advanced to candidacy following presentation of their research to the department in a seminar. This presentation takes place no later than spring of the third year.

Graduate students must take two approved advanced graduate electives. Students who enter the Ph.D. program with a master's degree but without doing rotations must complete an additional two approved graduate elective courses.

Ph.D. Requirements

- Complete the graduate core course
- Complete the *Practice of Science* course
- Complete an oral qualifying examination
- Complete an advancement to candidacy seminar
- Complete two advanced, graduate elective courses
- Meet yearly with a thesis committee after the qualifying examination
- Complete two quarters of service as a teaching assistant
- Complete thesis research resulting in a dissertation of individual work
- Present the thesis defense in departmental seminar

M.A. Requirements

Students apply to the master's degree program through the same portal as for the Ph.D. degree program. However, since master's students do not do research rotations, they must identify a research adviser at the outset of the training period.

- Completion of the graduate core courses

- Completion of the *Practice of Science* course
- Write a master's thesis based on original research
- Presentation of thesis defense in departmental seminar

Lower-Division Courses**15. Undergraduate Research Reports (1 credit). F,W,S**

Undergraduate students who work in faculty research laboratories present the results of their projects. Organized by the Minority Undergraduate Research Program and the Minority Access to Research Careers Program. Designed for students with membership in the above-mentioned programs. Prerequisite(s): qualifications as determined by instructor at first class meeting. May be repeated for credit. *B. Bowman, A. Zahler*

20A. Cell and Molecular Biology. F,W,S

Introduction to molecular biology, cell physiology, and genetics. Prerequisite(s): Chemistry 1A and 1B. (General Education Code(s): IN.) *A. Zahler, M. Dalbey, B. Bowman*

20L. Experimental Biology Laboratory (2 credits). F,W,S

Provides biology majors with the theory and practice of experimental biology. A wide range of concepts and techniques used in the modern laboratory are included in the exercises. Designed to satisfy the introductory biology lab requirement of many medical and professional schools. Students are billed a materials fee. Prerequisite(s): BIOL 20A and previous or concurrent enrollment in BIOE 20B. Enrollment restricted to health sciences majors; other majors by permission. Enrollment limited to 20. *M. Dalbey, L. Ogren*

21L. Environmental Phage Genomics Laboratory (3 credits). F,W,S

Introduction to hypothesis-driven laboratory research. Students isolate and characterize both the structure and genome of a unique bacteriophage. Students gain experience in basic sterile technique, solution, manipulation of DNA, and bioinformatic analysis of a new genome. Enrollment restricted to first-year students and sophomores. Enrollment by online application and permission of instructor. Enrollment limited to 14. May be repeated for credit. *G. Hartzog, M. Ares*

80A. Female Physiology and Gynecology. S

Biochemical, medical, social, and clinical aspects of the female body. Emphasis will be on biological-chemical interactions in the female organs. Topics include female anatomy, cell physiology, endocrine functions, sexuality and intimacy, sexually transmitted diseases, puberty, pregnancy, menopause, birth control, abortion, immunity, cancer. (General Education Code(s): SI, T-2 Natural Sciences.) *M. Zavanelli*

80E. Evolution. F

Introduction to Darwinian evolution including how the theory was devised and a discussion of other theories proposed at the time. Explores the facts and evidence of evolutionary processes and the insights they provide in biological diversity, consequences of extinction, and emergence of new diseases. Includes a discussion of evolution and spirituality. (General Education Code(s): SI, T-2 Natural Sciences.) *M. Zavanelli*

80J. Biology of AIDS. W

An overview of the biology of the acquired immunodeficiency syndrome (AIDS) and the social and legal issues that surround it are explored in a series of lectures by biol-

ogy faculty and experts in the field. (General Education Code(s): SI, T-2 Natural Sciences.) *M. Zavanelli*

Upper-Division Courses

100. Biochemistry. F,S

An introduction to biochemistry including biochemical molecules, protein structure and function, membranes, bioenergetics, and regulation of biosynthesis. Provides students with basic essentials of modern biochemistry and the background needed for upper-division biology courses. Students who plan to do advanced work in biochemistry and molecular biology should take the Biochemistry and Molecular Biology 100 series directly. Students cannot receive credit for this course after they have completed any two courses from the BIOC 100A, 100B, and 100C sequence with grades of Pass, C, or better. Prerequisite(s): BIOL 20A and BIOE 20B; and CHEM 108A or 112A. Concurrent enrollment in course 100K is required. *R. Ludwig, J. Sanford*

100K. Biochemistry Laboratory (2 credits). F,W,S

Laboratory course providing hands-on experience with, and covering conceptual background in, fundamental techniques in molecular biology and biochemistry, including DNA cloning, PCR, restriction digest, gel electrophoresis, protein isolation, protein quantification, protein immunoblot (Western) analysis, and use of online bioinformatics tools. Students are billed a materials fee. Concurrent enrollment in course 100 or BIOC 100A is required. *J. Lee*

100L. Advanced Biochemistry Laboratory. W

Basic techniques and principles of laboratory biochemistry including isolation and characterization of a natural product, manipulation of proteins and nucleic acids to demonstrate basic physical and chemical properties; and characterization of enzyme substrate interactions. Students are billed a materials fee. (Formerly *Biochemistry Laboratory*). Prerequisite(s): previous or concurrent enrollment in BIOL 100; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to biological sciences and affiliated majors; biology minors; non-majors by instructor permission. Enrollment limited to 20. (General Education Code(s): W.) *M. Dalbey*

105. Genetics. F,W,S

Mendelian and molecular genetics; mechanisms of heredity, mutation, recombination, and gene action. Prerequisite(s): BIOL 20A. *R. Kamakaka, N. Bhalla, S. Strome*

105L. Eukaryotic Genetics Laboratory. W,S

Classical and newly developed molecular-genetic techniques used to explore genetic variation in wild populations of the fruit fly *Drosophila melanogaster*. Topics include Mendelian fundamentals, mapping, design of genetic screens, bio-informatic and database analysis, genetic enhancers, and population genetics. Students are billed a materials fee. Prerequisite(s): BIOL 105; BIOL 100 or BIOC 100A recommended; satisfaction of Entry Level Writing and Composition Requirements. Enrollment restricted to biological sciences and affiliated majors; biology minors; non-majors by instructor permission. (General Education Code(s): W.) *J. Lee*

105M. Microbial Genetics Laboratory. F,S

Exploration of basic genetics processes such as replication, mutation, DNA repair, recombination, gene exchange, population genetics, and evolution using microbial model organisms; classic techniques in microbial genetics and contemporary molecular techniques presented. Students are billed a materials fee. Prerequisite: BIOL 105; satisfaction of the Entry Level Writing and Composition re-

quirements. Enrollment restricted to biological sciences and affiliated majors; biology minors; other majors by instructor permission. Enrollment limited to 16. (General Education Code(s): W.) *M. Dalbey*

109L. Yeast Molecular Genetics Laboratory. *

The powerful genetic and molecular techniques available for yeast combined with the complete genomic DNA sequence offers opportunity for discovery of fundamental aspects of eukaryotic life. Lab providing practical experience in using yeast as an experimental system. Students are billed a materials fee. Prerequisite(s): BIOL 105; BIOL 115 strongly recommended; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to biological sciences and affiliated majors; biology minors; other majors by instructor permission. Enrollment limited to 15. (General Education Code(s): W.) *The Staff*

110. Cell Biology. F,S

Covers the structure, organization, and function of eukaryotic cells. Topics include biological membranes, organelles, protein and vesicular trafficking, cellular interactions, the cytoskeleton, and signal transduction. Requires a good understanding of basic biochemistry and molecular biology. Prerequisite(s): BIOL 100 or BIOC 100A. *M. Rexach, L. Hinck*

110L. Cell Biology Laboratory. S

Fundamental aspects of cell biology explored through experimentation in a modern laboratory setting. Research topics include the structure and function of biological membranes; intracellular transport and organelle biogenesis; the cell cycle; and the cytoskeleton. Students are billed a materials fee. Prerequisite(s): BIOL 100 or BIOC 100A; previous/concurrent enrollment in course 110; satisfaction of the Entry Level Writing and Composition requirements. Restricted to biological sciences/affiliated majors; biology minors; other majors by permission. Enrollment limited to 16. (General Education Code(s): W.) *M. Rexach*

111A. Immunology I. W

Principles and concepts of the innate and adaptive immune systems, with emphasis on mechanisms of action and molecular and cellular networks. The development, differentiation, and maturation of cells of the immune system are also discussed. Prerequisite(s): courses BIOE 20B, and BIOL 20A, 105, and 110. *M. Zúñiga*

111B. Immunology II. S

The immune system in health and disease, including failures of host immune-defense mechanisms, allergy and hypersensitivity, autoimmunity, transplantation biology, the immune response to tumors, immune-system interactions with pathogens, and manipulation of the immune response. Prerequisite(s): courses BIOE 20B, and 20A, 105, 110, and 111A. *M. Zúñiga*

113. Mammalian Endocrinology. S

Introduction to the major endocrine organs, their hormones, and their receptors. Emphasis is on the following topics: structural analysis of the hormones and receptors at the protein and molecular level, regulation of expression of hormones and their receptors, and the biological functions of hormones. Prerequisite(s): BIOL 100 or BIOC 100A. *L. Ogren*

114. Cancer Cell Biology. S

Focuses on the molecular and cellular mechanisms behind cancer. Topics covered include oncogenes, tumor suppressor genes, cell growth genes, checkpoint genes, telomeres, and apoptosis. Students will gain experience in reading the primary scientific literature. Prerequisite(s): BIOL 110 or 115. (General Education Code(s): TA.) *A. Zahler*

115. Eukaryotic Molecular Biology. W,S

Covers eukaryotic gene and genome organization; DNA, RNA, and protein synthesis; regulation of gene expression; chromosome structure and organization; and the application of recombinant DNA technology to the study of these topics. Prerequisite(s): BIOL 100 or BIOC 100A, and BIOL 105. Enrollment restricted to biological sciences and affiliated majors, non-majors by permission of instructor. *H. Boeger, M. Jurica*

115L. Eukaryotic Molecular Biology Laboratory. S

A laboratory designed to provide students with direct training in basic molecular techniques. Each laboratory is a separate module which together builds to allow cloning, isolation, and identification of a nucleic acid sequence from scratch. Students cannot receive credit for this course and course 187L or 287L. Students are billed a materials fee. Prerequisite(s): BIOL 100 or BIOC 100A; previous/concurrent enrollment in course 115; satisfaction of the Entry Level Writing and Composition requirements. Restricted to biological sciences/affiliated majors; biology minors; other majors by permission. Enrollment limited to 20. (General Education Code(s): W.) *M. Zavanelli*

118. Pathogenesis: Molecular Mechanisms of Disease. S

Overview of the pathogenic mechanisms underlying human disease at the physiological and molecular levels, with their implications for epidemiology, diagnosis, and treatment. Includes discussion of clinical cases and of emerging areas of research. Geared toward students interested in future research or clinical careers in the area of human or animal health. Students cannot receive credit for this course and Microbiology and Environmental Toxicology 238. (Also offered as Microbiology and Environmental Toxicology 138. Students cannot receive credit for both courses.) Prerequisite(s): Biology 130. Enrollment restricted to students majoring in biology; human biology; molecular, cell and developmental biology; biochemistry and molecular biology; or neuroscience. Offered in alternate academic years. *M. Camps*

119. Microbiology. W

Cell and molecular biology of bacteria and their viruses, including applications in medicine, public health, agriculture, and biotechnology. (Also offered as Microbiology and Environmental Toxicology 119. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 100 or BIOC 100A. *V. Stone*

119L. Microbiology Laboratory. F,W,S

An introduction to the principles and practices of laboratory microbiology, with a substantial presentation of optical microscopy. Students are billed a materials fee. (Also offered as Microbiology and Environmental Toxicology 119L. Students cannot receive credit for both courses.) Prerequisite(s): previous or concurrent enrollment in BIOL 119 is required; satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to biological sciences and affiliated majors; biology minors; other majors by permission. (General Education Code(s): W.) *M. Dalbey, C. Saltrikov, K. Ottemann*

120. Development. W

A description and analysis of selected developmental events in the life cycle of animals. Experimental approaches to understanding mechanisms are emphasized. Prerequisite(s): BIOL 100 or BIOC 100A, and BIOL 105. *A. Ralston*

120L. Development Laboratory. W

Experimental studies of animal development using a variety of locally obtainable organisms. Approximately eight

hours weekly, but it will often be necessary to monitor continuing experiments throughout the week. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; previous or concurrent enrollment in BIOL 120 required. Enrollment restricted to biological sciences and affiliated majors; biology minors; other majors by permission. *J. Lee*

125. Introduction to Neuroscience. F

The structure and function of the nervous system. Topics include elementary electrical principles, biophysics and physiology of single nerve and muscle cells, signal transduction at synapses, development of the nervous system, and neural basis of behavior. Requires a good understanding of basic biochemistry, cell biology, and molecular biology. Prerequisite(s): BIOL 100. Concurrent enrollment in BIOL 105 or 110 is encouraged. *B. Chen*

126. Advanced Molecular Neuroscience. W

Explores in detail cellular and molecular events that underlay the function of the nervous system. Topics include neural development, axon guidance and regeneration, advanced electrical principles (synaptic transmission through a variety of receptors), synaptic plasticity, learning and memory, as well as several neural disorders. Prerequisite(s): BIOL 125. (General Education Code(s): TA.) *Y. Zuo*

127. Mechanisms of Neurodegenerative Disease. S

Focuses on cellular and molecular processes that underlie neurodegenerative diseases. Includes lectures, student oral presentations, discussions, a term paper, and exams. Prerequisite(s): BIOL 105 and 110. (General Education Code(s): TA.) *W. Saxton*

130. Human Physiology. F,W

Function, organization, and regulation of the major organ systems of humans, with emphasis on integration among systems. Students cannot receive credit for this course and course 131. Prerequisite(s): BIOL 20A, BIOE 20B, BIOL 100, and BIOL 110. *L. Ogren*

130L. Human Physiology Laboratory (2 credits). F,W

Examines fundamental principles of systemic physiology focusing on the human. Students cannot receive credit for this course and BIOE 131L. Students are billed a materials fee. (General Education Code(s): W satisfied by taking this course and course 189.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, BIOL 100, and BIOL 110. Previous or concurrent enrollment in BIOL 130 is required; restricted to biological sciences and affiliated majors; biology minors; other majors by permission. *L. Ogren*

135. Human Functional Anatomy. S

Study of structure and function of the human body through lectures with an evolutionary perspective including regional anatomy and body systems. Students cannot receive credit for this course and Anthropology 207. (Also offered as Anthropology 107. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 20A and BIOE 20B; or ANTH 1. Concurrent enrollment in BIOL 135L is required. Enrollment restricted to biological sciences and affiliated majors, non-majors by permission of instructor. *The Staff*

135L. Human Functional Anatomy Laboratory. S

Study of structure and function of the human body using dissection, comparative vertebrate anatomy, anatomical models, and computer-assisted instruction. Students are billed a materials fee. Students cannot receive credit for this course and Anthropology 207L. (Also offered as Anthropology 107L. Students cannot receive credit for both

courses.) Prerequisite(s): BIOL 20A and BIOE 20B. Concurrent enrollment in BIOL 135 is required. Enrollment restricted to biological sciences and affiliated majors; biology minors; other majors by instructor permission. Enrollment limited to 20. *The Staff*

178. Stem Cell Biology. W

Basic concepts, experimental approaches, and therapeutic potential are discussed. Students gain experience in reading the primary scientific literature. (Also offered as Biomolecular Engineering 178. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 110; BIOL 115 recommended. *C. Forsberg*

178L. Protocols in Stem Cell Biology. *

Provides hands-on experience in embryonic stem cell culture methods and techniques. Students grow and passage mouse embryonic stem (mES) cells and perform established protocols that differentiate mES cells into cardiac muscle cells and neurons. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; previous or concurrent enrollment in course 178. Enrollment restricted to biological sciences and affiliated majors; biology minors; non-majors by permission. Enrollment limited to 16. *D. Feldheim*

179. Biotechnology and Drug Development. W

Recommended for students interested in careers in the biopharmaceutical industry. Focuses on recombinant DNA technology and the drug-development process, including discovery research; preclinical testing; clinical trials; and regulatory review, as well as manufacturing and production considerations. Students may not receive credit for this course and Biomolecular Engineering 255 and Chemistry 255. (Also offered as Biomolecular Engineering 155. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 20A and BIOL 100 or BIOC 100A. Enrollment limited to 15. *P. Berman*

180. Research Programming for Biologists and Biochemists. W

No programming experience required, but basic computer skills assumed. Students without prior programming experience taught basic proficiency in Perl, BioPerl, and other Perl libraries needed to analyze, transform, and publish biological data. Students required to solve a research problem as a final project. Lectures and labs are shared with Biomolecular Engineering 60. Students cannot receive credit for this course and Biomolecular Engineering 60. (Also offered as Biomolecular Engineering 160. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 20A or BIOL 21A. Concurrent enrollment in BIOL 180L is required. (General Education Code(s): ME.) *The Staff*

180L. Research Programming for Biologists and Biochemists Laboratory (1 credit). W

Laboratory sequence illustrating topics covered in course 160. One two-hour laboratory per week. Students cannot receive credit for this course and Biomolecular Engineering 60L. (Also offered as Biomolecular Engineering 160L. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 20A or BIOL 21A. Concurrent enrollment in BIOL 180 is required. *The Staff*

181. Computational Biology Tools. F,S

Hands-on laboratory geared to teach basic tools used in computational biology (motif searching, primer selection, sequence comparison, multiple sequence alignment, genefinders, phylogenetics analysis, X-ray crystallography software). Web- and Unix-based tools/databases are used. Open to all science students; no prior Unix experience required. (Also offered as Biomolecular Engineering 110. Students cannot receive credit for both courses.)

Prerequisite(s): course 100, 105, or Biochemistry 100A or declared bioinformatics majors. Enrollment limited to 25. *D. Gerloff, T. Lowe*

182. ACE Program Service Learning (2 credits). F

Students participate in training and development to co-facilitate collaborative learning in ACE chemistry discussion sections and midterm/examination review sessions. Students are role models for students pursuing science- and math-intensive majors. Prerequisite(s): Prior participation in ACE; good academic standing; no non-passing grades in prior quarter. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 10. (General Education Code(s): PR-S.) *B. Bowman*

186F. Undergraduate Research in MCD Biology (2 credits). F,W,S

Supervised undergraduate research in laboratory of an MCD biology faculty member accompanied by weekly lectures on ethical and practical scientific issues. Topics include laboratory safety; the scientific method; the collection, treatment, and presentation of data; critical evaluation of scientific literature; scientific misconduct; and peer review. Career issues, including how to apply for admission to graduate and professional schools, also discussed. Prerequisite(s): BIOL 20A and BIOE 20B; at least one of BIOL 100, BIOL 105, or BIOC 100A; and permission of instructor. May be repeated for credit. *The Staff*

186L. Undergraduate Research in MCD Biology. F,W,S

Supervised undergraduate research in laboratory of an MCD biology faculty member accompanied by weekly lectures on ethical and practical scientific issues. Topics include laboratory safety; the scientific method; the collection, treatment, and presentation of data; critical evaluation of scientific literature; scientific misconduct; and peer review. Career issues, including how to apply for admission to graduate and professional schools, also discussed. Prerequisite(s): satisfaction of the Entry-Level Writing and Composition requirements; courses BIOL 20A and BIOE 20B; at least one of BIOL 100, BIOL 105, or BIOC 100A; and permission of instructor. (General Education Code(s): W.) *The Staff*

187L. Molecular Biotechnology Laboratory. F

An intensive molecular biology laboratory that presents procedures used in molecular and biotechnology research. Topics and procedures include DNA/RNA isolation, cloning and library construction, southern and northern hybridization, DNA fingerprinting, PCR, manual and automated sequencing, and computer methods for analyzing molecular data. New procedures currently being developed in biotechnology industries are presented by industry representatives. Students cannot receive credit for this course and BIOL 116L or BIOL 287L. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and BIOL 20A, BIOE 20B, BIOE 20C, BIOL 100, and BIOL 110. Enrollment limited to 20. *M. Zavanelli*

189. Health Sciences Internship. F,W,S

Structured off-campus learning experience providing hands-on experience and pre-professional mentoring in a variety of health-related settings. Interns are trained and supervised by a professional at their placement and receive academic guidance from their faculty sponsor. Students spend 10-12 hours per week at their placement, participate in weekly discussion meetings on campus, keep a reflective journal, and submit a final paper. Enrollment by application. Students interview with health sciences internship coordinator; applications are due one quarter in advance to the Health Sciences Internship Office.

Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to human biology majors. (General Education Code(s): W satisfied by taking this course and BIOL 130L.) *The Staff*

189F. Health Sciences Internship (2 credits). F,W,S
Structured off-campus learning experience providing hands-on experience and pre-professional mentoring in a variety of health-related settings. Interns are trained and supervised by a professional at their placement, and receive academic guidance from their faculty sponsor. Students spend six hours per week at their placement, keep a reflective journal, and submit a final paper. Enrollment by application. Students interview with health sciences internship coordinator. Applications due one quarter in advance to the Health Sciences Internship Office. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. May be repeated for credit. *The Staff*

190. Senior Seminar (2 credits). S
Satisfies the senior exit requirement for all biological sciences majors. (Also offered as Biology: Ecology and Evolutionary 190. Students cannot receive credit for both courses.) *The Staff*

195. Senior Thesis Research. F,W,S
An individually supervised course, with emphasis on independent research, to culminate in a senior thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S
Provides for individual programs of study (a) by means other than the usual supervision in person, or (b) when the student is doing all or most of the course work off campus. With permission of the department, may be repeated for credit, or two or three courses taken concurrently. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S
Provides for two units of independent field study (a) by means other than the usual supervision in person, or (b) when the student is doing all or most of the course work off campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S
Reading, discussion, written reports, and laboratory research on selected biological topics, using facilities normally available on campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S
Two-unit tutorial. Reading, discussion, written reports, and laboratory research on selected biological topics, using facilities normally available on campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200A. Critical Analysis of Scientific Literature. F
Development of critical thinking skills via discussion of research articles on a broad range of topics. Prepares students to critically evaluate research publications, and improves their ability to organize effective oral presentations and to evaluate the oral presentations of other scientists. Enrollment restricted to graduate students in MCD biology, or by permission of instructor. (Formerly *Critical Analysis of Genetics and Molecular Biology*.) Enrollment limited to 20. *W. Saxton*

200B. Advanced Molecular Biology. F
An in-depth coverage of the structure, function, and synthesis of DNA, RNA, and proteins. Discussion of the roles of macromolecules in the regulation of information in the cell. Prerequisite(s): Enrollment restricted to graduate students. *R. Kamakaka*

200C. Advanced Cell Biology. W
An in-depth coverage of topics in cellular and subcellular organization, structure, and function in plants and animals. Emphasis on current research problems. Prerequisite(s): BIOL 200B. Enrollment restricted to graduate students. *W. Sullivan*

200D. Developmental Biology. S
Key topics in developmental biology, including developmental genetics, epigenetics, stem cell biology, and developmental neurobiology. Lectures are accompanied by critical analysis and discussion of recent publications. Enrollment restricted to graduate students in MCD biology, or by permission of instructor. Enrollment limited to 20. *S. Strome*

201. RNA Processing. *
An advanced graduate-level course on biological aspects of RNA function and processing in eukaryotes. Lectures and discussions will be developed using the current literature. Prerequisite(s): BIOL 200B or permission of instructor. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Ares*

203. Ribosomes and Translation. *
Covers the field of ribosome research in depth, including the structure and function of ribosomes and the molecular mechanisms of protein synthesis. Begins with historical review of the ribosome field and proceeds to the most recent findings. Focus is on central questions: (1) How is the accuracy of the aminoacyl-tRNA selection determined? (2) What is "accommodation"? (3) What is the mechanism of peptide bond formation (peptidyl transferase)? (4) What is the mechanism of translocation? (5) What are the mechanistic roles of the ribosome and translation factor EF-G in translocation? (6) To what extent is the mechanism of translation determined by RNA? (7) Why is RNA so well suited for the ribosome? (8) How did translation evolve from an RNA world? Prerequisite(s): BIOC 100A, BIOL 200B or permission of instructor. Enrollment restricted to graduate students. *H. Noller*

204. Chromatin. *
Eukaryotic DNA is complexed with histones to form chromatin. This course focuses on the ways in which chromatin influences and is manipulated to regulate gene expression. Prerequisite(s): BIOL 105 and BIOL 115; undergrads by permission of instructor. Enrollment restricted to graduate students. Enrollment limited to 15. Offered in alternate academic years. *J. Tamkun, G. Hartzog*

205. Epigenetics. *
In-depth coverage of epigenetics focusing on how alterations in chromatin structure and DNA methylation establish and maintain heritable states of gene expression. Lectures are supplemented with critical discussion of recent publications. Prerequisite(s): BIOL 105 and BIOL 115, or permission of instructor. Enrollment restricted to graduate students. Enrollment limited to 20. *S. Strome, J. Tamkun*

206. Introduction to Stem Cell Biology. *
Fundamental issues and experimental approaches of stem cell biology research. Course divides into three sections: basic principles, experimental approaches, and emerging areas of research. Topics covered include stem cell self-renewal and differentiation, the microenvironment, epi-

genetics, cell cycle regulation, as well as how basic research translates to medical therapeutics. Enrollment restricted to graduate students. *W. Sullivan*

206L. Current Protocols in Stem Cell Biology. *
Provides students with hands-on experience in embryonic stem cell culture methods. Enrollment restricted to graduate students; qualified undergraduates may enroll by permission of instructor. Enrollment limited to 10. *D. Feldheim*

208. Cellular Signaling Mechanisms. *
All eukaryotic cells utilize intricate signaling pathways to control such diverse events as cell-cell communication, cell division, and changes in cell morphology. This course covers the molecular basis of these cellular signaling pathways, focusing on the most current research. Prerequisite(s): BIOL 105, BIOL 110, and BIOL 115. Enrollment restricted to seniors and graduate students. Enrollment limited to 15. Offered in alternate academic years. *D. Kellogg*

214. Cancer Cell Biology. *
Focuses on molecular and cellular mechanisms behind cancer. Topics include oncogenes, tumor suppressor genes, cell growth genes, checkpoint genes, telomeres, and apoptosis. Students gain experience in understanding the cutting edge of cancer drug design and formulate their own proposals for applying molecular and cellular biological techniques toward cancer diagnosis and treatment. Enrollment restricted to graduate students. Enrollment limited to 10. *A. Zahler*

226. Advanced Molecular Neuroscience. W
Basis of neural behavior at the cellular, molecular and system levels. First half of course focuses on cellular, molecular, and developmental aspects of the nervous system and covers two sensory systems: olfaction and auditory. Last half of course concerns higher-level functions of the nervous system, such as processing and integrating information. Discusses human diseases and disorders. Enrollment restricted to graduate students. *Y. Zuo*

280A. Topics in Research on Molecular Genetics of Yeast (2 credits). F,W,S
Intensive research seminar on the structure and function of the gene expression machinery in the simple eukaryote *Saccharomyces cerevisiae* and its relationship to the human gene expression machinery. Enrollment restricted to graduate students; qualified undergraduates may enroll with approval of instructor. May be repeated for credit. *M. Ares*

280B. Chromatin Structure and Transcriptional Regulation (2 credits). F,W,S
Weekly seminar on structure and gene regulatory function of chromatin. Discusses research of participants and relevant scientific literature. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *H. Boeger*

280C. Mammalian Brain Development (2 credits). F,W,S
Seminar covers research into the development of the mammalian brain. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *B. Chen*

280D. RNA Processing (2 credits). F,W,S
A discussion of current research and literature concerning the regulation of precursor messenger RNA processing. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor.

Enrollment limited to 10. May be repeated for credit. *A. Zahler*

280E. Meiotic Chromosome Dynamics (2 credits). F,W,S

Intensive course on the molecular mechanisms underlying homolog pairing, synapses, and recombination; and how they are regulated, coordinated, and monitored to ensure accurate meiotic chromosome segregation. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. May be repeated for credit. *N. Bhalla*

280F. Development of Vertebrate Neural Connections (2 credits). F,W,S

Intensive research seminar on molecular mechanisms by which neural connections are established during mouse development. Special focus on topographic maps and role of Eph receptors and ephrins in this process. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *D. Feldheim*

280H. Topics on Research into Chromatin and Transcription (2 credits). F,W,S

Seminar covering research into the effects of chromatin on transcription in yeast. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *G. Hartzog*

280I. Epigenetic Gene Silencing and Insulators (2 credits). F,W,S

Intensive course on molecular mechanisms by which insulator elements regulate epigenetic gene silencing. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *R. Kamakaka*

280J. Structures of Macromolecular Complexes (2 credits). F,W,S

Focuses on structure and function of the spliceosome using electron microscopy and x-ray crystallography. Participants present results from their own research and relevant journal articles. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 20. May be repeated for credit. *M. Jurica*

280K. Topics in Cell Cycle Research (2 credits). F,W,S

An intensive seminar focusing on current research on the molecular mechanisms that control cell division. Participants are required to present results of their own research or to review journal articles of interest. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. *D. Kellogg*

280L. Topics on Neural Development (2 credits). F,W,S

Seminar covering research into the development of the embryonic nervous system. Enrollment restricted to graduate students. Enrollment limited to 12. May be repeated for credit. *L. Hinck*

280N. Structure and Function of Ribosomes (2 credits). F,W,S

An intensive and advanced course focusing on the structure and function of ribosomes. Participants present research findings in an organized, critical fashion, in the context of current research literature in the ribosome field. Enrollment restricted to graduate students; qualified undergraduate students may enroll with permission of the instructor. Enrollment limited to 20. May be repeated for credit. *H. Noller*

280O. Topics in Bacterial Pathogenesis (2 credits). F,W,S

Intensive seminar focusing on mechanisms of bacterial pathogenesis of the ulcer-causing bacterium *Helicobacter pylori*. Participants are required to present results from their own research and relevant journal articles. (Also offered as Microbiology and Environmental Toxicology 281O. Students cannot receive credit for both courses.) Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 20. May be repeated for credit. *K. Ottemann*

280Q. Cell Biology of Oocytes, Embryos, and Neurons (2 credits). F,W,S

Weekly seminar and round-table discussion about research problems and recent advances in molecular motor proteins, cytoskeletons, and the control of force-producing processes. Each participant reports recent advances in their field from current literature, their own primary research questions, current approaches to answering those questions, and their research progress. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *W. Saxton*

280R. Structure and Function of the Nuclear Pore Complex (2 credits). F,W,S

Intensive and advanced course focusing on structure and function of the nuclear pore complex. Participants present research findings in an organized critical fashion in the context of current research literature in the nucleocytoplasmic transport field. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *M. Rexach*

280S. Chromatin and RNA Regulation in *C. elegans* (2 credits). F,W,S

Intensive research seminar about regulators of chromatin organization; the composition and function of germ granules; and the roles of both levels of regulation in germline development in *C. elegans*. Participants present their research results and report on related journal articles. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *S. Strome*

280T. Molecular Biology of *Drosophila* Development (2 credits). F,W,S

An intensive seminar concerning the molecular genetics of *Drosophila*. Recent research is discussed weekly, with an emphasis on gene regulation and development. Students present their own research or critical reviews of recent articles at least once during the quarter. Enrollment restricted to graduate students. Qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *J. Tamkun*

280U. Discussions on the Development of the *Drosophila* Embryo (2 credits). F,W,S

Involves a two-hour weekly meeting in which the students discuss topics concerning the cell cycle, early embryonic development, and the cytoskeleton. These discussions critically evaluate ongoing research in this area. Material is drawn from student research and recently published journal articles. Students are also expected to meet individually with the instructor two hours weekly. In addition to a three-five page research proposal, each student gives two one-hour oral presentations. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *W. Sullivan*

280W. Membrane Proteins (2 credits). F

Seminar on recent research on membrane proteins, with an emphasis on ion-pumping ATPase. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 20. May be repeated for credit. *B. Bowman*

280X. Mammalian Developmental and Stem Cell Biology. F,W,S

Explores topics in developmental and stem cell biology, with emphasis on mammalian systems. Students present results of independent research projects in the context of relevant publications and other background information. Course meets once each week. Enrollment restricted to graduate students. May be repeated for credit. *A. Ralston*

280Y. Activity-Dependent Synaptic Plasticity (2 credits). F,W,S

Research seminar covering the regulation of synaptic plasticity in the mammalian nervous system, focusing on how the activity regulates the structural and functional dynamics of synapses. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *Y. Zuo*

288. Stem Cell Research: Scientific, Ethical, Social, and Legal Issues. *

Scientific, ethical, social, and legal dimensions of human embryonic stem-cell research, including the moral status of the embryo; the concept of respect for life; ethical constraints on oocyte procurement; creation of embryonic chimeras; federal policies; and political realities. (Also offered as Biomolecular Engineering 247. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *The Staff*

289. Practice of Science. W

Examination of ethical and practical scientific issues, including the collection and treatment of data, attribution of credit, plagiarism, fraud, and peer review. Career issues, including how to apply for grants and positions in industry or academia, will be discussed. Prerequisite(s): BIOL 200A, BIOL 200B, and BIOL 200C or permission of instructor. Enrollment restricted to graduate students; undergraduates may enroll with permission of the instructor. Enrollment limited to 20. *W. Sullivan*

291. Molecular, Cellular, and Developmental Biology Seminar (2 credits). F,W,S

Topics of current interest in molecular, cellular, and developmental biology are presented weekly by graduate students, faculty, and guest speakers. Enrollment restricted to graduate students. Enrollment limited to 60. May be repeated for credit. *Y. Zuo*

292. MCD Seminar (no credit). F,W,S

Various topics by weekly guest speakers. Enrollment restricted to graduate students. *Y. Zuo*

296. Laboratory Research in Molecular, Cell, and Developmental Biology. F,W,S

Independent laboratory research in molecular, cellular, and developmental biology. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Independent study for graduate students who have not yet settled on a research area for their thesis. Students submit petition to sponsoring agency. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. *The Staff*

Biomolecular Engineering

See Engineering, page 233.

British Literature

Students wishing to pursue a course of study in British literature should consult the English-language literatures concentration in national/transnational literatures under Literature, page 361.

Business Management Economics

Students wishing to pursue a course of study in business management economics should consult the business management economics major under Economics, page 200.

Chemistry and Biochemistry

Chemistry and Biochemistry Department
230 Physical Sciences Building
(831) 459-4125
<http://chemistry.ucsc.edu>

Physical and Biological Sciences Undergraduate Affairs
387 Thimann Laboratories
(831) 459-4143
<http://undergrad/pbsci.ucsc.edu/index.html>

Faculty and Professional Interests

Professor

ROGER W. ANDERSON

Experiments and theory for low temperature, light-activated chemical vapor deposition, achromatic focusing of molecules with external electric fields, discrete orthogonal polynomials in molecular collision theory, fractal geometry structural measures for large molecules

FRANK C. ANDREWS, Emeritus

Theoretical chemistry, molecular dynamics of chemical reactions in liquids and at interfaces

CLAUDE F. BERNASCONI

Kinetic studies of fast reactions, organic reaction mechanisms, acid-base catalysis, proton transfers, nucleophilic reactions, organometallic reactions, ab initio molecular orbital calculations

ROBERTO A. BOGOMOLNI

Biophysical chemistry, photobiology, light energy conversion and signal transduction in biological systems

REBECCA BRASLAU

Synthetic organic chemistry: new synthetic methodologies using free radicals; nitroxides, nitroxide mediated "living" polymerizations: design and functionalization of tailored polymers for biomedical applications and nanotechnology, photofluorescent nitroxides as sensors

JOSEPH F. BUNNETT, Emeritus

SHAOWEI CHEN

Synthesis, characterization, and manipulation of novel functional nanomaterials (metals and semiconductors); their long-range ordered assemblies and related nanoscale electron transfer; applications in fuel cells, photovoltaics, and electronic devices

PHILIP O. CREWS

Marine natural products chemistry, bioorganic chemistry, organic structural analysis by NMR, natural products of marine macro- and microorganisms

ÓLÖF EINARSDÓTTIR

Time-resolved spectroscopy, biophysics and bioenergetics, heme-copper oxidases, electron transfer, application of photolabile NO and O₂ donors

THEODORE R. HOLMAN

Biochemistry and bioinorganic chemistry; lipoxygenase enzymology, protein engineering, inhibitor discovery, computer inhibitor design, mass spectroscopy, electron paramagnetic resonance

DAVID S. KLIGER

Time-resolved laser spectroscopy, biophysics, studies of visual transduction, protein function, and protein folding

JOSEPH P. KONOPELSKI

Synthetic organic chemistry; heterocyclic chemistry, bioorganic chemistry

PRADIP MASCHARAK

Bioinorganic chemistry, design of antitumor drugs, modeling of active sites of metalloenzymes, design of catalysts for hydrocarbon oxidation, studies on intermediates in non-heme oxygenase chemistry, design of NO-donors for photodynamic therapy

GLENN L. MILLHAUSER

Electron spin resonance; nuclear magnetic resonance, melanocortin receptor signaling, agouti proteins, prions, peptide synthesis

THOMAS W. SCHLEICH

Biomedical magnetic resonance spectroscopy, magnetic resonance imaging, nuclear magnetic resonance spectroscopy, biophysical chemistry

WILLIAM G. SCOTT

Structure and function of RNA, proteins, and their complexes, origin of life

BAKTHAN SINGARAM

Organic synthesis, organoborane chemistry, heterocyclic chemistry, organometallic chemistry, asymmetric synthesis, biosensors, and natural products chemistry

EUGENE SWITKES

Quantum theory applied to problems in chemistry and biochemistry; visual information processing, spatial vision, color vision

STANLEY M. WILLIAMSON, Emeritus

W. TODD WIPKE, Emeritus

Molecular engineering for drug discovery, computational high-throughput screen QSAR; virtual library design; improving cancer chemotherapy

JIN Z. ZHANG

Design, synthesis, characterization, and application of nanomaterials, including semiconductor and metal nanoparticles; femtosecond laser spectroscopy; ultrafast dynamics on surfaces and at interfaces; cancer biomarker detection; surface-enhanced Raman spectroscopy

Associate Professor

SCOTT R. OLIVER

Inorganic materials: nanoporous materials for environmental cleanup and catalysis; polymer templating of thin-film semiconductors for solar cells

Assistant Professor

YAT LI

Experimental physical chemistry, materials chemistry, nanomaterials, nanoscale photonics and electronics, energy conversion

ROGER G. LININGTON

Marine natural products; drugs for neglected diseases; chemical biology; chemical probes

R. SCOTT LOKEY

Organic chemistry; combinatorial synthesis, biotechnology, molecular cell biology

SETH M. RUBIN

Biomolecular mechanisms of cell-cycle regulation and cancer; structural biology and biochemistry; macromolecular x-ray crystallography; nuclear magnetic resonance

MICHAEL STONE

Molecular basis of telomere length and telomerase-related diseases; biophysical characterization of nucleic acid-associated molecular motors; development of novel approaches for imaging enzymes in cells

Lecturer

DANIEL PALLEROS, Affiliate



Professor

KENNETH W. BRULAND (Ocean Sciences)

Chemical oceanography, biogeochemistry of trace metals and radionuclides, aquatic chemistry, geochemistry

A. RUSSELL FLEGAL (Microbiology and Environmental Toxicology)

Anthropogenic perturbations of biogeochemical cycles, applications of isotopic tracers in anthropology and archaeology

DONALD R. SMITH (Microbiology and Environmental Toxicology)

Neurotoxicity, cellular and organismal responses to environmental toxins

MANEL CAMPS (Microbiology and Environmental Toxicology)

Molecular mechanisms of reactive DNA methylation toxicity

PHILLIP BERMAN (Biomolecular Engineering)

Drug development vaccines, AIDS, monoclonal antibody therapeutics, immunology, molecular cell/biology, recombinant protein production (commercial scale)

Program Description

Chemistry is central to modern science and, ultimately, most phenomena in biology, medicine, geology, and the environmental sciences can be described in terms of the chemical and physical behavior of atoms and molecules. Because of the wide appeal and utility of chemistry, UCSC offers many lower-division courses, differing in emphasis and style, to meet diverse needs. Students should also note the numerous upper-division course offerings and select those most suitable to their academic interests. The curriculum in chemistry exposes the student to the principal areas of modern chemistry, including organic, inorganic, physical, analytical, and biochemistry. The curriculum is designed to meet the needs of students who plan to end their formal education with a bachelor of arts (B.A.) or bachelor of science (B.S.) degree, as well as those who wish to go on for an advanced degree. The UCSC chemistry B.A. or B.S.

graduate is well prepared to pursue a career in chemistry or an allied field.

Research in chemistry at UCSC is closely interwoven with graduate and undergraduate education. The chemistry and biochemistry research program is active at the graduate level, and faculty also encourage undergraduates to become involved in research. Research is done for academic credit in Chemistry 195A-B-C, *Senior Research*; or in Chemistry 199, *Tutorial*. There are also opportunities for interdisciplinary research spanning, for example, chemistry/physics, chemistry/geology, chemistry/oceanography, chemistry/biology, chemistry/computer science, and chemistry/microbiology and environmental toxicology. At UCSC, it is not uncommon for students to see their own original work published in research journals.

Chemistry and biochemistry faculty and approximately 90 graduate students and 30 postdoctoral fellows are housed in the Physical Sciences Building near the Science Library. Standard and specialized spectrophotometric equipment, a number of instruments devoted to structural studies, instrumentation for specialized analytical purposes, and computer facilities used in studies of structure and reactivity are all available. The Science Library has an excellent collection of current journals, in print and electronic form, and reference works, as well as earlier volumes of all the major journals. Additional source material can be readily and rapidly obtained on interlibrary loan.

A degree in chemistry opens the door to a wide variety of academic careers. Some UCSC graduates are working as researchers in industry in areas such as electronic materials, biotechnology, medicinal chemistry, or laser technology. Others have entered government service as research chemists in the Food and Drug Administration, the Environmental Protection Agency, or law enforcement crime laboratories. Fields such as patent law, commercial development, and scientific writing are open to graduates. Many chemistry majors go on to university graduate programs across the nation to prepare for careers in research, teaching, or a combination of the two. The degree in chemistry also provides a strong disciplinary background in preparation for a career in the important and much needed area of science teaching in high school. A major in chemistry is also an excellent beginning for one of the many opportunities in the health sciences.

The UCSC Chemistry and Biochemistry Department offers both B.S. and B.A. degree programs. The B.S. program has more requirements, and a student in this program earns a degree that meets the requirements of an American Chemical Society certified program. The B.S. degree should be the choice if a student is interested in getting a job in industry immediately after receiving his or her college degree. The B.S. program also provides a good background for graduate work in chemistry. The B.A. program has fewer requirements and should be considered by students who wish to take more science courses outside of chemistry to enter an interdisciplinary area. Examples might be chemical oceanography, geochemistry, chemical physics, environmental chemistry, and health sciences. The B.A. might also be a good choice for students who wish to become high school teachers. However, for either degree, the courses stress the fundamentals of chemistry and allow students to pursue independent research.

A minor in chemistry is also offered for those who wish to have a strong complementary program in chemistry while majoring in another course of study.

Requirements for the Chemistry B.A.

Degree

The requirements for the bachelor of arts in chemistry have been kept to a minimum so that students may tailor their program to their own purposes, for example, to pursue a double major, to study areas of the humanities or social sciences, to complete major requirements late in their college career, or to concentrate on a study in a specific branch of chemistry. The minimum requirements (including prerequisites) constitute 54 percent of a student's total undergraduate program; consequently, there is ample time to explore and discover other interests within the university. To plan wisely, students are advised to refer to each course description for a detailed listing of prerequisites. Students who decide they want a professional career in chemistry are advised to meet with the chemistry undergraduate faculty adviser.

Lower-Division Requirements

General Chemistry: Chemistry 1A, 1B/M, and 1C/N

Calculus: Mathematics 11A-B and 22; or Mathematics 19A-B and 22

Physics: Physics 5A/L, 5B/M, and 5C/N; or 6A/L, 6B/M, and 6C/N

Upper-Division Requirements

Organic Chemistry: Chemistry 108A/L and 108B/M; or 112A/L, 112B/M, and 112C/N

Inorganic Chemistry: Chemistry 151A/L

Physical Chemistry: Chemistry 163A, 163B, 164A, and 164B

One of the following laboratory courses: Chemistry 146A, *Advanced Laboratory in Organic Chemistry*; 146B, *Advanced Laboratory in Inorganic Chemistry*; 146C, *Advanced Laboratory in Physical Chemistry*.

Students currently conducting senior thesis research are required to choose an advanced laboratory in the Chemistry 146-series that is outside their research area.

Elective(s)

At least two if 108A/L and 108B/M are taken; or at least one from the following list if 112A/L, 112B/M, and 112C/N are taken:

Chemistry 103, *Biochemical Structures, Reactions and Energetics**

Chemistry 122, 143, 151B, 156C, 163C, and graduate-level lecture courses in chemistry

Biochemistry and Molecular Biology 100A, 100B, 100C

Computer Science 12A or 5C, or Biomolecular Engineering 60

Microbiology and Environmental Toxicology 101 or 102

Ocean Sciences 120 or 220

Physics 110A-B, 116A-B-C

*Can be used as elective only if Biochemistry and Molecular Biology 100A, 100B, and 100C are not taken as electives

Disciplinary Communication (DC)

Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement for the bachelor of arts degree in chemistry is satisfied by completing Chemistry 151L, *Inorganic Chemistry Laboratory*, and either Chemistry 146A, 146B, or 146C.

Chemistry Major B.A. Planner

<http://undergrad.pbsci.ucsc.edu/programs/chemistry/chemba.html>

Requirements for the Chemistry B.S.

Degree

The bachelor of science major program is designed for students who intend to pursue a professional career in chemistry. It is rigorous and broadly based, appropriate for that purpose. The course requirements for the B.S. major are as follows; please refer to each course description for a detailed listing of prerequisites.

Lower-Division Requirements

General Chemistry: Chemistry 1A, 1B/M, and 1C/N

Calculus: Mathematics 11A-B and 22; or Mathematics 19A-B and Mathematics 22;

Advanced Mathematics: Applied Mathematics and Statistics 10, or Mathematics 21, or Mathematics 24

Physics: Physics 5A/L, 5B/M, and 5C/N; or 6A/L, 6B/M, and 6C/N

Upper-Division Requirements

Organic Chemistry: Chemistry 112A/L, 112B/M, and 112C/N; or 108A/L, 108B/M, and 143

Inorganic Chemistry: Chemistry 151A/L

Biochemical Structures, Reactions, and Energetics: Chemistry 103

Physical Chemistry: Chemistry 163A, 163B, 163C, 164A, and 164B

One of the following laboratory courses:

Chemistry 146A, *Advanced Laboratory in Organic Chemistry*

Chemistry 146B, *Advanced Laboratory in Inorganic Chemistry*

Chemistry 146C, *Advanced Laboratory in Physical Chemistry*

Students currently conducting senior thesis research are required to choose an advanced laboratory in the Chemistry 146-series that is outside their research area.

Elective(s)

At least two from the following list:

Chemistry 122, *Principles of Instrument Analysis**

Chemistry 143, *Organic Chemical Structure and Reactions* (if not taken for the organic chemistry requirement)

Chemistry 151B, *Chemistry of the Main Element Groups*

Biochemistry and Molecular Biology 100A, *Biochemistry*

Biochemistry and Molecular Biology 100B, *Biochemistry*

Biochemistry and Molecular Biology 100C, *Biochemistry* (can substitute for Chemistry 103)

Microbiology and Environmental Toxicology 101, *Sources and Fates of Pollutants*

Microbiology and Environmental Toxicology 102, *Cellular and Organismal Toxicology*

Ocean Sciences 120, *Aquatic Chemistry: Principles and Applications*

Ocean Sciences 220, *Chemical Oceanography*

Physics 110A-B, *Electricity, Magnetism, and Optics*

Physics 116A-B, *Mathematical Methods in Physics*

*To receive certification from the American Chemical Society, you must complete Chemistry 122; see additional information below.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement for the bachelor of science degree in chemistry is satisfied by completing Chemistry 151L, *Inorganic Chemistry Laboratory*, and either Chemistry 146A, 146B, or 146C.

Chemistry Major B.S. Planner

<http://undergrad.pbsci.ucsc.edu/programs/chemistry/chembs.html>

Chemistry B.S. Degree with Biochemistry Concentration

The biochemistry concentration is designed for students who intend to pursue a career in biochemistry or in a related field such as biotechnology, and it provides an exceptionally rigorous chemistry emphasis.

Lower-Division Requirements

General Chemistry: Chemistry 1A, 1B/M, 1C/N

Calculus: Mathematics 11A-B, and 22; or Mathematics 19A-B and 22

Advanced Mathematics: Applied Mathematics and Statistics 10, or Mathematics 21, or Mathematics 24

Introductory Biology: Molecular, Cellular and Developmental Biology (BIOL) 20A, and Ecology and Evolutionary Biology (BIOE) 20B

Physics: Physics 5A/L, 5B/M, and 5C/N; or Physics 6A/L, 6B/M, and 6C/N

Upper-Division Requirements

Organic Chemistry: Chemistry 112A/L, 112B/M, and 112 C/N; or Chemistry 108A/L, 108B/M, and 143

Inorganic Chemistry: Chemistry 151 A/L

Biochemistry: Biochemistry and Molecular Biology 100A-C and 110

Physical Chemistry: Chemistry 163A-C

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in chemistry with a biochemistry concentration is satisfied by completing Chemistry 151L, *Inorganic Chemistry Laboratory*, and Biochemistry and Molecular Biology 110, *Biochemistry Laboratory*.

Chemistry Major B.S. with Biochemistry Concentration Planner

<http://undergrad.pbsci.ucsc.edu/programs/chemistry/chembs-bioc.html>

Biochemistry and Molecular Biology B.S.

See the biochemistry and molecular biology program description and major requirements.

Chemistry B.S. Degree with Environmental Chemistry Concentration

A concentration within the biology, chemistry and biochemistry, and Earth sciences degree programs, collectively identified as the environmental sciences program, is offered. Students will develop a core competence suitable for pursuing graduate work in the environmental chemistry area or in graduate environmental sciences programs.

Lower-Division Requirements

General Chemistry: Chemistry 1A, 1B/M, and 1C/N

Introductory Biology: Molecular, Cell, and Developmental Biology (BIOL) 20A, and Ecology and Evolutionary Biology (BIOE) 20B

Geology: Earth Sciences 20/L, 10/L, or 5/L

Environmental Policy and Economics: Environmental Studies 25

Calculus: Mathematics 11A-B and 22; or 19A-B and 22

Physics: Physics 5A/L, 5B/M, and 5C/N; or 6A/L, 6B/M, and 6C/N

Upper-Division Requirements

Environmental Toxicology: Microbiology and Environmental Toxicology 101 or 102

Biochemical Structures, Reactions, and Energetics: Chemistry 103

Organic Chemistry: Chemistry 108A/L, 108B/M

Instrumental Analysis: Chemistry 122

Inorganic Chemistry: Chemistry 151A/L

Physical Chemistry: Chemistry 163A 163B, 164A, and 164B

Earth Sciences: Earth Sciences 110B/M

Ocean Sciences: Ocean Sciences 120 or 220

One of the following laboratory courses:

Chemistry 146A, *Advanced Laboratory in Organic Chemistry*

Chemistry 146B, *Advanced Laboratory in Inorganic Chemistry*

Chemistry 146C, *Advanced Laboratory in Physical Chemistry*

Students currently conducting senior thesis research are required to choose an advanced laboratory in the Chemistry 146-series that is outside their research area.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in chemistry with an environmental chemistry concentration is satisfied by completing Chemistry 151L, *Inorganic Chemistry Laboratory*, and either Chemistry 146A, 146B, or 146C.

Chemistry Major B.S. with Environmental Chemistry Planner

<http://undergrad.pbsci.ucsc.edu/programs/chemistry/chembs-envr.html>

Comprehensive Requirement

The comprehensive requirement is a part of all UCSC degrees. In the Department of Chemistry and Biochemistry, there are two options for satisfying this requirement:

Senior thesis: A senior research project based

on original experimental or theoretical research (Chemistry 195A-B-C). At the conclusion of the project, the student submits a satisfactory formal research paper to the faculty sponsor. Students arrange for a faculty sponsor by consulting with a relevant faculty member within the chemistry and biochemistry or the biochemistry and molecular biology major programs. In some cases, faculty outside these major programs (for example, in biology, ocean sciences, microbiology and environmental toxicology, or Earth sciences) may be an appropriate sponsor. Students who select a sponsor outside the chemistry or the biochemistry and molecular biology major programs should have the title and description of the proposed thesis reviewed by the Chemistry and Biochemistry Department undergraduate faculty adviser. Students, usually working in the laboratory of the faculty sponsor, acquire experimental and/or theoretical research experience and skills in the laboratory as well as instruction in the writing of a research paper. Students are expected to make satisfactory academic progress and be in good academic standing while they take Chemistry 195 courses. Students who achieve excellence in both research and thesis may be awarded honors in the thesis upon graduation.

Senior essay: An essay based on literature research (Chemistry 199). After agreeing in advance on an appropriate topic of interest and a format, the student submits a satisfactory essay on the topic. Students arrange for a faculty sponsor by consulting with a relevant faculty member within the chemistry and biochemistry major program. In some cases, faculty outside these major programs (for example, in biology, ocean sciences, microbiology and environmental toxicology, or Earth sciences) may be an appropriate sponsor. Students who select a sponsor outside the chemistry and biochemistry major program should have the title and description of the proposed essay reviewed by the Chemistry and Biochemistry Department undergraduate faculty adviser. Students acquire experience and skills in scientific literature research as well as in the writing of a research paper.

Requirements for the Minor

The course requirements for the minor, including electives, are the same as for the B.A. degree, with the exclusion of Chemistry 146A, 146B, 146C, 151A/151L, 164A, and 164B. The minor has no senior comprehensive requirement.

Chemistry Minor Planner

<http://undergrad.pbsci.ucsc.edu/programs/chemistry/chem-min.html>

Chemistry Major Disqualification Policy

The Chemistry and Biochemistry Department's major disqualification policy is intended to encourage students to take their performance seriously and to make a strong effort to pass the lower-division and beginning upper-division courses.

Students who receive more than one No Pass, D, and/or F in any combination of the following requirements will not be permitted to pursue any of the chemistry degrees:

Chemistry 1A, *General Chemistry*

Chemistry 1B, *General Chemistry*

Chemistry 1C, *General Chemistry*

Chemistry 108A, *Organic Chemistry*
 Chemistry 108B, *Organic Chemistry*
 Chemistry 112A, *Organic Chemistry*
 Chemistry 112B, *Organic Chemistry*
 Chemistry 112C, *Organic Chemistry*
 Chemistry 163A, *Physical Chemistry*
 Chemistry 163B, *Physical Chemistry*
 Mathematics 11A, *Calculus with Applications*
 Mathematics 11B, *Calculus with Applications*
 Mathematics 19A, *Calculus for Science, Engineering, and Mathematics*
 Mathematics 19B, *Calculus for Science, Engineering, and Mathematics*
 Mathematics 22, *Introduction to Calculus of Several Variables*
 Physics 5A, *Introduction to Physics*
 Physics 5B, *Introduction to Physics*
 Physics 5C, *Introduction to Physics*
 Physics 6A, *Introductory Physics*
 Physics 6B, *Introductory Physics*
 Physics 6C, *Introductory Physics*

Students may appeal their disqualification within the appeal period by writing a letter to the undergraduate faculty adviser. This appeal must be submitted to the advising office no later than 15 days from the date the disqualification notification was mailed. The advising office will subsequently notify the student and the college of the decision no later than 15 days after the submission of the appeal.

A student who has been disqualified from the major may, no earlier than three months from the date of the disqualification, petition to be reinstated. This application will be considered only if there is substantial new evidence that the student is capable of making normal progress in the major.

Advising

The chemistry and biochemistry adviser provides counsel to undergraduate majors. Students are encouraged to declare their major at an early date so that advising and planning can commence. For assistance with advising, please refer to the Physical and Biological Sciences Undergraduate Affairs web site at <http://undergrad.pbsci.usc.edu>.

Prerequisites

Students who wish to obtain permission to take a course without having completed the listed prerequisites must make prior arrangements with the instructor. Courses are designed for students who have met all the prerequisites; those who have not are at a disadvantage.

Materials Fee

Chemistry students should be aware of the materials fee required for some courses. The fee is billed to the student's account for specific laboratory materials purchased by the Chemistry and Biochemistry Department through the university. Fees generally range from \$15 to \$50 per course. Students may incur additional expense purchasing individual supplies.

High School Preparation

Prospective chemistry majors are encouraged to get a solid foundation in high school mathematics; familiarity with algebra, logarithms, trigonometry, and analytic geometry is particularly recommended. Students who

take chemistry at UCSC begin with Chemistry 1A or 1B, both of which require a strong background in high school chemistry. Students without a high school chemistry background may begin with Chemistry 1P, Essentials of Chemistry. Starting with Chemistry 1P does not cause impediment to progress in the major. To assess your level of preparation in chemistry, please see the Chemistry Self-Assessment examination on the Undergraduate Affairs web site at <http://undergrad.pbsci.usc.edu>.

Transfer Students

The Chemistry and Biochemistry Department welcomes applications from community college students. Students who intend to transfer from other institutions, particularly community colleges, should complete one full year of general chemistry, organic chemistry, calculus, and physics prior to transfer. If the institution offers a physics course based on calculus as well as a non-calculus-based course, the student should take the calculus-based course. Prospective transfer students should consult the Physical and Biological Sciences Undergraduate Affairs web site for information on preparing to transfer to UCSC at <http://undergrad.pbsci.usc.edu>.

Program for Students of the Health Sciences

Students intending to enter medical, dental, or another health science professional school can satisfy entrance requirements with a major program in chemistry supplemented with further courses, especially in biology, as specified by the admissions requirements of the school where they intend to apply. Students are urged to contact the Career Center for assistance with the application process.

American Chemical Society Certification

The American Chemical Society (ACS) recognizes certain undergraduate programs, including those of UCSC, to be of such quality as to entitle graduates to become ACS members immediately upon graduation. Graduates must be individually certified to the ACS by the Chemistry and Biochemistry Department chair if they have satisfactorily completed an approved program of study. ACS certification standards are rigorous; a graduate who has met them carries a distinction that is well recognized in the profession. Broadly speaking, ACS certification requirements are satisfied by completing a B.S. major in chemistry (not including concentrations in biochemistry or environmental chemistry) at UCSC, including Chemistry 122 as an elective. A year of study in a major modern foreign language (preferably German) is recommended. More information is available from the Chemistry and Biochemistry undergraduate adviser.

Honors in the Major

The chemistry honors in the Major program requires at least a 3.5 grade point average (GPA) in all chemistry courses. Highest honors requires at least a 3.8 GPA in all chemistry courses for the major.

Graduate Programs

The Chemistry and Biochemistry Department offers three graduate degrees: the doctor of philosophy (Ph.D.), a thesis master of science (M.S.), and a coursework M.S. The Ph.D. and thesis M.S. programs are designed to help students develop into independent scholars while pursuing the excitement of scientific

research in a personal, supportive environment. Both the Ph.D. and the research M.S. programs prepare students for careers in academia, industry, government laboratories, and other settings requiring an advanced education in chemistry and related disciplines. The coursework M.S. does not require research and is suited to teachers and others wishing to update or broaden their chemical expertise. Approximately 90 graduate students are currently enrolled in the graduate program.

Within the Ph.D. program students have the flexibility to design a course of study focused on personal research interests, and at the same time are expected to maintain the high intellectual standards associated with the doctoral degree. Research options include biochemistry, physical chemistry, biophysical chemistry, inorganic chemistry, bioinorganic chemistry, materials, organic chemistry, and bio-organic chemistry. Collaborative research efforts are encouraged, both intra- and inter-departmentally. The interdisciplinary Center for Biomolecular Science and Engineering emphasizes bioinformatics, nanotechnology, and computational approaches to chemistry. Biochemists join geneticists, computer scientists, and biologists in the Center for the Molecular Biology of RNA. Productive interactions have developed between the Chemistry and Biochemistry Department, the departments of Microbiology and Environmental Toxicology, and Molecular Cell and Developmental Biology, and the School of Engineering. Several Chemistry and Biochemistry faculty members also participate in the new graduate program in Biomedical Sciences and Engineering.

Before beginning coursework, Ph.D. students take attainment examinations to confirm their level of preparation in four areas: organic, inorganic, physical, and biochemistry. First-year students take Chemistry 292 and 296, and select a research adviser and research committee in spring quarter. In the first two years, students enroll in core courses and electives related to their specialization. Core courses are Chemistry 200A, B, and C for biochemistry and biophysical chemistry; Chemistry 234 and 256A, B, or C for inorganic and bioinorganic chemistry; the Chemistry 240-series for organic chemistry; and Chemistry 261, 262, and 263 for physical chemistry. Organic studies students must pass four cumulative examinations based on assigned reading in current research journals. The Ph.D. candidate's research committee meets formally with the student to evaluate research progress at least once a year. Students are expected to finish all Ph.D. requirements in five to six years.

M.S. students and Ph.D. students who have not advanced to candidacy attend a weekly seminar (Chemistry 291A, B, C, or D). Speakers from UCSC, other universities, and research labs expose students to advances at the frontiers of chemical research, offering the opportunity for personal contact with leading scientists.

Teaching assistantships provide both financial support and the opportunity to put into practice the required pedagogical training offered in Chemistry 296 (presentation techniques, discussion strategies, laboratory teaching skills, laboratory safety procedures, and time management). Advanced doctoral students can also be supported as graduate-student researchers.

Ph.D. Requirements

1. Pass all four attainment examinations and meet any deficiencies as directed by spring of the first year.
2. Take Chemistry 292 and 296 in the fall of the first year.

- Take Chemistry 291A, B, C, or D, *Research Seminar*, every quarter until advanced to candidacy.
- Organic studies students must pass four out of 12 "cumulative examinations" based on reading lists of current published organic research.
- Select an adviser and nominate members of the research committee in the spring of the first year.
- Present a second-year seminar on a topic of current interest in published research outside the candidate's own research area.
- Serve as a teaching assistant (TA) during at least three quarters in the first two years, before attempting the Ph.D. oral qualifying examination.
- Pass five lecture courses (25 credits): at least four at the graduate (200) level, at least four in chemistry and biochemistry (with departmental approval, up to two courses may be at upper-division undergraduate level).
- In the fall of the third year, pass the Ph.D. oral qualifying examination before an examining committee consisting of three research committee members plus one outside member approved by the graduate dean. The Ph.D. candidate presents (a) a summary of current research results and possible future direction, and (b) an original research proposal on a chemistry or biochemistry topic either related or unrelated to the candidate's current thesis research.
- Nominate members of the Dissertation Reading Committee (DRC).
- Submit a research prospectus (outline of dissertation chapters) in the spring of the fourth year, and meet with the DRC to review research progress.
- Submit an updated research prospectus (outline of dissertation chapters) to the DRC in the winter of the fifth year.
- Submit written dissertation based on original research.
- Present dissertation seminar.

The average time to degree is five and one-quarter years. Ph.D. candidates are expected to complete research and write the dissertation within nine quarters after advancing to candidacy following a successful Ph.D. oral qualifying examination. Financial support is not available after 18 quarters in the graduate program.

For both Ph.D. and M.S. students, the standard course load is three courses per quarter, or a total of 15 credits per quarter.

M.S. Requirements: Research Thesis Path

- Pass all four attainment examinations in the first year.
- Take Chemistry 292.
- Take Chemistry 296 if working as teaching assistant (TA) at any time.
- Take Chemistry 291A, B, C, or D each quarter.
- Select an adviser and nominate members of the research committee in the first year.
- Pass at least five Chemistry and Biochemistry lec-

ture courses, of which at least three must be graduate (200) level.

- Conduct original laboratory research.
- Capstone requirement: write a thesis based on original research.

M.S. Requirements: Coursework Path

- Pass all four attainment examinations in the first year.
- Take Chemistry 296 if enrolled as teaching assistant (TA) at any time.
- Take Chemistry 291A, B, C, or D each quarter.
- Pass seven chemistry lecture courses (at least four at the graduate (200) level) from three of the four sub-disciplines: organic, inorganic, physical chemistry, and biochemistry.
- Capstone requirement: present a seminar on a topic of current interest in published research.

Lower-Division Courses

1A. General Chemistry. F,W,S

First quarter of an integrated study of general chemistry. Covers a range of topics including the atomic structure of matter; molecules; chemical reactions; acids and bases; gases; and equilibria in the gas and liquid phase. Lecture: 3-1/2 hours; discussion: 1-1/4 hours. Students expected to use algebra to solve problems. Prerequisite(s): Course 1P or strong high school level chemistry equivalent to 1P is strongly recommended; taking the online chemistry self-assessment exam is strongly recommended. (General Education Code(s): SI, IN, Q.) *T. Schleich, I. Benjamin*

1B. General Chemistry. F,W,S

Second quarter of an integrated study of general chemistry. Coverage includes quantum mechanics; the hydrogen atom; many-electron atoms and chemical periodicity; elementary covalent bonding; transition metals; and chemical kinetics. Lecture: 3-1/2 hours, discussion: 1-1/4 hours. Prerequisite(s): Course 1P or strong high school level chemistry equivalent to 1P is strongly recommended; taking the online chemistry self-assessment exam is strongly recommended. Concurrent enrollment in course 1M is recommended. (General Education Code(s): IN, Q.) *E. Switkes, R. Bogomolni*

1C. General Chemistry. F,W,S

Third quarter of an integrated study of general chemistry. Coverage includes thermodynamics; oxidation-reduction and electrochemistry; liquids and solids; intermolecular forces and solutions, including colligative properties; and nuclear chemistry. Lecture: 3-1/2 hours; discussion: 1-1/4 hours. Prerequisite(s): course 1A. Concurrent enrollment in course 1N is required. (General Education Code(s): IN, Q.) *R. Roland, R. Anderson*

1M. General Chemistry Laboratory (2 credits). F,W,S

Laboratory sequence illustrating topics covered in courses 1B and 1C and important experimental techniques. Laboratory: 3 hours; lecture: 1-1/4 hours. Students are billed a materials fee. Prerequisite(s): Previous or concurrent enrollment in course 1B is required. *R. Roland*

1N. General Chemistry Laboratory (2 credits). F,W,S

Laboratory sequence illustrating topics covered in courses 1B-1C, respectively, and important experimental techniques. Laboratory: 3 hours; lecture: 1-1/4 hours. Stu-

dents are billed a materials fee. Prerequisite(s): Concurrent enrollment in course 1C is required. *R. Roland*

1P. Chemistry Essentials (3 credits). F

Introduction to basic concepts required for the Chemistry 1 series. This course is for students who have little background in high school chemistry or equivalent. Covers elementary topics including units, conversions, the mole, chemical reactions, and balancing. Enrollment limited to 90. *R. Roland*

80H. Introduction to Wines and Wine Chemistry. *

Introduction to scientific aspects of winemaking and wine sensory evaluation. Overview of wines emphasizing chemical and biological principles appropriate for both non-science and science students. Aspects of wine presented including history, viticulture, fermentation, winery operations, and physiology of wine consumption. Students are billed a materials fee. (General Education Code(s): T2-Natural Sciences.) *P. Crews*

80L. Introduction to Chemistry of Wines and Musts (2 credits). *

An integrated course exploring elementary aspects of wine evaluation and modern winemaking. Topics: effects of grape varieties, vineyard locations, production techniques, aging practices on wine quality, and winemaking. Survey of commercial wine styles and lab methods of wine component analysis provide insights on how fine wines are made and analyzed. Students are billed a materials fee. Prerequisite(s): concurrent enrollment in or completion of course 80H. Enrollment limited to 32. *P. Crews*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

103. Biochemical Structures, Reactions, and Energetics. S

Introduces biochemical molecules that compose all living organisms. Focus on structure and function relationships in chemical components of cells, primary enzyme-catalyzed reactions of metabolism. Chemical principles of cell function at molecular level; molecular structure of nucleic acids discussed. Prerequisite(s): courses 1B and 1C; 108A-B or 112A-B-C or 7. *M. Stone*

108A. Organic Chemistry. F,W

An integrated study of fundamental organic chemistry, with emphasis on materials especially relevant to the biological sciences. Students with credit for course 112A cannot receive credit for course 108A. Lecture: 3-1/2 hours, discussion: 1-1/4 hours. Prerequisite(s): courses 1B, 1C, and 1N. *C. Bernasconi*

108B. Organic Chemistry. W,S

An integrated study of fundamental organic chemistry, with emphasis on materials especially relevant to the biological sciences. Students with credit for 112B cannot receive credit for 108B. Lecture: 3-1/2 hours, discussion: 1-1/4 hours. Prerequisite(s): course 108A or 112A. *P. Crews, B. Singaram*

108C. Organic Chemistry (3 credits). S

Integrated study of fundamental organic chemistry, with emphasis on materials especially relevant to biological sciences. Lecture: 2 hours, 20 minutes. Discussion: 1 hour. Prerequisite(s): course 108B or equivalent. *D. Palleros*

108L. Organic Chemistry Laboratory (2 credits). F,W

Laboratory experience in organic chemistry associated with course 108A. Designed to introduce the student to the many techniques associated with organic chemistry while affording an opportunity to explore the concepts discussed in the lecture material. Laboratory: 4 hours, lecture: 1-1/4 hours. Students are billed a materials fee. Prerequisite(s): courses 1C/N and previous or concurrent enrollment in 108A is required. *D. Palleros*

108M. Organic Chemistry Laboratory (2 credits). W,S

Laboratory experience in organic chemistry associated with course 108B. Designed to introduce the student to the many techniques associated with organic chemistry while affording an opportunity to explore the concepts discussed in the lecture material. Laboratory: 4 hours, lecture: 1-1/4 hours. Students are billed a materials fee. Prerequisite(s): courses 108A/L and previous or concurrent enrollment in 108B is required. *D. Palleros*

112A. Organic Chemistry. F

An integrated study of fundamental organic chemistry, including principles, descriptive chemistry, synthetic methods, reaction mechanisms, and compounds of biological interest. These courses are coordinated with 112L-M-N respectively and are to be taken concurrently with them. Students with credit in course 108A cannot receive credit for 112A. Lecture: 3-1/2 hours; optional discussion section: 1-1/4 hours. Prerequisite(s): courses 1B, 1C, and 1N. Concurrent enrollment in course 112L is required. Enrollment limited to 80. *S. Lokey*

112B. Organic Chemistry. W

An integrated study of fundamental organic chemistry, including principles, descriptive chemistry, synthetic methods, reaction mechanisms, and compounds of biological interest. These courses are coordinated with 112L-M-N respectively and are to be taken concurrently with them. Students with credit in 108B cannot receive credit for 112B. Lecture: 3-1/2 hours; optional discussion section: 1-1/4 hours. Prerequisite(s): course 112A/L. Concurrent enrollment in course 112M is required. Enrollment limited to 80. *R. Braslaw*

112C. Organic Chemistry. S

An integrated study of fundamental organic chemistry, including principles, descriptive chemistry, synthetic methods, reaction mechanisms, and compounds of biological interest. These courses are coordinated with 112L-M-N respectively and are to be taken concurrently with them. Lecture: 3-1/2 hours; optional discussion section: 1-1/4 hours. Prerequisite(s): courses 112B/M. Concurrent enrollment in course 112N required. Enrollment limited to 80. *R. Linington*

112L. Organic Chemistry Laboratory (2 credits). F

Laboratory experience in organic chemistry and associated principles. Experiments involve the preparation, purification, characterization, and identification of organic compounds and make use of modern as well as classical techniques. Lecture: 1-1/2 hours. Laboratory: 4 hours. Students are billed a materials fee. Prerequisite(s): courses 1C/N. Concurrent enrollment in course 112A required. Enrollment limited to 80. *D. Palleros*

112M. Organic Chemistry Laboratory (2 credits). W

Laboratory experience in organic chemistry and associated principles. Experiments involve the preparation, purification, characterization, and identification of organic compounds and make use of modern as well as classical

techniques. Lecture: 1-1/2 hours. Laboratory: 4 hours. Students are billed a materials fee. Prerequisite(s): course 112A/L. Concurrent enrollment in course 112B is required. Enrollment limited to 80. *D. Palleros*

112N. Organic Chemistry Laboratory (2 credits). S

Laboratory experience in organic chemistry and associated principles. Experiments involve the preparation, purification, characterization, and identification of organic compounds and make use of modern as well as classical techniques. Lecture: 1-1/4 hours. Laboratory: 8 hours. Students are billed a materials fee. Prerequisite(s): courses 112B/M. Concurrent enrollment in course 112C required. Enrollment limited to 80. *D. Palleros*

122. Principles of Instrumental Analysis. F

A laboratory course designed to develop familiarity with techniques and instrumentation used in analytical chemistry, emphasizing determination of trace inorganic species. Primary emphasis on applications utilizing the absorption or emission of electromagnetic radiation and on voltammetry. Topics include molecular UV-visible absorption and fluorescence spectrometry; atomic absorption, emission and fluorescence spectrometry; and various forms of voltammetry. Lecture: 2 hours; laboratory: 8 hours. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, course 108B or 112C. (General Education Code(s): W.) *S. Oliver*

143. Organic Chemical Structure and Reactions. F

Advanced topics such as the chemistry of terpenes, steroids, synthetic polymers, alkaloids, reactive intermediates, and reaction mechanisms are treated. Lecture: 4 hours. Prerequisite(s): course 108B or 112C. *B. Singaram*

146A. Advanced Laboratory in Organic Chemistry (3 credits). F

Exposes students to advanced laboratory techniques in organic chemistry. Designed for students without previous research background in organic chemistry. Experiments carry a research-like format and cover the areas of natural products and reaction chemistry. Modern methods of organic analysis are emphasized including chromatographic methods and organic structure determination by spectroscopy. Laboratory: 8 hours. Students billed a materials fee. (General Education Code(s): W satisfied by taking this course and courses 151L and 164B.) Prerequisite(s): courses 108B/M or 112C/N; satisfaction of Entry Level Writing and Composition requirements.; enrollment restricted to chemistry majors. Enrollment limited to 16. *S. Lokey, R. Linington, R. Braslaw*

146B. Advanced Laboratory in Inorganic Chemistry (3 credits). S

Designed to expose students to advanced synthetic and spectroscopic techniques in inorganic chemistry. Examples include anaerobic manipulations, characterization of inorganic materials through spectral assignments and synthesis of coordination and organometallic complexes. Lecture: 1-1/4 hours; laboratory: 8 hours. Students billed a materials fee. (General Education Code(s): W satisfied by taking this course and courses 151L and 164B.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; courses 108B/M or 112C/N; 163A. *T. Holman*

146C. Advanced Laboratory in Physical Chemistry (3 credits). S

Provides advanced laboratory experience in the areas of nanomaterial synthesis and characterization; spectroscopy; fabrication and measurements energy-conversion

devices; and soft lithography techniques and instrumentation. Lecture: 1-1/4 hours; laboratory: 4 hours. Students are billed a materials fee. (General Education Code(s): W satisfied by taking this course and courses 151L and 164B.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 163B and 164B. Enrollment limited to 20. *Y. Li*

151A. Chemistry of Metals. S

Fundamental topics of inorganic chemistry are presented at the level of the standard texts of field. Special emphasis is given to maintain breadth in the areas of metallic, nonmetallic, and biological aspects of inorganic chemistry. Lecture: 3-1/2 hours; discussion: 1-1/4 hours. Prerequisite(s): courses 108B/M or 112C/N; 163A. Concurrent enrollment in course 151L required. *T. Holman*

151B. Chemistry of the Main Group Elements. W

Fundamental aspects of inorganic chemistry of main group elements are discussed. The emphasis is placed on the chemistry of nontransition elements including noble gases and halogens. In addition, students are exposed to the concepts of extended structures, new materials, and solid-state chemistry. Lecture: 3-3/4 hours. Prerequisite(s): courses 108B/M or 112C/N, and 163A. Recommended for chemistry majors. *P. Mascharak*

151L. Inorganic Chemistry Laboratory (2 credits). S

Laboratory experience in inorganic chemistry. Experiments involve the preparation, purification, and characterization of inorganic compounds. In addition, experiments are designed to illustrate fundamental principles in inorganic chemistry and are coordinated with lectures in course 151A. Laboratory: 4 hours per week. Students are billed a materials fee. (General Education Code(s): W satisfied by taking this course and courses 164B and either course 146A, 146B, or 146C.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; courses 108B/M or 112C/N; 163A. Concurrent enrollment in course 151A required. *T. Holman*

156C. Advanced Topics in Inorganic Chemistry. S

Advanced topics in inorganic chemistry and an introduction to solid state chemistry. Synthesis and structure of materials discussed as well as their influence on properties for modern devices and applications. Recent developments in area of material science also explored. Taught in conjunction with course 256C. Prerequisite(s): course 151A. Enrollment restricted to seniors. *S. Oliver*

163A. Quantum Mechanics and Basic Spectroscopy. F

A detailed introduction to quantum theory and the application of wave mechanics to problems of atomic structure, bonding in molecules, and fundamentals of spectroscopy. Prerequisite(s): course 1C or 4B, Physics 5A-B-C or 6A-B-C and Mathematics 11C or 22 or 23B. Physics 6C can be taken concurrently. *J. Zhang*

163B. Chemical Thermodynamics. W

Fundamentals of thermodynamics and applications to chemical and biochemical equilibria. (Formerly *Thermodynamics and Kinetic Theory*.) Prerequisite(s): course 1C, Physics 6A or 5A, and Math 22 or 23A-B. *E. Szwitek*

163C. Kinetic Theory and Reaction Kinetics, Statistical Mechanics, Spectroscopic Applications. S

Introduction to statistical mechanics, kinetic theory, and reaction kinetics and topics in spectroscopy. Prerequisite(s): courses 163A and 163B. *R. Anderson*

164A. Physical Chemistry Laboratory I: Data Analysis (2 credits). F

Introduction to data analysis and statistical treatment of

errors for physical chemistry experiments. Emphasizes the use of computers for problem solving and data analysis of one required laboratory report. Lecture: 1 hour; laboratory: 4 hours. Prerequisite(s): course 1C or 4B; Physics 6A-B-C or 5A-B-C; Mathematics 11C or 22. *S. Chen*

164B. Physical Chemistry Laboratory II (2 credits). W

Provides laboratory experience in the areas of thermodynamics, kinetics, and spectroscopy. Lecture: 1 hour; laboratory: 4 hours. Students are billed a materials fee. (General Education Code(s): W satisfied by taking this course and courses 151L and either course 146A, 146B, or 146C.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 164A. *S. Chen*

182. ACE Program Service Learning (2 credits). F

Students participate in training and development to co-facilitate collaborative learning in ACE chemistry discussion sections and midterm/exam review sessions. Students are role models for students pursuing science- and math-intensive majors. Prerequisite(s): Prior participation in ACE; good academic standing; no non-passing grades in prior quarter. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 10. (General Education Code(s): PR-S.) *O. Einarsdóttir*

195A. Senior Research. F

An individually supervised course with emphasis on independent research. Multiple-term course extending over two or three quarters; the grade and evaluation submitted for the final quarter apply to all previous quarters. Students submit petition to sponsoring agency; may not be repeated for credit. Prerequisite(s): satisfaction of the Entry Level and Composition requirements. (General Education Code(s): W satisfied by taking two of the following: courses 195A, 195B, and 195C.) (Formerly course 180A.) *The Staff*

195B. Senior Research. W

An individually supervised course with emphasis on independent research. Multiple-term course extending over two or three quarters; the grade and evaluation submitted for the final quarter apply to all previous quarters. Students submit petition to sponsoring agency; may not be repeated for credit. Prerequisite(s): satisfaction of the Entry Level and Composition requirements. (General Education Code(s): W satisfied by taking two of the following: courses 195A, 195B, and 195C.) (Formerly course 180B.) *The Staff*

195C. Senior Research. S

An individually supervised course with emphasis on independent research. Multiple-term course extending over two or three quarters; the grade and evaluation submitted for the final quarter apply to all previous quarters. Students submit petition to sponsoring agency; may not be repeated for credit. Prerequisite(s): satisfaction of the Entry Level and Composition requirements. (General Education Code(s): W satisfied by taking two of the following: courses 195A, 195B, and 195C.) (Formerly course 180C.) *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200A. Advanced Biochemistry: Biophysical Methods. F

An introduction to the theory, principles, and practical application of biophysical methods to the study of biomolecules, especially proteins and nucleic acids. Emphasis on spectroscopic techniques. Topics include magnetic resonance, optical spectroscopy, fast reaction techniques, crystallography, and mass spectrometry. *W. Scott*

200B. Advanced Biochemistry: Protein Structure and Function. W

A detailed discussion of protein chemistry, ranging from the structure, thermodynamics, and folding of proteins to the relationship between structure and function, and encompassing the methods used to determine such information. *M. Stone*

200C. Advanced Biochemistry: Structure and Function of Nucleic Acids. *

A variety of contemporary problems in biochemistry and molecular biology are investigated in a detailed manner. Lecture: 3-1/2 hours. *W. Scott*

231. Enzyme Mechanisms and Kinetics. W

A study of enzyme kinetics, mechanisms, and factors involved in enzymic catalysis. Lecture: 3-1/2 hours. Offered in alternate academic years. *W. Scott*

234. Bioinorganic Chemistry. S

The role played by transition metals in biological systems is discussed through application of the principles of coordination chemistry and inorganic spectroscopy. Topics include metalloproteins involved in oxygen binding, iron storage, biological redox reactions, and nitrogen fixation, as well as metal complexes of nucleic acids. Lecture: 4 hours. Prerequisite(s): courses 151A/L, 163A; and Biochemistry and Molecular Biology 100A. *P. Mascharak*

238. Topics in Biophysical Chemistry. *

A discussion of the application of selected topics in biophysical chemistry to contemporary problems in biochemistry and molecular biology. Lecture: 3-1/2 hours. Offered in alternate academic years. *T. Schleich*

240A. Kinetics and Mechanisms of Organic Reactions (3 credits). S

Basic principles and methods of the kinetic study of reaction mechanisms are covered, including linear free energy relationships. Theories are examined concerning how reactions choose a mechanism. *C. Bernasconi*

240B. Chemistry and Biology of Drug Design and Discovery (3 credits). W

Covers topics related to the chemistry of drug action and methods of drug discovery, including combinatorial and medicinal chemistry, computer-assisted drug design, pharmacodynamics and pharmacokinetics, high-throughput screening, and the biology of drug-target interactions. (Formerly *Combinatorial and High-Throughput Methods in Synthetic Chemistry*) Enrollment restricted to seniors and graduate students. *S. Lokey*

240C. Organic Structure Analysis from Spectra (3 credits). S

Determination of 2-D and 3-D structure and functionality of organic molecules from spectroscopic properties, including nuclear magnetic resonance, infrared, ultraviolet-visible and mass spectrometry. *R. Linnington*

240E. Modern Synthetic Methods (3 credits). F

An advanced study designed to provide the background and insight to enable the student to compare and contrast new reagents and reactions with existing methods. Prerequisite(s): course 143. *B. Singaram*

240F. Selectivity and Strategy in Organic Synthesis (3 credits). F

An advanced study on the use of chemoselectivity, regioselectivity, and stereoselectivity in organic transformations. Strategic planning in approaching the synthesis of complex molecules focuses primarily on retrosynthetic analysis and stereochemical control. Prerequisite(s): course 240E. *R. Braslau*

240G. Bioorganic Chemistry of Amino Acids and Peptides (3 credits). W

Chemistry of amino acids and secondary structure of amino acid polymers (peptides and proteins) discussed. Special emphasis placed on structure and function of the distinct amino acid side chain functionality as it contributes to structure and function. *J. Konopelski*

246. Advanced Topics in Organic Chemistry. *

A graduate course covering advanced topics in organic chemistry. Topics vary from year to year. *The Staff*

246A. Organic Reactions and Molecular Orbital Theory. *

Qualitative molecular orbital concepts, especially concerning aromaticity, orbital symmetry, and perturbation theory, and their application toward interpretation of reactivity and mechanism. Lecture: 3-1/2 hours. Prerequisite(s): courses 273 and 240A. Offered in alternate academic years. May be repeated for credit. *The Staff*

246B. Marine Organic Chemistry. *

A survey of organic natural products from marine sources. Organic chemical structural families unique to marine organisms are outlined. Pathways of their synthesis and interconversions; their role in the marine environment; approaches to their analysis; the distribution of organics in seawater. Lecture: 3-1/2 hours. Prerequisite(s): courses 108B/M or 112C/N. Offered in alternate academic years. May be repeated for credit. *P. Crews*

246C. Computers and Information Processing in Chemistry. *

An introduction to digital computers and their applications in chemistry. Includes Monte Carlo, artificial intelligence, pattern recognition, modeling, simulation, and optimization problem-solving methods. Applications to include structural analysis, spectroscopy, organic synthesis, and kinetics. Lecture: 3-1/2 hours; laboratory: 1-1/2 hours. Offered in alternate academic years. May be repeated for credit. *The Staff*

246F. Organoboranes in Organic Synthesis. *

An introduction to organoborane chemistry and its applications to synthetic organic chemistry, including principles, synthetic methods, reaction mechanisms, and asymmetric synthesis. A variety of topics including allylboration, boron-enolates, and asymmetric reductions are discussed. Enrollment restricted to seniors and graduate students. Offered in alternate academic years. May be repeated for credit. *B. Singaram*

246G. Heterocyclic Chemistry. *

Advanced study of synthesis and reactions of heterocyclic organic compounds; particular emphasis on structures with important medicinal value from natural products or pharmaceutical research. Prerequisite(s): course 143 or approval of instructor. *J. Konopelski*

246H. Organic Free Radical Chemistry. *

Covers a range of topics including radical stabilization, rates of fundamental radical reactions, methods of radical generation, synthetic applications of free radicals, persistent radicals, and some aspects of free radicals in biology. Prerequisite(s): course 143 or permission of instructor. *R. Braslau*

246I. Advanced Mechanistic Chemistry and Solution Kinetics. *

Kinetic approach to selected topics in mechanistic chemistry with emphasis on structure-reactivity relationships in organic as well as inorganic and biochemical systems. Discussion of significance and treatment of kinetic data illustrated with examples from various branches of chemistry. Prerequisite(s): permission of instructor. *C. Bernasconi*

255. Biotechnology and Drug Development. W

Recommended for students interested in careers in the biopharmaceutical industry. Focuses on recombinant DNA technology and the drug-development process, including discovery research; preclinical testing; clinical trials; and regulatory review, as well as manufacturing and production considerations. Students may not receive credit for this course and Biomolecular Engineering 155 and Biology 179. (Also offered as Biomolecular Engineering 255. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *P. Berman*

256A. Advanced Topics in Inorganic Chemistry. *

Advanced topics in inorganic chemistry are presented. Topics covered vary from year to year, and are announced in advance. Possible topics include A) organometallic chemistry; B) structural methods in inorganic chemistry; C) solid-state chemistry. Prerequisite(s): courses 151A/L and 146B or graduate standing. *The Staff*

256B. Advanced Topics in Inorganic Chemistry. *

Advanced topics in inorganic chemistry are presented. Topics covered vary from year to year, and are announced in advance. Possible topics include A) organometallic chemistry; B) structural methods in inorganic chemistry; C) solid-state chemistry. Prerequisite(s): courses 151A/L and 146B or graduate standing. *T. Holman*

256C. Advanced Topics in Inorganic Chemistry. S

Advanced topics in inorganic chemistry are presented. Topics covered vary from year to year, and are announced in advance. Possible topics include A) organometallic chemistry; B) structural methods in inorganic chemistry; C) solid-state chemistry. Prerequisite(s): courses 151A/L and 146B or graduate standing. *S. Oliver*

256D. X-ray Crystallography. *

Course in chemical crystallography focuses on the needs of small-molecule, single-crystal diffraction studies. Includes diffraction theory, space-group analysis, data collection, structure solution, and refinement. Practical component: use of diffraction equipment and solution/refinement software. Enrollment restricted to graduate students and seniors who have taken courses 151A, 151L, and 163A. *The Staff*

261. Foundations of Spectroscopy. W

The basic theory of time dependent processes is covered at an advanced level. The interaction of electromagnetic radiation and matter is described using both semiclassical and quantum field formulations. A variety of modern spectroscopic techniques are discussed both in terms of the basic processes and their use in the elucidation of chemical structure and dynamics. Prerequisite(s): course 163A. Offered in alternate academic years. *J. Zhang*

262. Statistical Mechanics. S

Theory and concepts of statistical mechanics with applications to ideal gases, condensed systems, phase transition, and non-equilibrium thermodynamics. Lecture: 3-1/2 hours. Prerequisite(s): course 160B or 163A. Offered in alternate academic years. *I. Benjamin*

263. Quantum Mechanics. F

A rigorous introductory course: the Schrödinger equation, operator formalism, matrix mechanics, angular momentum, and spin. Perturbation and other approximate methods. Applications to atomic and molecular problems. Lecture: 3-1/2 hours. Prerequisite(s): courses 163A and Physics 114A-B. Offered in alternate academic years. *R. Anderson*

tion, operator formalism, matrix mechanics, angular momentum, and spin. Perturbation and other approximate methods. Applications to atomic and molecular problems. Lecture: 3-1/2 hours. Prerequisite(s): courses 163A and Physics 114A-B. Offered in alternate academic years. *R. Anderson*

265. Computer Simulation in Statistical Mechanics. *

A detailed introduction of the use of computer simulation methods in physical and biophysical chemistry. Includes review of thermodynamics and statistical mechanics, molecular mechanics, molecular dynamics, and Monte-Carlo methods. Applications to liquid structure, reaction dynamics, and protein dynamics. Offered in alternate academic years. *I. Benjamin*

266. Advanced Topics in Physical Chemistry. *

A graduate course covering advanced topics in physical chemistry. Topics vary from year to year. *The Staff*

266A. Lasers and Their Chemical Applications. *

Introduces the basic theoretical principles of lasers and laser light. Various types of lasers and selected applications to chemistry are discussed. The use of lasers in photochemistry, spectroscopy, chemical kinetics, and chemical analysis is considered. Lecture: 3-1/2 hours. Prerequisite(s): course 163A and Physics 114A-B. Offered in alternate academic years. May be repeated for credit. *The Staff*

266B. Gas Phase Kinetics. *

A discussion of rate processes in gases. Descriptions of experimental and theoretical work on unimolecular, bimolecular, and termolecular reactions and energy transfer processes. Lecture: 3-1/2 hours. Prerequisite(s): course 262. Offered in alternate academic years. May be repeated for credit. *The Staff*

268. Solid State and Materials Chemistry. F,W

Topics include synthesis of solid-state materials and their characterization using experimental techniques: XRD, TEM spectroscopy, NMR, and their applications in technologies. Emphasis on new materials, e.g., polymer, biopolymers, nanomaterials, organic/inorganic composites, ceramics, superconductors, electronic, magnetic, and opto-electronic materials. Prerequisite(s): courses 163A and 163B. Enrollment restricted to senior and graduate chemistry majors. *Y. Li*

269. Electrochemistry. W

Designed to introduce basic principles and applications of electrochemistry to students at upper undergraduate and lower graduate levels in various fields including analytical, physical, and materials chemistry. Enrollment restricted to seniors and graduate students. *S. Chen*

273. Applications of Symmetry and Quantum Mechanics. *

Group theory and quantum mechanics are applied to problems of the electronic structure and spectra of molecules. A variety of topics including molecular orbital theory, reactivity, electronic structure calculations, and spectroscopy are discussed. Lecture: 3-1/2 hours. Prerequisite(s): course 163A. Offered in alternate academic years. *E. Switkes*

274. Proseminar in Synthetic and Polymer Chemistry. F,W,S

Weekly meetings devoted to study of synthetic organic chemistry and controlled polymer design for applications in nanotechnology. Topics drawn from current literature and research interests of participants. May be repeated for credit. *R. Braslau*

275. Proseminar in Biological Inorganic Chemistry. F,W,S

Weekly meetings devoted to biological inorganic chemistry and biochemistry. Topics are drawn from current literature. Papers and reviews are discussed, and participants give short seminars on their research interests. May be repeated for credit. *T. Holman*

282. Proseminar: Synthetic Methods. F,W,S

Weekly meetings devoted to the study of asymmetric and/or enantio-selective synthesis of optically active organic compounds of biological and medicinal significance. Topics drawn from the current literature and the research interests of the participants. May be repeated for credit. *B. Singaram*

283. Proseminar in Physical Organic Chemistry. F,W,S

Weekly meetings devoted to the study of physical and mechanistic organic chemistry. Topics drawn from the current literature and the research experiences of the participants. May be repeated for credit. *C. Bernasconi*

284. Proseminar in Synthetic Organic Chemistry. F,W,S

Weekly meetings devoted to the study of synthetic organic chemistry. Topics drawn from the current literature and the research interests of the participants. May be repeated for credit. *J. Konopelski*

285. Proseminar: Photobiochemistry and Photobiology. F,W,S

A detailed study of molecular mechanisms of light energy conversion and light-signal transduction processes in biological systems. Student participation in critical discussion of current literature examples are emphasized. Two-hour lecture and two-hour seminar weekly. Enrollment limited to 8. May be repeated for credit. *R. Bogomolni*

286. Proseminar in Natural Products Chemistry. F,W,S

Weekly meetings devoted to the study of natural products. Topics drawn from the current literature and research interests of the participants. May be repeated for credit. *P. Crews*

288. Proseminar in Bioinorganic Chemistry. F,W,S

Weekly meetings devoted to inorganic and bioinorganic research. Topics are drawn from current literature. Papers and reviews are discussed. Participants also give short seminars on topics of their research interests. May be repeated for credit. *P. Mascharak*

289. Proseminar: Biophysical Chemistry. *

Weekly meetings devoted to a detailed study of the theory and applications of nuclear magnetic resonance spectroscopy and imaging and related spectroscopic techniques to problems in biophysical chemistry. Topics are drawn from the current research literature and the research experiences of the participants. Enrollment limited to 20. May be repeated for credit. *T. Schleich*

291A. Organic Chemistry Research Seminar. F,W,S

Open to chemistry graduate students interested in organic chemistry. Weekly meetings are held to hear both local and external speakers discuss their work. Enrollment restricted to graduate students. May be repeated for credit. *S. Lokey, R. Linington, R. Braslau*

291B. Biochemistry and Molecular Biology Research Seminar. F,W,S

A weekly seminar series covering topics on the frontiers of biochemistry and molecular biology. The speakers include experts in these fields from other institutions. Enrollment

restricted to graduate students. May be repeated for credit. *W. Scott, M. Stone, S. Rubin*

291C. Inorganic Chemistry Research Seminar. F,W,S

For those interested in following the recent developments in the various areas of inorganic chemistry. External speakers; weekly discussion based on personal research or recent literature, led by the inorganic chemistry faculty, postdoctoral fellows, and students. Enrollment restricted to graduate students. May be repeated for credit. *S. Oliver, P. Mascharak*

291D. Physical Chemistry Research Seminar. F,W,S

A weekly seminar series covering topics of current research in physical chemistry. Weekly meetings are held to hear both local and external speakers discuss their work. Enrollment restricted to graduate students. May be repeated for credit. *S. Chen, Y. Li, (S) J. Zhang*

292. Seminar (2 credits). F

Enrollment restrictions: graduate standing or approval of the graduate adviser. *The Staff*

296. Teaching Chemistry (2 credits). F

University-level pedagogy in chemistry; examines the role of preparation, assessment, and feedback in teaching chemistry discussion and laboratory sections. Effective classroom techniques and organizational strategies discussed; oral presentations analyzed critically. Required of entering chemistry graduate students. *R. Roland*

297. Independent Study. F,W,S

A topic will be studied with faculty tutorial assistance to satisfy a need for the student when a regular course is not available. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. *The Staff*

Chinese

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Professor

CHRISTOPHER L. CONNERY, Chinese Literature
World literature and cultural studies, globalism and geographical thought, the 1960s, Marxism, pre-modern and modern Chinese cultural studies, cultural revolution

Lecturer

DAVID L. KEENAN
Chinese language, fiction, and history

Program Description

Students interested in acquiring proficiency in Chinese can enroll in language courses from beginning to advanced levels. Students may choose a major or minor in language studies, a minor in East Asian studies through the History Department, an individual major in East Asian studies through their college, or a global economics major.

The sequence of lower-division courses 1-6 is aimed at enabling students to gain proficiency in aural

comprehension, speaking, reading, and writing skills. Instruction takes place mostly in Chinese from the second half of the first quarter.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

Students may apply to study intensive Chinese language at one of China's finest universities-in Taipei, Hong Kong, or Beijing-for periods ranging from a summer up to a full year through the UC Education Abroad Program (EAP). Courses taken abroad can, with approval of an adviser, be applied to major requirements. For more information on the program, see UC Education Abroad Program. For information on credit applied to a major, please contact the appropriate department.

Lower-Division Courses

1. Instruction in the Chinese (Mandarin) Language. F

Instruction in elementary spoken and written Chinese (Mandarin), beginning with the sounds of Chinese and their representation in the pinyin romanization system. Conversation, structural analysis, and an introduction to character texts. Elementary sequence (1-2-3) begins only in fall quarter. Students interested in learning Chinese who are uncertain about where they should enter the sequence should meet with the instructor, prior to the first class meeting. *The Staff*

2. Instruction in the Chinese (Mandarin) Language. W

Continuation of Chinese 1, which assumes that students are familiar both with the pinyin romanization system and approximately 150 basic characters. Prerequisite(s): course 1, or equivalent. *The Staff*

3. Instruction in the Chinese (Mandarin) Language. S

Continuation of Chinese 2, which assumes that students are familiar both with the pinyin romanization system and approximately 300 basic characters. Prerequisite(s): course 2, or equivalent. *The Staff*

4. Intermediate Chinese (Mandarin). F

Instruction in intermediate spoken and written Chinese (Mandarin). Conversation, composition, and the reading of modern texts. Intermediate sequence (4-5-6) begins only in fall quarter. Students interested in improving their Chinese who are uncertain about where they should enter the sequence should meet with the instructor, prior to the first class meeting. Prerequisite(s): course 3, or equivalent. (General Education Code(s): IH.) *The Staff*

5. Intermediate Chinese (Mandarin). W

Continuation of Chinese 4. Conversation, composition, and the reading of modern texts. Prerequisite(s): course 4, or equivalent. (General Education Code(s): IH.) *The Staff*

6. Intermediate Chinese (Mandarin). S

Continuation of Chinese 5. Conversation, composition, and the reading of modern texts. Prerequisite(s): course 5, or equivalent. (General Education Code(s): IH.) *The Staff*

50. Preadvanced Chinese. F

Places additional emphasis in the areas of specialized

vocabulary, sentence structure, and translation as well as conversational and compositional skills in preparation for advanced courses. Offered fall quarter only. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. Prerequisite(s): course 6, or placement by examination. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

107. Introduction to Classical Chinese. *

Introduces the grammar and lexicon of classical Chinese and the language of China's pre-modern canonical writings in philosophy, religion, history, music, visual art, and literature. Reading from the Han and pre-Han era is featured. Prerequisite(s): course 50 or placement by interview. (General Education Code(s): IH.) *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Classical Studies

Department of History
201 Humanities
(831) 459-2982
<http://classicalstudies.ucsc.edu>

Faculty and Professional Interests

KAREN BASSI, Professor of Literature
Greek and Latin literatures; gender; literary and cultural theory; pre- and early modern studies; historiography; visual and performance studies

JOHN BOWIN, Assistant Professor of Philosophy
Ancient philosophy, metaphysics

MARIA EVANGELATOU, Assistant Professor, History of Art and Visual Culture
Medieval visual culture, with emphasis on Byzantium and its periphery; manuscript illumination, Marian cult and iconography; ancient Greek and Roman visual culture; Islamic visual culture; gender studies

MARY-KAY GAMEL, Professor of Literature
Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and

Roman texts and artifacts, film, feminist approaches to literature and performance

GILDAS HAMEL, Lecturer

History of Israel, Hellenistic and Roman Palestine, and Christianity; Hebrew and Greek Bible; classical languages; Celtic cultures

CHARLES W. HEDRICK JR., Professor of History
Greek and Roman history

JENNIFER K. LYNN, Lecturer

Later Roman Republic and Principate; Homeric epic; Hellenistic and Augustan poetry; Cicero

JOHN P. LYNCH, Professor of Literature, Emeritus

DEAN MATHIOWETZ, Assistant Professor of Politics
Political theory, philosophy of language, political economy

GARY B. MILES, Professor of History, Emeritus

DANIEL L. SELDEN, Professor of Literature
Afroasiatic languages and literatures, Greek and Latin, Hellenistic culture, the classical tradition, history of criticism, literary theory

Program Faculty Advisers

KAREN BASSI, Professor of Literature

MARY-KAY GAMEL, Professor of Literature

CHARLES W. HEDRICK JR., Professor of History

JENNIFER LYNN, Lecturer

DANIEL L. SELDEN, Professor of Literature

Program Description

"Classics" is a traditional designation for the study of the literature, history, and culture of ancient Greece and Rome. Classical studies at UCSC combines features of traditional programs, such as solid grounding in the ancient languages, with innovative, interdisciplinary approaches (literary theory, gender studies, performance, and film).

Classical studies is an interdisciplinary field. While the core of the program is focused on courses in the ancient Greek and Latin languages it also includes courses in history, history of art and visual culture, linguistics, literature, philosophy, politics, religious studies, and theater arts. Students are encouraged to study the literary and material artifacts of Greece and Rome within the larger context of ancient Mediterranean and Near Eastern cultures.

The classical studies program offers an opportunity to work in small classes with a dedicated teaching faculty and excellent fellow students. Classical studies is an excellent preparation for further study in a wide variety of graduate and professional programs including comparative literature, English, philosophy, law, and publishing.

The basic requirements for the classical studies major allow a variety of emphases and concentrations. For example, students with an interest in contemporary philosophy and political theory might want to concentrate in Greek, taking upper-division courses in Greek, history, philosophy, and politics. Students with an interest in European literature might want to concentrate in Latin, taking upper-division courses in Latin, history, and literature in translation. Students planning on pursuing a classics degree at the doctor of philosophy (Ph.D.) level should concentrate most of their course work in the Greek and Latin languages themselves.

Classical studies is administered by the History Department.

Requirements for the Major

A prerequisite for the classical studies major is the lower-division sequence in elementary Greek or Latin language (Greek 1 and 2 or Latin 1 and 2). The major requires a total of 10 courses plus a senior comprehensive examination and must include the following:

- one lower-division survey of ancient history or literature in translation;
- three upper-division courses in Greek or Latin literature;
- six additional approved upper-division courses (which may include additional courses in Greek or Latin literature);
- enrollment in a 2-credit comprehensive examination preparatory course, History 199F, is required in the same quarter that the senior comprehensive examination will be given. The preparatory course will be taken with the chair of the student's examination committee.

Disciplinary Communication (DC) Requirement.

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in classical studies is satisfied by completing two upper-division courses in Greek literature or Latin literature from the following list: Greek Literature 102, 103, and 105; or Latin Literature 102, 103, and 104.

Honors in the Classical Studies Major.

All students who announce candidacy during the academic year are reviewed for honors or highest honors in the major. The classical studies faculty advisers determine honors based upon narrative evaluations in courses applied toward the classical studies major. Performance in courses taken elsewhere and being transferred toward the major will be considered when applicable. The minimum standard applied is excellence in most courses for honors, and excellence in all courses for highest honors. Summer graduates are reviewed for honors in fall quarter.

Requirements for the Minor

A minor in classical studies requires the lower-division sequence in elementary Greek or Latin language (Greek 1 and 2 or Latin 1 and 2) and Greek or Latin Literature 100 plus any four of the upper-division courses listed as satisfying the classical studies major requirements.

Cognitive Science

273 Social Sciences 2
(831) 459-2002
<http://psych.ucsc.edu>

Program Description

Cognitive science has emerged in the last few decades as a major discipline that promises to be increasingly important in the 21st century. Focused on achieving a scientific understanding of how human cognition works and how cognition is possible, its subject matter encompasses cognitive functions (such as memory and perception), the structure and use of human language,

the evolution of the mind, animal cognition, artificial intelligence, and more.

The cognitive science degree provides a strong grounding in the principles of cognition through courses in cognitive psychology, and, in addition, provides breadth in the interdisciplinary aspects of cognitive science such as anthropology, linguistics, biology, philosophy, and computer science. Graduates will be well prepared for advanced training in research fields of cognitive psychology and cognitive neuroscience, technology industries such as human-computer interface, and health fields in the treatment of brain disorders.

The cognitive science major is intended for students wishing to enter doctor of philosophy (Ph.D.) programs in cognitive psychology, cognitive science, or cognitive neuroscience to pursue careers in research; enter the field of public health to work with individuals with neurological disorders and learning disabilities; or to enter the field of human-computer interface design; or pursue other related careers.

The Department of Psychology administers the program and student major advising.

Preparation for the Major

Students who are not prepared to begin the calculus requirement should take preparatory courses offered by the mathematics and applied mathematics departments, including pre-calculus.

Requirements for the Cognitive Science Major

The undergraduate degree program in cognitive science is a program offering a course of study leading to the bachelor of science (B.S.) degree. Fifteen courses (75 credits) are required. Because some courses have additional prerequisites, students should read the descriptions of courses carefully, noting the prerequisites for courses of interest to them.

Lower-Division Requirements:

PSYC 2, *Introduction to Psychological Statistics*

PSYC 20, *Introduction to Cognitive Psychology*

Calculus (one of AMS 11A, MATH 11A, 19A or 20A)

Computer Programming (one of CMPE 13/L, CMPS 5C, 5J, 5B, 12A)

Upper-Division Requirements:

PSYC 100, *Research Methods in Psychology* (7 credits)

Core Courses — students must complete three of the following:

PSYC 121, *Perception*

PSYC 123, *Behavioral Neuroscience*

PSYC 125, *Psychology of Language*

PSYC 129, *Human Learning and Memory*

Cognitive Psychology Electives — students must complete three additional upper-division Psychology courses from the following list. One of the core courses that is not used to satisfy the core courses requirement may be used to satisfy this requirement:

Any of PSYC 120–139 (i.e., the "Cognitive Series")

PSYC 101, *Development in Infancy*

PSYC 105, *Children's Thinking*

PSYC 119F, *Language Development*

PSYC 181, *Psychological Data Analysis*

PSYC 194, *Advanced Cognitive Research*

PSYC 195A, *Senior Thesis*

PSYC 204-252, graduate cognitive courses, by petition

Interdisciplinary Electives — students must complete four interdisciplinary electives from lists of courses pre-approved by the Psychology Department. The electives fall into four groups: Evolution; Artificial Intelligence and Human-Computer Interaction; Linguistics; Philosophy. Three of the four electives must be selected from the same group. Students are responsible for planning their course of study to complete any necessary prerequisites for electives they wish to take. Possible sequences of interdisciplinary courses, including prerequisites, are given below.

Group 1: Evolution

Anthropology 1, 101, 106, 194B, Biology: Ecology and Evolutionary Biology 20C, 129, 140

Group 2: Artificial Intelligence and Human-Computer Interaction

Computer Engineering 8, 80A, 131, Computer Science 20, 80B, 80K, 80V

Group 3: Linguistics

Linguistics 50, 53, 80D, 101, 102, 105, 111 (formerly Linguistics 55), 112 (formerly Linguistics 52), 113, 116, 117, 125

Group 4: Philosophy

Philosophy 100B (formerly Philosophy 93), 100C (formerly Philosophy 94), 121, 123, 133, 135, 138, 141

Major Admission Requirements

Students may petition to declare the cognitive science major once they have completed the lower-division requirements. Students admitted to the major must have a 3.00 grade-point average (GPA) in the lower-division requirements, with no single grade lower than C and no course taken P/NP. Transfer students may substitute equivalent courses from other institutions, with the exception of Psychology 20. Students receiving a C or lower in one of the lower-division courses may contact the department for possible substitutions.

Comprehensive Requirement

UCSC requires that every student satisfy a senior exit/comprehensive requirement prior to graduation. Cognitive Science students will satisfy this requirement by receiving a passing grade in either a cognitive seminar (PSYC 139A-G), or research experience (PSYC 194B, *Advanced Cognitive Research*, or PSYC 195, *Senior Thesis*).

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in cognitive science is satisfied by completing Psychology 100, Research Methods in Psychology, and one of the following seminars: Psychology 119F, 139G, and 139H. Please refer to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

Honors

Honors in the cognitive science major are awarded to graduating seniors whose academic performance is judged to be consistently excellent by a committee of psychology faculty. Highest honors in the major are

reserved for students with consistently excellent academic performance and an honors-level senior thesis.

Cognitive Science Course Planners

Following are two recommended academic plans for students to complete the Cognitive Science major. Plan 1 assumes typical curriculum selections. Plan 2 assumes the maximum number of prerequisites.

Plan One

| Year | Fall | Winter | Spring |
|------------|--|--|--|
| 1st (frsh) | MATH 2 PSYC 20 college core | MATH 3 Programming | Calculus PHYS 5C/N |
| 2nd (soph) | Interdisciplinary prerequisite | PSYC 2 Interdisciplinary prerequisite | PSYC 100 |
| 3rd (jr) | Core Interdisciplinary prerequisite Cognitive elective | Core Interdisciplinary prerequisite Cognitive elective | Core Interdisciplinary prerequisite Cognitive elective |
| 4th (sr) | Interdisciplinary elective | Cognitive upper-division | Cognitive upper-division |

Plan Two

| Year | Fall | Winter | Spring |
|------------|--|--|--|
| 1st (frsh) | MATH 2 PSYC 20 college core | MATH 3 Programming | Calculus |
| 2nd (soph) | Interdisciplinary prerequisite | PSYC 2 Interdisciplinary prerequisite | PSYC 100 Interdisciplinary prerequisite |
| 3rd (jr) | Core Interdisciplinary prerequisite | Core Cognitive elective | Core Interdisciplinary elective |
| 4th (sr) | Cognitive elective Cognitive elective Interdisciplinary elective | Cognitive upper-division Interdisciplinary elective | Cognitive upper-division Interdisciplinary elective |

College Eight

College Office
(831) 459-2361
<http://eight.ucsc.edu>

For college description and list of faculty, see page 101.

Lower-Division Courses

10. Academic Success (2 credits). *

An interactive course providing students with the opportunity to assess and revise methods of and purposes in studying. Critical, effective approaches to reading, writing, participating in lectures and sections, taking exams, balancing competing responsibilities, and utilizing campus resources are all explored. Prerequisite(s): permission of college adviser. Enrollment limited to 30. *The Staff*

20C. The Water Environment: Literature of the Sea (2 credits). *

Students consider the representation of the sea in selected

texts, noting how it becomes the focal point for the fears, hopes, and prejudices of Western civilization. Students write critical papers and their own narratives. Enrollment restricted to first-year and sophomore college members. Enrollment limited to 25. *C. Calsoyas*

20D. College Students' Lives (2 credits). *

Students understand their peers and themselves better through an exploration of issues that affect the daily life of college students. Topics include campus/student cultures, the academic system, and other critical issues. Overview of campus resources also provided. Enrollment restricted to first-year and sophomore College Eight members. *J. Pehlke*

20F. Justice on Earth (3 credits). W

Examines issues of oppression, privilege, and social justice within a global and environmental context through self-reflective and group work. May include an optional service-learning component requiring travel during spring break. Enrollment limited to 20. *The Staff*

20G. Peregrine Falcons Return (2 credits). W

Required training laboratory for students who wish to pursue a hands-on, two-credit service project (laboratory or field) that is focused on peregrine falcon conservation. Enrollment limited to 26. *G. Stewart*

28. Peer Leadership in Higher Education (3 credits). S

Overview of theories of student development, critical student issues, and skills needed for appropriate peer leadership interventions. Utilizes a variety of learning modes including readings, discussions, case studies, lectures, and group projects. Interview only: approval of instructor; Resident Assistant (RA) pre-employment training course. Enrollment limited to 25. May be repeated for credit. *J. Pehlke*

61. Education for Sustainable Living Program (2 credits). S

Analyzes sustainability and its application in daily life and on campus, involving collaboration between students, faculty, staff, administration, and the community. Guest lecturers, discussions, an optional UC-wide retreat, and essays allow engagement with aspects of ecological and social sustainability. *J. Borrego*

80A. Introduction to University Discourse: Environment and Society. F

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Introduces students to environmental history, ethics, and policy options, and teaches them to analyze and interpret key literary texts. Students cannot receive credit for this course and course 80B. Concurrent enrollment in course 81A is required. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. (General Education Code(s): TA, T3-Social Sciences, C1.) *S.R. Rajan*

80B. Rhetoric and Inquiry: Environment and Society. F

Explores the intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Introduces students to environmental history, ethics, and policy options, and teaches them to analyze and interpret key literary texts. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the C1 requirement; concurrent enrollment in course 81A is required. Enrollment restricted to first-year college members. (General Education Code(s): TA, T3-Social Sciences, C2.) *S.R. Rajan*

81A. The Environment and Us (3 credits). F

Takes students through a wide range of approaches to environmental citizenship and provides conceptual and practical tools to explore alternatives. Students also participate in a hands-on sustainability project designed to connect academic learning with practical applications. Concurrent enrollment in course 80A or 80B is required. Enrollment restricted to first-year college members. *S.R. Rajan*

81B. Fundamentals of Environmental Science. W

Addresses major issues in physical and biological environmental sciences and provides tools to critically evaluate, debate, and make informed choices regarding one's own impact on the environment. Topics include: climate change, water resources, air pollution, evolution, ecology (from populations to ecosystems), and conservation. Quantitative problem solving is an integral part of this course. (Also offered as Earth Sciences 81B. Students cannot receive credit for both courses.) Prerequisite(s): courses 80A or 80B. Enrollment restricted to first-year and sophomore college members. (General Education Code(s): MF, IN, Q.) *S.R. Rajan*

81C. Technological Innovation and Environmental Challenges. S

Introduces key technological solutions to environmental problems; discusses their underlying principles; and examines their societal dimensions. Topics include: conventional and renewable energy; emerging technologies for transportation, energy efficiency clean water; planetary engineering; and lean manufacturing. (Also offered as Electrical Engineering 81C. Students cannot receive credit for both courses.) Prerequisite(s): courses 80A or 80B. Enrollment restricted to first-year and sophomore college members. (General Education Code(s): T2-Natural Sciences.) *K. Pedrotti, J. Vesecky*

90. College Eight Garden Internship (1 credit). F,W,S

One-credit internship in the College Eight Garden. Offers students of College Eight an opportunity to become involved in an experimental learning project focusing on application of concepts of sustainable agriculture. Enrollment restricted to members of College Eight. Enrollment limited to 10. May be repeated for credit. *The Staff*

93. Field Study. F,W,S

The Staff

99. Tutorial. F,W,S

May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Individual study for lower-division students directed by a faculty member affiliated with College Eight. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***128. Advanced Peer Leadership Practicum (3 credits). S**

Advanced practicum for the application of skills and theoretical knowledge studied in course 28. Uses many learning modes including readings, discussions, case studies, lectures, and group projects. Prerequisite(s): course 28. Enrollment by permission of instructor. Enrollment limited to 25. May be repeated for credit. *J. Pehlke*

161. Education for Sustainable Living Program. S

Analyzes sustainability and its application in daily life and on campus, involving collaboration between students, faculty, staff, administration, and the community. Guest lecturers, discussions, an optional UC-wide retreat, and

essays allow engagement with aspects of ecological and social sustainability. Enrollment limited to 25. *J. Borrego*

193. Field Study. F,W,S

The Staff

193F. Field Study (2 credits). F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Must be sponsored by College Eight faculty. Approval of the student's adviser and the academic preceptor is needed to enroll. May be repeated three times for credit. Students submit petition to sponsoring agency. *The Staff*

195. Senior Thesis. F,W,S

May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

The Staff

199. Tutorial. F,W,S

May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual study for upper-division students directed by a faculty member affiliated with College Eight. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

College Nine

College Office
(831) 459-5034
<http://collegenine.ucsc.edu>

For college description and list of faculty, see page 102.

*Lower-Division Courses***80A. Introduction to University Discourse: International and Global Issues. F**

Explores rhetorical principles and conventions of university discourse and provides intensive practice in analytical writing, critical reading, and speaking. Topics address contemporary global issues including economic globalization, human rights, international and inter-ethnic conflicts, poverty, and immigration. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): T3-Social Sciences, C1.) *The Staff*

80B. Rhetoric and Inquiry: International and Global Issues. F

Explores the intersection of investigation, interpretation, and persuasion and refines strategies for writing, research, and speaking. Topics address contemporary global issues including economic globalization, human rights, international and inter-ethnic conflicts, poverty, and immigration. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. Enrollment limited to 22. (General Education Code(s): T3-Social Sciences, C2.) *The Staff*

80C. Introduction to University Discourse: International and Global Issues Writing Intensive 1. F

Explores rhetorical principles and conventions of university discourse and provides intensive practice in analytical writing, critical reading, and speaking. Topics address

contemporary global issues. More writing intensive than course 80A; prerequisite to 80D. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. *The Staff*

80D. Introduction to University Discourse: International and Global Issues Writing Intensive 2. W

Continues to provide practice in analytical writing, critical reading, and speaking, and to examine global issues. Prerequisite(s): course 80C. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): C1.) *The Staff*

85. Global Action (2 credits). W

Workshop facilitated by peer instructors. Students learn about current international and global issues through interactive exercises, small-group discussions, and faculty presentations. Students develop an "action plan" to raise awareness about one or more of these concerns and take practical steps to create positive change in the world. (Formerly *Global Leadership: A Model United Nations Workshop*.) Enrollment restricted to College Nine members. Enrollment limited to 20. *E. Ramsden*

86. College Leadership Development (2 credits). S

Students newly appointed into leadership positions at College Nine explore the concept of leadership relating to college's theme of International and Global Perspectives. Prerequisite(s): current College Nine student leader; permission of instructor. *H. Jibri*

91. Global Issues Colloquium (1 credit). F,W,S

Weekly colloquium on global issues with UCSC topical focus each quarter. Presentations by UCSC faculty and invited speakers. Students must attend class, read an assigned article, and write a one-page synopsis. Co-sponsored by College Nine and The Center for Global, International, and Regional Studies. Enrollment restricted to College Nine members. Enrollment limited to 50. May be repeated for credit. *The Staff*

*Upper-Division Courses***105. Researching Food Sovereignty. S**

Students engage in individual and collective research projects on transformational food systems in the United States and abroad. Readings look at the current global food system and grassroots responses to food and environmental crises. Enrollment restricted to junior and senior College Nine and Ten members during priority enrollment only. Enrollment limited to 20. *The Staff*

191. Teaching Global Action. F,W

Undergraduates at upper-division level participate in teaching discussion groups for College Nine 80 (F) or College Nine 85 (W). Prerequisite(s): permission of instructor: essay describing interest in becoming course assistant, copies of evaluations, and letter of recommendation from faculty member and/or college staff member. Enrollment restricted to College Nine juniors or seniors. (Formerly *Teaching International and Global Issues*.) *E. Ramsden*

199. Independent Study. F,W,S

Individual directed study for upper-division college members with college-affiliated faculty. Students must submit petition with one of the college academic advisers with accompanying letter from faculty adviser. Approval of provost required. Enrollment restricted to upper-division College Nine members. May be repeated for credit. *The Staff*

199F. Independent Study (2 credits). F,W,S

Individual directed study for upper-division college members with college-affiliated faculty. Students must submit petition with one of the college academic advisers with accompanying letter from faculty adviser. Approval of provost required. Enrollment restricted to upper-division College Nine members. May be repeated for credit. *The Staff*

College Ten

College Office
(831) 459-5034
<http://collegeten.usc.edu>

For college description and list of faculty, see page 105.

Lower-Division Courses

80A. Introduction to University Discourse: Social Justice and Community. F

Explores rhetorical principles and conventions of university discourse and provides intensive practice in analytical writing, critical reading, and speaking. Examines social justice issues; topics include racism, sexism, and other forms of prejudice and discrimination; poverty and welfare; civil liberties; and community involvement and citizenship. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): T3-Social Sciences, C1.) *The Staff*

80B. Rhetoric and Inquiry: Social Justice and Community. F

Explores the intersection of investigation, interpretation, and persuasion and refines strategies for writing, research, and speaking. Examines social justice issues; topics include racism, sexism, and other forms of prejudice and discrimination; poverty and welfare; civil liberties; and community involvement and citizenship. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. Enrollment limited to 22. (General Education Code(s): T3-Social Sciences, C2.) *The Staff*

80C. Introduction to University Discourse: Social Justice and Community Writing Intensive 1. F

Explores rhetorical principles and conventions of university discourse and provides intensive practice in analytical writing, critical reading, and speaking. Examines social-justice issues. Topics include: racism, sexism, and other forms of prejudice and discrimination; poverty and welfare; civil liberties; and community involvement and citizenship. More writing-intensive than 80A; prerequisite to 80D. Enrollment restricted to first-year college members who have not satisfied the Entry Level Writing and C1 requirement and who scored a 5 or lower on the AWPE (Analytical Writing and Placement Exam). Enrollment limited to 22. *The Staff*

80D. Introduction to University Discourse: Social Justice and Community Writing Intensive 2. W

Continues to provide practice in analytical writing, critical reading, and speaking, and to examine social-justice issues. Prerequisite(s): course 80C. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): C1.) *The Staff*

85. Social Justice Issues Workshop (2 credits). W

Series of presentations, films, and workshops that address personal and cultural identity and examine social, cultural, political, environmental, and other justice concerns. Enrollment restricted to College Ten members. Enrollment limited to 20. *W. Baxter*

86. College Leadership Development (2 credits). S

Students newly appointed into leadership positions at College Ten explore the concept of leadership relating to program's theme of Social Justice and Community. Prerequisite(s): current College Ten student leader; permission of instructor. *H. Jibri*

91. Introduction to Nuclear Policy (1 credit). F

Introduces the key aspects of nuclear policy. Examines issues associated with nuclear weapons and civil nuclear power and the interplay between the two with regards to proliferation. Presentation will be given by guest speakers. Enrollment limited to 80. May be repeated for credit. *D. Hirsch*

Upper-Division Courses

105. The Making and Influencing of Nuclear Policy. W

Explores how policy is made and influenced, using nuclear policy as a case study. Topics include: Freedom of Information Act (FOIA); legislation and rule-making; environmental impact statements (EISs); licensing and judicial proceedings; research and news media. Focuses on skills that enable citizens to impact policy. Enrollment restricted to junior and senior College Nine and College Ten members during priority enrollment only. Enrollment limited to 50. *D. Hirsch*

110. Service-Learning Field Study (Esprit de Corps). F,W,S

Provides college members opportunity to apply their academic learning in a practical setting in the community. Students earn academic credit by volunteering in a non-profit agency or school for 10 hours per week. Students supervised by a professional on site. Students attend a weekly class, complete readings, listen to local leaders from the community, reflect upon their experiences with fellow students, and submit a final project related to their service-learning placement. Taught concurrently with course 110B. (Formerly course 193, *Field Study*.) Enrollment restricted to sophomore, junior, and senior College Nine and College Ten members. Enrollment limited to 22. May be repeated for credit. *A. Asher*

110B. Service-Learning Field Study (Esprit de Corps) (2 credits). F,W,S

Provides college members opportunity to apply their academic learning in a practical setting in the community. Students earn academic credit by volunteering in a non-profit agency or school for four hours per week. Students supervised by a professional on site. Students attend a weekly class, complete readings, listen to local leaders from the community, reflect upon their experiences with fellow students, and submit a final project related to their service-learning placement. Taught concurrently with course 110. (Formerly course 193F, *Field Study*.) Enrollment restricted to sophomore, junior, and senior College Nine and College Ten members. Enrollment limited to 22. May be repeated for credit. *The Staff*

191. Teaching Social Justice. F,W

Undergraduates at upper-division level participate in teaching discussion groups for College Ten 80 (F) or College Ten 85 (W). Prerequisite(s): permission of instructor: essay describing interest in becoming course assistant, copies of evaluations, and letter of recommendation from

faculty member and/or college staff member. Enrollment restricted to College Ten juniors or seniors. *W. Baxter*

199. Independent Study. F,W,S

Individual directed study for upper-division college members with college-affiliated faculty. Students must submit petition with one of the college academic advisers with accompanying letter from faculty adviser. Approval of provost required. Enrollment restricted to upper-division College Ten members. May be repeated for credit. *The Staff*

199F. Independent Study (2 credits). F,W,S

Individual directed study for upper-division college members with college-affiliated faculty. Students must submit petition with one of the college academic advisers with accompanying letter from faculty adviser. Approval of provost required. Enrollment restricted to upper-division College Ten members. May be repeated for credit. *The Staff*

Communication and Rhetoric

Writing Program
166 Kresge College
(831) 459-2431
<http://writing.usc.edu>

Program Description

Admission to the minor in communication and rhetoric has been suspended. The following conditions will apply if it is reinstated.

The Writing Program accepts students each quarter into the minor in communication and rhetoric. The minor consists of a series of courses that give students the opportunity to hone practical communication skills in a variety of contexts. It also provides a grounding in the analytical tools and critical theory that a rhetorical perspective provides.

A full description of the minor and forms for proposing a study plan and declaring the minor are available at the Writing Program office (166 Kresge).

Course Requirements

To earn a minor in communication and rhetoric, students must complete six courses after having satisfied the lower-division composition requirements:

- either Writing 70, *Communication and Rhetoric: An Introduction*; or Writing 101, *An Introduction to the History, Theory, and Practice of Rhetoric*;
- a course that concentrates on editing: either Writing 120, *Editing English Prose*, or Writing 163, *Advanced Workshop in Expository Writing*;
- four electives, at least three of which must be chosen from among the following upper-division writing courses: 101, 102, 103, 104, 106, 107, 108, 109, 110A, 163, 167, 169, and 191A–D. No more than one elective may be chosen from a list of courses offered by other departments (list is available from the program office).

Community Studies

231 Oakes Academic Building
(831) 459-2371
<http://communitystudies.ucsc.edu>

Faculty and Professional Interests

Professor

DAVID BRUNDAGE

American working-class and immigration history, history of U.S. social movements, Irish history and politics

WILLIAM H. FRIEDLAND, Emeritus

B. RUBY RICH

Documentary film and video, post-9/11 culture, new queer cinema, feminist film history, Latin American and Latin/a cinema, U.S. independent film and video, the essay film, the politics of film festival proliferation and the marketing of foreign films in the U.S.

NANCY STOLLER, Emerita

RENEE TAJIMA-PEÑA

Documentary film and video focusing on Asian American and immigrant communities, media, and social change

DAVID T. WELLMAN, Emeritus

CARTER WILSON, Emeritus

DEBORAH A. WOO, Emerita

Associate Professor

JULIE GUTHMAN

Sustainable agriculture and alternative food movements, international political economy of food and agriculture, politics of obesity, political ecology, race and food, critical human geography

PAUL ORTIZ

African American history, U.S. social and political history, social documentary, oral history, subaltern studies and theories of resistance, U.S. South, Latino studies, social movements, working-class history; history of farm labor, African diaspora

MARY BETH PUDUP

Regional studies, economic justice, public policy, historical geography of the U.S.

Assistant Professor

JOHN LEAÑOS

Social documentation, social art practice, community arts, documentary animation, Chicano/a art practice and cultural studies, media and cultural studies, subaltern studies, photography, installation art, public art and intervention

MARCIA OCHOA

Gender and sexuality, race and ethnicity, Latina/o studies, media and cultural studies, ethnography of media, feminism, queer theory, geography, multimedia production, graphic design, colonialism and modernity, Latin American studies—Colombia and Venezuela

Field Program Coordinator

MICHAEL ROTKIN

Marxist theory, capitalist system, community organizing, electoral politics, media, government and non-profit programs, community power structure, institutional analysis, and affirmative action

Lecturer

ANDREA STEINER

Health policy, critical public-health studies, gerontology

(aging), ageism, women's health, critical analysis of civically engaged education



Professor

JOHN G. BORREGO (Latin American and Latino Studies)

Global political economy, national development, urban and regional planning, community organizing, social change, ethnic minorities, Mexico and the Southwest

DANA FRANK (History)

U.S. social and economic history; women, labor, and working-class history; contemporary political economy

Program Description

The bachelor of arts degree in community studies was suspended effective April 2010 for up to two years. The degree remains available during this time to all currently declared majors, as well as to students who had begun taking the preparatory courses for the major.

Community studies is an interdisciplinary major that integrates scholarship and community engagement in both research and teaching. Since its founding in 1969, and across radically changing political landscapes, the department has maintained a focus on identifying, analyzing, and helping to construct sites for social change and cultural transformation. To this end, the Community Studies Department addresses principles of social justice and the dynamics of racial and class inequity through courses that explore constructions of community and their implications.

The range of the faculty's disciplines, research interests, and arenas of civic engagement permits the department to delve into cross-cutting contemporary approaches that color every aspect of social life. The major offers community studies students a dynamic array of courses in areas such as public health and health politics, gender and sexuality, political economy and globalization, agriculture and food justice, race and racism, historical and contemporary social movements, immigration history and policy, and the theory and practice of documentary representation.

Pedagogically, community studies relies on developing a critical awareness of the relationship between the theoretical and practical issues involved in social change, and of the wider global contexts in which social justice is defined and achieved. A distinguishing feature of the community studies major is the six-month, full-time field study. The department's model of field-study immersion requires undergraduate majors to spend six months engaging with specific communities through residence and participation in (mostly) non-profit organizations with a social change and/or social justice mission. The undergraduate core curriculum focuses on the development of academic tools for social analysis and field observation/participation while deepening students' knowledge of specific histories and theoretical perspectives that are essential to the study of communities and transformation. Students complete their work in the major with a senior capstone project integrating academic coursework, field study, and original research. The major usually takes about two years to complete.

With the shared guidance of a faculty adviser and a field-study coordinator, community studies students choose field placements related to one of the department's areas of focus. Placements have been arranged in the past with health centers, immigrant-rights organizations, newspapers, media centers, direct-action mobilizations, sustainable-development projects, city

planning departments, neighborhood organizations, civil rights groups, farm-to-school programs, battered women's shelters, legal clinics, community-based cultural organizations, programs for seniors, tenant unions, government agencies and the offices of elected officials, trade unions, and other organizations committed to and working for social justice.

Facilities

The Community Studies Department maintains several unique resources for students. A media laboratory is available where majors can learn the use of video, audio, and photography as research and presentation tools. Two field-study coordinators work with students to develop part- and full-time field studies, and a field-study resource office is available to assist students in selecting an appropriate organization. The field-study office provides logistical and academic support during the field study, while also functioning as a liaison between students, faculty, and host organizations.

Major Program

The program for all students in the major includes courses that develop a substantive focus for the field study, courses that contextualize the field study in broader social forces, courses that provide methodological tools for analyzing the field study, the field study itself, and the capstone requirement. Students who wish to pursue a major in Community Studies must satisfactorily complete course 10, *Introduction to Community Activism* prior to or concurrently with CMMU 102.

It is important to emphasize community studies is a major with a sequential core curriculum. This means that some required courses must be successfully completed in a specified order, as indicated by the quarter(s) when those courses are offered.

To begin the major and declaration process, a student must be enrolled in one of the CMMU 100(A–Z) gateway seminars. Through these seminars students develop a substantive focus for their academic study plan, field study, and senior capstone requirement. Students in the 100 (A–Z) seminars are presented with recommended organizations from which to select their placements. Several sections of CMMU 100(A–Z) are offered each fall and winter quarter. Topics vary from year to year and may include economic justice; health-care inequities; immigration and social justice; sex, gender, and sexuality; politics of culture, agriculture, food, and social justice; and media and social change. Following (or concurrent with) the gateway seminar is course 101, *Communities, Social Movements, and the Third Sector*, offered only in winter quarter, and course 102, *Preparation for Field Study*, offered only in spring quarter. In addition, four directed electives must be taken, one each in the areas of 1) race, class, and privilege, 2) regional or historical background, 3) political economy, and 4) cultural politics and representation. Students must also complete at least two of the four directed electives before leaving for their field study: one class that addresses race, class, and privilege and one class that provides regional or historical background for their field study. Two of these directed electives must be satisfied through courses offered inside the department; a complete list of directed electives for each area is posted on the department's web site <http://communitystudies.ucsc.edu>.

Students are expected to arrange the rest of their academic program of study around the six-month, full-time field study (two quarters of 15 credits each). Students must conduct their fieldwork in summer and fall quarters so that they can enroll in course 194,

Analysis of Field Materials immediately upon their return because course 194 is offered only in winter quarter. The remaining two directed electives, one course in political economy (the 140 series) and one course focusing on cultural politics and representation, may be completed any quarter prior to finishing the major.

Language competency must be demonstrated by all students planning a field study in a non-English speaking country and, therefore, such students must plan appropriate language study well in advance of the field study. In addition, students must demonstrate knowledge of the history, culture, and political economy of the place where they will be carrying out their field study—whether that place is a neighborhood in Santa Cruz, New York City, or a small village in Guatemala. Students who find media production relevant to their fieldwork and are required to take course 80L prior to their field study; note that course 80L includes laboratories facilitated by the instructional staff of the Social Sciences Media Laboratory, located in 47 Social Sciences 2.

Admission to the Major

A general background or coursework in politics, sociology, anthropology, and/or community activism is suggested for students considering the community studies major. Students are required to have enrolled in two community studies courses at the time they declare the major: one must be a CMMU 100(A–Z) seminar and the other may be any of five-credit, lower- or upper-division course, including CMMU 10, except for the 42 series of student-directed seminars or independent or field studies.

The process of declaring the community studies major begins when a student enrolls in a section of CMMU 100(A–Z), the gateway seminar series. Prospective majors must choose a seminar that matches their own academic and social justice focus. Because of their small size, the CMMU 100(A–Z) seminars are enrolled through an “interview only” procedure, which usually takes the form of attending the first class, participating in discussion, and completing a questionnaire regarding background and interests. Based on this interview, each CMMU 100(A–Z) instructor will decide who gets priority in the class. Although the seminars are open to all students, prospective community studies majors enjoy priority enrollment. You must attend the first class to be considered for enrollment.

It is wise to communicate with your potential CMMU 100(A–Z) instructor to discuss your plans for the major prior to the beginning of the quarter to make sure that the Community Studies Department and the specific course you have chosen is appropriate for your interests and needs. Occasionally, a student is not accepted into the major because the student’s social-justice and field-study focus are poorly matched with the department’s areas of expertise and/or the student’s academic interests cannot be fulfilled by current department offerings.

Instructions for Applying to the Major

- Attend a department orientation held at the beginning of each quarter.
- Choose and enroll in the appropriate CMMU 100(A–Z) seminar. If you are accepted into the class, a permission number will allow you to register; you can then move on to the next step.
- Print out a Declaration of Major petition from <http://advising.ucsc.edu>, fill in the University

General Education and College Requirements portion, and obtain the signature of your college adviser. Complete the Application for Admission to Community Studies (available in the *Student Handbook*, found on the department web site: communitystudies.ucsc.edu.) Prepare an academic study plan on a separate piece of paper with your plans for completing all requirements for the major including field study and selection of directed electives.

- Write a three- to four-page essay (typewritten) explaining:
 - Why you think that the community studies major is the best way for you to pursue your academic and social-change interests and how your focus matches the emphasis of your gateway seminar.
 - The type of social-change or social-justice organization with which you expect to work.
 - The classes you have taken and/or plan to take, in addition to CMMU 100(A–Z), to prepare you to work with this organization.
 - Your social location (defined as the intersections of nationality, immigration history, ethnicity, racial privilege, class, gender, age, urban/rural/suburban/ex-urban upbringing, and/or sexuality) and how it may influence and/or be influenced by your proposed six-month field placement. For this part of the essay we encourage you to think deeply about all of these aspects although you are not required to reveal details about any individual category listed nor will you be accepted or rejected from the major on the basis of any of these categories.
- Keep in mind that the department is interested in both the substance of your essay and your ability to express yourself in written form.
- Meet with your CMMU 100(A–Z) seminar professor to discuss your essay, field-study plans, electives, and other application materials. Be prepared to list which electives you plan to take to fulfill your directed elective requirement, although you may need to be flexible on your elective choices as your faculty adviser may make other recommendations. Obtain the faculty signature on the application form. Bring any evaluations or progress reports from currently enrolled courses to support your application to the major.
 - Well before the deadline for the declaration of major, bring your completed Declaration of Major petition, draft study plan, signed application form, and essay to the Community Studies Department office (231 Oakes College) for final approval and processing. You are not officially declared until step 6 is finalized.

Note: you cannot begin course 102 without declaring the major. Failure to do so will defer your progress in the major until the following year when the 102 course is next offered (spring only).

Major Course Requirements

| Summary of Core Sequence Requirements | | Credits |
|---------------------------------------|--|---------|
| 10 | <i>Introduction to Community Community Activism</i> (spring) | 5 |
| 100(A–Z) | <i>Gateway Seminar</i> (fall) | 5 |
| 101 | <i>Communities, Social Movements, and the Third Sector</i> (winter) | 5 |
| 102 | <i>Preparation for Field Studies</i> (spring) | 5 |
| 120-129 | <i>Race, Class, and Privilege Directed Elective</i> (can be satisfied within or outside the department) (any quarter before field study) | 5 |
| 130-139 | <i>Regional or Historical Directed Elective</i> (can be satisfied within or outside the department) (any quarter before field study) | 5 |
| 140-149 | <i>Political Economy Directed Elective</i> (can be satisfied within or outside the department) (any quarter before finishing) | 5 |
| 150-159 | <i>Cultural Politics and Representation Directed Elective</i> (can be satisfied within or outside the department) (any quarter before finishing) | 5 |
| 194 | <i>Analysis of Field Materials</i> (winter) | 5 |
| 198 | <i>Independent Field Study</i> (summer/fall) | 30 |

10, Introduction to Community Activism

This course introduces students to different approaches to community activism including charity, volunteering, labor and community organizing, non-violent resistance, non-profit sector involvement, and social documentation.

100(A–Z), Gateway Seminars

The CMMU 100(A–Z) seminars provide students with a substantive focus for their academic work and field study. In each of these courses, students learn about the social, cultural, historical, geographic, and/or economic context of specific issues as well as efforts to change existing conditions.

101, Communities, Social Movements, and the Third Sector

This course critically engages with concepts central to the major including constructions of community in social-change efforts and the institutionalization of social movements in third-sector organizations. It is designed to deepen students’ understanding of the opportunities and obstacles embedded in various avenues of social action.

102, Preparation for Field Study

This course examines participatory and other social-research methods including participant-observation, conducting interviews, writing ethnographic field notes, and collecting descriptive data. Students receive practical experience with developing research questions, methods, and writing field notes. The course also addresses ethical and logistical issues of research. The final project is a field-study prospectus with articulated research questions and methods.

120-129, Race, Class, and Privilege Electives

These courses examine race, class, and other hierarchies of difference as they intersect with structural inequality,

self-identification, and identity politics. The requirement may be satisfied within or outside the department from a pre-approved list of courses.

130-139, *Regional/Historical Electives*

Students have a choice of courses that provide historical/geographic knowledge of particular peoples, places, or regions in preparation for their field study. The requirement may be satisfied within or outside the department from a pre-approved list of courses, by petition, or through an approved independent study.

140-149, *Political Economy Electives*

Students have a choice of courses that examine the dynamics, logics, and/or institutions of colonialism, capitalism, neoliberalism, and/or globalization. The requirement may be satisfied within or outside the department from a pre-approved list of courses.

150-159, *Cultural Politics and Representation Electives*

Students have a choice of courses that examine ideas of discourse, social construction, knowledge, and representation as they help explain political and cultural contestation in the arts, science, medicine, media, and everyday life. The requirement may be satisfied within or outside the department from a pre-approved list of courses.

198, *Full-Time Independent Field Study*

During the full-time, six-month field study, students are enrolled at UCSC and receive full-time university credit. Students are required to submit field notes and several papers during the field study.

194, *Analysis of Field Materials*

This course is designed for students returning from their full-time field study. The course has two related goals: (1) to help students, both individually and collectively, analyze and gain perspective on their field experiences; and (2) to move students through the process of completing the senior capstone requirement. Students work with their field material to develop findings and arguments. For students completing the major with a senior essay, the essay is completed in course 194. For students doing a senior thesis, project, or student-directed seminar, the student completes at least three major pieces of writing; some or all of which will be incorporated into the completed thesis, project, or student-directed seminar.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The Community Studies Department's model of experiential pedagogy relies heavily on writing instruction to develop students' analytical, reflexive, and communicational skills. Although students in the community studies major receive disciplinary writing skills throughout the core curriculum, they fulfill the Disciplinary Communication requirement with two required upper-division courses, CMMU 102 and CMMU 194. The goals of the Community Studies Department's Disciplinary Communication requirement are to teach students to:

1. Research and synthesize core arguments, debates, and ideas related to students' topical focus within community studies.
2. Formulate a proposal describing a conceptual framework to approach the topical focus in a specific social context, including background, literature

review, research questions, and methods.

3. Write descriptive and analytical field notes, then analyze the results of the field study and report findings in a capstone essay, thesis, or project.

Senior Capstone Requirement

Each student must fulfill a senior capstone requirement, either through the senior essay, a senior thesis, a senior project, or a student-directed seminar. For a thesis, project, or student-directed seminar, the student must choose a faculty member to serve as his or her adviser.

Senior Essay: Students complete a senior essay that incorporates field study observations and contextualizes their findings historically and theoretically; the essay can incorporate writing completed in other courses, including CMMU 100(A-Z) and field study, along with essays written in course 194. The minimum length is 25 pages, plus bibliography. The senior essay is completed entirely in course 194, *Analysis of Field Materials*.

Senior Thesis: Some students may choose to complete a senior thesis, which is comprised of field-study observations, historical and theoretical contextualizations of the field study, and deeper analysis of the social-justice issues at the heart of the field study. In general, a thesis involves a more tightly developed argument related to field-study findings than the senior essay. It may also involve post-field-study research; typical length is 35–50 pages, including bibliography. Students begin the senior thesis during course 194 and should complete it in the following quarter(s) by enrolling in course 195, *Senior Thesis*.

Senior Project: Students may choose to complete a senior project in other genres of social documentation including video production, photography, audio production, creative writing, and other formats such as grant proposals and organizing pamphlets. The senior project also requires a significant analytical essay of 20 pages, plus bibliography, describing the project conceptualization, rationale, methodology, and evaluation. Students begin the senior project during course 194 and complete it the following quarter by enrolling in course 195, *Senior Thesis*.

Student-Directed Seminar (SDS): The SDS capstone option is reserved for exceptional students. Under the direction of a faculty adviser, the student develops and teaches a Community Studies 42 course that relates to the student's field-study and social-justice focus, accompanied by a seminar completion report.

The department selects only a limited number of student-directed seminars each year. Selection is based on the excellence of the SDS proposal, the relevance of the subject matter to the major, the student's background preparation, and the total number of proposals submitted each quarter. The Committee on Educational Policy gives the final approval.

For students interested in teaching a student-directed seminar, it is recommended that they meet with their adviser early on—prior to the full-time field study—to begin the process of obtaining course approval. A short written work providing the theoretical basis for the project, giving a brief analysis of the connection between the student's field work and the project itself, a course syllabus, a bibliography, and copies of the student's evaluations are required, along with a letter from the sponsoring faculty.

Students must also take course 199, *Tutorial*, the quarter prior to teaching the student-directed seminar, to give them time to prepare the course material. A student-directed seminar guide, giving detailed information about preparing for and teaching a student-direct-

ed seminar, is available in the department office.

Honors in the Major

Honors in the community studies major are awarded to graduating seniors whose academic performance in their major coursework is judged to be consistently excellent to outstanding. Students must also do excellent work on their senior capstone requirement; an honors-eligible senior essay must be particularly outstanding. The senior capstone must have intellectual merit, a genuine social change/social-justice focus, and evidence that the student gained insight into processes of social change. In accordance with UCSC policy, the Community Studies Department aims to award honors to approximately 15 percent of community studies graduates.

Lower-Division Courses

10. **Introduction to Community Activism. S**

Surveys different strategies of community activism including charity, volunteering, labor and community organizing, and recently emerging global activism with goal of demonstrating how certain strategies challenge existing social relations and arrangements while others typically (and often by design) reproduce them. (General Education Code(s): IS.) *The Staff*

42. **Student-Directed Seminar. F,W,S**

Seminars taught by upper-division or graduate students under faculty supervision. (See course 192.) *The Staff*

70. **Video Laboratory (2 credits). F**

Trains students in the techniques of documentary film making. Through lectures, demonstrations, hands-on instruction, and review of students' work in progress, students learn the fundamentals of film/video pre-production, production, and post-production skills. Concurrent enrollment in course 80L required. Enrollment limited to 25. *The Staff*

71. **Basic Photography Laboratory (2 credits). F**

Provides students with photography skills. Through lecture, demonstration, hands-on experience, and field sessions, students acquire technical and aesthetic training in basic darkroom skills, methods of photographing people, an introduction to alternative processes, and presentation of finished photographs. Concurrent enrollment in course 80L required. Enrollment limited to 20. *The Staff*

72. **Audio Laboratory (2 credits). F**

Trains students in the fundamental techniques of documentary audio production. Through lectures, documentary examples, demonstrations, hands-on instruction, and consultation with students regarding their work in progress, students gain the skills they need to produce their own audio documentaries. Concurrent enrollment in course 80L required. Enrollment limited to 20. *The Staff*

73. **Digital Photo Lab (2 credits). F**

Provides introduction to digital photography and social documentary photographic techniques. Through lecture, demonstration, hands-on experience and field sessions, students learn camera operation, how to photograph people, photographic aesthetics, Adobe Photoshop, and arranging photos in essay form. Concurrent enrollment in CMMU 80L is required. Enrollment limited to 15. *The Staff*

80A. **Chicanos and Social Change. ***

Introduction to study of Chicano political experience with selected U.S. institutions, e.g., education and health, beginning with historical overview and ending with con-

sideration of Chicanos' political future in the 1990s. Weekly guest lecturers. (General Education Code(s): ER, T3-Social Sciences, E.) *The Staff*

80B. Civil Rights Movement: Grassroots Change and American Society.*

The civil rights movement of the 1950s–60s was one of the most important grassroots social movements in American history. Course examines this movement, focusing especially on the experiences of rank-and-file participants and on its effects on American society. (General Education Code(s): T3-Social Sciences, E.) *D. Brundage*

80L. Social Documentation. F

Examines works from various media recognized as being drawn from "real life." Through film, photography, oral history, and other examples, develops critical understanding of social documentation as a process with implicit theories and conventions. Students create beginning documentaries in production collectives. (General Education Code(s): IM, T3-Social Sciences.) *The Staff*

93. Field Study. F,W,S

Supervised research for lower-division students, conducted off campus within regular commuting distance of the campus. Petitions may be obtained in the Community Studies Office. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

93F. Field Study (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

93G. Field Study (3 credits). F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a faculty supervisor. For lower-division students doing part-time off-campus study. Petition must be obtained from the Community Studies Department. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Individual directed study for lower-division undergraduates. Petitions may be obtained in the Community Studies Office. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

100. Theory and Practice.

Introduces students to different ways of perceiving and understanding social phenomena in an ongoing dialogue about practical implications of theory and theoretical implications of practice. Faculty introduce and discuss their own work in these terms. Topics vary from quarter to quarter. Enrollment priority given to proposed community studies majors. Permission of instructor required; see enrollment conditions in the *Schedule of Classes*. *The Staff*

100B. Media and Social Change. †

Uses case study approach to analyze use of films and videos in relation to social change movements. Students produce a video as final project. Interview only: admission determined at first class meeting. Enrollment restricted to sophomores and juniors. Concurrent enrollment in course 170 is required. Course 80L is recommended. Enrollment limited to 25. *R. Tajima*

100E. Economic Justice. F

Examines how markets operate within the political economy of contemporary capitalism to generate myriad and

often chronic forms of economic and social inequality in the United States. Explores different approaches to addressing inequality within the multi-faceted economic justice movement. Interview only: admission determined at first class meeting. Enrollment limited to sophomores and juniors. (Formerly *Theory and Practice of Economic Justice*.) Enrollment limited to 25. (General Education Code(s): E.) *M. Pudup*

100J. Immigration and Social Justice. F

Introduction to contemporary U.S. immigration patterns and policies, to major problems facing immigrant communities, and to theory and practice of immigrants and their allies in confronting these problems and working for social justice. Interview only: admission determined at first class meeting. Enrollment limited to sophomores and juniors. Enrollment limited to 25. (General Education Code(s): E.) *D. Brundage*

100M. Health Care Inequalities. F

Examines system and non-system that is American health care with special attention to inequalities in access, financing, and quality of care. Covers concepts such as equality, fairness, and need as well as community organizing and community building for health. Interview only: admission determined at first class meeting. Enrollment limited to sophomores and juniors. Enrollment limited to 25. *A. Steiner*

100T. Agriculture, Food, and Social Justice. F

Examines the primary ways in which activists are attempting to resist, provide alternatives to, and/or transform aspects of the food system using social and environmental justice frameworks to evaluate such activism. Topics explored include organic farming, food charity, fair trade, relocalization, and farmworker organizing. Interview only: admission determined at first class meeting. Enrollment limited to sophomores and juniors. Enrollment limited to 25. *J. Guthman*

100V. Politics of Culture. F

Contemporary history of community arts and public practices as they pertain to social movements, transformation, and community building from the Mexican Revolution through the Dadaist movement, the cultural movements of the Sixties, and up to the present. Course assignments involve practice as well as research. Enrollment limited to 25. *J. Leanos*

100X. Sex, Gender, and Sexuality.*

How do people produce and politicize sex, gender, and sexuality on their bodies? How are these represented and disciplined? Topics include transgender, sex work, feminist and queer realities. Materials include testimonials, films, ethnography, social theory, and clinical texts. Interview only: admission determined at first class meeting. Enrollment limited to sophomores and juniors. Enrollment limited to 25. *M. Ochoa*

101. Communities, Social Movements, and the Third Sector. W

Engages with crosscutting ideas and concepts central to the major including constructions of community in social-change efforts and the institutionalization of social movements in third-sector organizations. Deepens students' understanding of the opportunities and obstacles embedded in various avenues of social action. Enrollment restricted to community studies majors. *M. Pudup*

102. Preparation for Field Studies. S

A practicum to prepare students for field study. Course must be successfully completed prior to the six-month field study. Prerequisite(s): course 10; satisfaction of the Entry Level Writing and Composition requirements; submission of signed Goals and Objectives form and comple-

tion of admissions process to the major; signed approval of full-time field study. Enrollment limited to community studies majors. *A. Steiner*

103. Field Study Practicum (2 credits). S

A practicum in social change work in which the students work for a social change organization on a part-time basis. Concurrent enrollment in course 102 required. *A. Steiner*

110. Resistance and Social Movements.*

Where do ideas for democratic social change come from? How are new social movements formed? Emphasis will be placed on subaltern groups including slaves, peasants, workers, utopians, and "second-class citizens" of the global economy from 1492 to the present. (Formerly course 100P.) (General Education Code(s): E.) *The Staff*

114. Communities, Problems and Interventions.*

Prepares students to develop and design responses to problems affecting communities. Informed by the history of community interventions in Chicana/o, feminist, labor, civil rights, HIV/AIDS, and GLBT/queer movements, students research, design, and propose a community-level intervention. (Formerly course 160.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 25. (General Education Code(s): W.) *M. Ochoa*

122. Whiteness, Racism, and Anti-Racism. F

Examines the social, cultural, institutional, and personal ways that white privilege and racial domination are constructed, maintained, and reproduced in U.S. society. Goal is to reveal the "hidden" quality of whiteness and illuminate effective strategies for anti-racist activism. (Formerly course 114.) Enrollment limited to 25. (General Education Code(s): E.) *The Staff*

132. American Cities and Social Change. S

Examines the historical development of and contemporary conditions within U.S. cities by focusing on social and economic restructurings of cities, cultural and political transformations, and spatial reorganizations of the urban landscape. Goal is understanding the changing nature of urban experience. (Formerly course 163.) *M. Pudup*

136. Northern Ireland: Communities in Conflict. S

Introduction to the so-called "troubles" in Northern Ireland, from the 1960s to the present. Examination of the historical background to the conflict, the patterns of conflict in the 1970s and 1980s, and the emergence of a peace process in the 1990s. (Formerly course 166.) (General Education Code(s): CC.) *D. Brundage*

142. Introduction to Marxism.*

A close study of original texts by Marx and Engels and contemporary Marxists, focusing on the basic tenets of Marxism and their applicability to current community problems. An interdisciplinary course for students with little previous experience in Marxist method. *M. Rotkin*

143. Wal-Mart Nation.*

Examines origins and growth of Wal-Mart stores as powerful guides to understanding dynamics of contemporary global political economy and, relatedly, the changing fortunes of global social classes. (Formerly course 123.) *M. Pudup*

145. Globalization and Its Discontents. S

Provides an overview of the origins and existing character of major institutions, structures, and dynamics of the global political economy. Examines some social consequences of neoliberalism as well as political responses to it. (Formerly course 168.) *J. Guthman*

*Not offered in 2010–11

†Quarter to be determined

149. Political Economy of Food and Agriculture. * Examines key concepts in agrarian political economy; the historical development of the world food system; and a selection of contemporary issues related to food production, consumption, distribution, and regulation. (General Education Code(s): PE-E.) *J. Guthman*

152. Mediating Desire. W

Considers the ways Third World voices and bodies are understood, performed, embraced, commodified, exploited, and rejected through representations. Uses representations of, by, and for the margins to engage theories of communication, identity, and representation. Creative final projects encouraged. (Formerly course 132.) (General Education Code(s): ER, E.) *M. Ochoa*

154. The Rise and Fall of the New Queer Cinema. * Documents/interprets the phenomenon "New Queer Cinema." Seeks to understand its precedents, preconditions (social, political, medical) leading to its explosive growth, and forces (economic, aesthetic, medical) spelling the end of the artistic movement, though its influence seemed simultaneously to spill into every televisual medium. (Formerly course 147.) (General Education Code(s): IM, A.) *B. Rich*

155. Popular Culture and Social Change. S

Examines the roles popular culture plays in peoples' everyday lives and the ways in which popular-culture texts reflect, shape, and contest the social values, ideas, and ideologies of particular historical moments. Special emphasis on examining the relationship between popular culture and social change in an effort to map out and study its transformations. *A. Berney*

156. Politics of Obesity. W

Critically examines the construction and representation of the so-called epidemic of obesity, the major explanations for the rise in obesity and the interventions they beget, and the implications of naming obesity as a problem. (Formerly course 145.) (General Education Code(s): PE-H.) *J. Guthman*

157. Ageism and Activism. *

Introduces students to gerontology, the study of aging. Taking a multidisciplinary approach, critically examines the theories, stereotypes, and realities of worldwide demographic transition and considers the many interesting implications for organizing social and personal life. (Formerly course 111.) *A. Steiner*

160. Public Health. *

Examination of community activism to address health issues: examples are drawn from a range of concerns, e.g., environmental racism, prison conditions, feminist health matters, the AIDS epidemic, violence, and alcoholism. Special attention is given to the social frameworks of health and to the utilization of social and political strategies for improving community well-being. (Formerly course 110.) *The Staff*

161. Women's Health Activism. F

Examines concrete aspects of women's health in social and political contexts, including such factors as environmental and occupational health, the role of race and nationality, diverse sexualities and health, American medical care systems, and international comparisons and organizing approaches. (Formerly course 148.) *A. Steiner*

162. Community Gardens and Social Change. *

Examines history, theory, and practice of community gardening, emphasizing contemporary garden projects using the transformative power of direct contact with nature to effect social change. Aims include understanding the nonprofit sector's response to social problems with novel

programs and practices. (Formerly course 117.) Enrollment limited to 50. *M. Pudup*

170. Social Documentation. *

Provides advanced understanding of history of social documentation and corresponding theories and practices of social documentation. Students also required to advance skills in a practical aspect of social documentation (i.e., video, photography, audio, oral history). (Formerly course 100S.) *The Staff*

178. Broadcast Journalism (2 credits). *

Focuses on writing radio news. Through lectures, hands-on instruction, and written assignments, students acquire technical and aesthetic training in broadcast news reporting, writing, and audio production. (Formerly course 118.) Enrollment restricted to first-year students, sophomores, and juniors. Enrollment limited to 25. *The Staff*

185. Gender and Sexuality in Latin America. S

Advanced topics in gender and sexuality in Latin America and Latina/o studies. Analyzes role of power, race, coloniality, national and transnational processes in the production and analysis of genders and sexualities. Materials include memoir, fiction, ethnography, social documentary and history. (Formerly course 152.) (General Education Code(s): CC, E.) *M. Ochoa*

189. Methods of Teaching Community Studies. F,W,S

Each student serves as a facilitator for small discussion groups in connection with core community studies courses. Facilitators complete course readings and meet with instructor as a group to discuss the teaching process. May not be counted toward upper-division major requirements. Prerequisite(s): prior course work in the major. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar, course 42, under faculty supervision. Students submit petition to sponsoring agency. Approval by the Committee on Educational Policy the prior quarter. *The Staff*

193. Field Study. F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a faculty supervisor. To be used primarily by upper-division students doing part-time off-campus study. Petitions may be obtained in the Community Studies Department Office. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a faculty supervisor. For upper-division students doing part-time off-campus study. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193G. Field Study (3 credits). F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a faculty supervisor. For upper-division students doing part-time off-campus study. Petition must be obtained from the Community Studies Department. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Analysis of Field Materials. W

A seminar for students who have completed a full-time field study. Devoted to the systematic analysis of field materials, integrating appropriate concepts and relevant literature, as well as utilizing the experience of other students. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, course 198. Enrollment restricted to community studies majors. (Gen-

eral Education Code(s): W.) *The Staff; J. Guthman, D. Brundage, A. Steiner*

195A. Senior Thesis. F,W,S

Individual study with a faculty member to complete the senior thesis. Petitions may be obtained in the Community Studies Department Office. Students submit petition to sponsoring agency. *The Staff*

195B. Senior Thesis. F,W,S

Individual study with a faculty member to complete the senior thesis. Petitions may be obtained in the Community Studies Department Office. Students submit petition to sponsoring agency. *The Staff*

195C. Senior Thesis. F,W,S

Individual study with a faculty member to complete the senior thesis. Petitions may be obtained in the Community Studies Department Office. Students submit petition to sponsoring agency. *The Staff*

198. Independent Field Study. F

Provides for department-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Community studies majors are required to take 30 credits of field study. Students engaging in full-time field study must complete all application procedures as described in the Community Studies handbook. Students submit petition to sponsoring agency. Prerequisite(s): course 102 must be successfully completed before enrollment in this course. May be repeated for credit. *M. Rotkin, The Staff*

199. Tutorial. F,W,S

Advanced directed reading and research for the serious student. May be repeated for credit with consent of instructor. Petitions may be obtained in the Community Studies Department Office. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Advanced directed reading and research for the serious student. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

209. Ethnographic Writing. *

Fleashes out social analysis. Prepares students entering or returning from fieldwork to represent people, places, and social processes in writing. Employs writing exercises, in-class workshop, and review of ethnographic literature. Enrollment restricted to graduate students. Enrollment limited to 30. *M. Ochoa*

297. Independent Study. F,W,S

Either study related to a course being taken or a totally independent study. Designed for graduate students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Computer Engineering

See Engineering, page 240.

Computer Science

See Engineering, page 251.

Cowell College

College Office
(831) 459-2253
<http://www2.ucsc.edu/cowell>

For college description and list of faculty, see page 89.

Lower-Division Courses

10. Becoming a Successful Student (2 credits). *

An interactive approach to effective studying, note-taking, critical thinking, and exams. Also explored: time management; good communication with staff and faculty; major and career exploration; and use of campus resources. Enrollment priority given to first-year students and sophomores. Enrollment restricted to college members, or by permission of instructor. Enrollment limited to 15. *The Staff*

12. Public Speaking (2 credits). W

Introduces students to the theory and practice of formal and informal public speaking through composition, presentation, and evaluation of informative reports, persuasive speech, introductory remarks, panels, and extemporaneous speech. Enrollment restricted to college members during priority enrollment. Enrollment limited to 20. *C. Carlstroem*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

50. Library Skills for the Digital Age (2 credits). W

Intended to enhance students' skills in using the most powerful learning tool in any university: the library. Topics: organization of the library; how to begin researching; search engine and database use; judging the quality of sources; using sources responsibly. Disciplinary focus changes from quarter to quarter. Enrollment restricted to first-year and sophomore Cowell college members, or by permission of instructor. Enrollment limited to 22. *W. Martyna*

61. Critical Journeys (2 credits). *

For publication in a Cowell literary journal, students substantively revise one of their fall quarter essays by studying a major work that influences, acknowledges, or further clarifies a required reading of the Cowell core course. Prerequisite(s): course 80A or 80B; enrollment restricted to members of Cowell College. Enrollment limited to 20. *J. Wilson, C. Carlstroem*

64. Social Justice: Issues and Debates (2 credits). *

Focused followup on social justice topics and readings introduced in the Cowell core course. Allows first-year students to pursue social justice themes in greater depth. Students must have previously taken a Cowell core course (or equivalent). Enrollment restricted to first-year students. Enrollment limited to 20. *J. Christianson*

70A. Bookbinding. *

Students learn techniques of bookbinding, construction, and design, and fundamentals of letterpress printing. Students are billed a materials fee. May not be used to fulfill art major requirements. Enrollment limited to 12. (General Education Code(s): A.) *G. Young*

70B. Printing I: Elements of Printing. W

Learn fundamental skills in fine letterpress printing, including hand typesetting and instruction in the operation of printing presses. Basic typography explored as students design and print a small edition of a selected text. Students are billed a materials fee. May not be used to

fill art major requirements. Prerequisite(s): course 70A. Enrollment limited to 12. (General Education Code(s): A.) *G. Young*

70C. Printing II: Typography and Book Design. S

Students learn fundamental skills in fine letterpress printing, including hand typesetting and instruction in the operation of printing presses. Basic typography explored as students design and print a small edition of a selected text. Students are billed a materials fee. May not be used to fulfill art major requirements. Prerequisite(s): course 70B or by instructor permission. Enrollment limited to 12. May be repeated for credit. (General Education Code(s): A.) *G. Young*

80A. Introduction to University Discourse: Imagining Justice Past and Present. F

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Focuses on conceptions of justice, historic and contemporary, and considers how literary and artistic media may transmit, question, or revise notions of the just. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): T4-Humanities and Arts, C1.) *The Staff*

80B. Rhetoric and Inquiry: Imagining Justice Past and Present. F

Explores the intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Focuses on conceptions of justice, historic and contemporary, and considers how literary and artistic media may transmit, question, or revise notions of the just. Incorporates independent research. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. Enrollment limited to 22. (General Education Code(s): T4-Humanities and Arts, C2.) *The Staff*

85. Introduction to Chinese Writing Systems. *

Gateway course illuminating the operation of the writing systems of greater China. Intended for students who are curious about the world's longest continually used symbol set as well as for those who may be considering a serious commitment to learning the language. *D. Keenan*

86. College Leadership Development (2 credits). S

Students newly appointed as residential life assistants in the college prepare for taking up their positions by studying identity and diversity issues; student development; community building; conflict resolution; intercultural competency; and leadership skills. Restricted to students selected for Cowell College Resident Assistantship, and by permission of instructor. *The Staff*

93. Field Study. F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

93F. Field Study (2 credits). F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

94. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a faculty instructor. Students submit petition to sponsoring agency. Enrollment limited to 10. May be repeated for credit. *The Staff*

94F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty instructor. Students submit petition to sponsoring agency. May be repeated for

credit. *The Staff*

99. Tutorial. F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

111. Mock Trial Workshop. F

Designed for training and mentoring of UCSC's Mock Trial team and students interested in acquiring forensic speech skills. Enrollment limited to 15. *D. Robertson*

118B. Words & Music: Poetry, Musical Theater, Opera. W

Study of significant texts enhanced by music for performance. Topics vary annually. Course compares original texts in English translation with their adaptation to musical theater (My Fair Lady, Oklahoma, etc.) and opera (Carmen, etc.) May be repeated for credit. (General Education Code(s): IH.) *M. Ellis*

156M. Arts and Sciences. *

Seminar exploring the relations between scientific modes of understanding and those pertaining to the liberal and fine arts, including literature, philosophy, and the visual and performing arts. Winter 2009: literature and medicine. May help students preparing to take the MCAT (reading comprehension and writing sections). Enrollment restricted to juniors and seniors. Priority to Cowell College students. Enrollment limited to 15. May be repeated for credit. *D. Schultz*

184A. Leadership and Institution Building (2 credits). F

Through lectures by senior administrators and student consensus-and-recommendation teams, students learn how leaders work with constituent groups, build cooperation, and develop implementation plans in an institution such as the University of California, specifically, UC Santa Cruz. Enrollment restricted to undergraduates accepted in the Chancellor's Undergraduate Internship Program. Enrollment limited to 40. *W. Ladusaw*

184B. Leadership and Institution Building (2 credits).

Through lectures by senior administrators and student consensus-and-recommendation teams, students learn how leaders work with constituent groups, build cooperation, and develop implementation plans in an institution such as the University of California, specifically, UC Santa Cruz. Enrollment restricted to undergraduates accepted in the Chancellor's Undergraduate Internship Program. Enrollment limited to 40. *W. Ladusaw*

184C. Leadership and Institution Building (2 credits). S

Through lectures by senior administrators and student consensus-and-recommendation teams, students learn how leaders work with constituent groups, build cooperation, and develop implementation plans in an institution such as the University of California, specifically, UC Santa Cruz. Enrollment restricted to undergraduates accepted in the Chancellor's Undergraduate Internship Program. Enrollment limited to 40. *W. Ladusaw*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Upper-division standing required and a proposal supported by a faculty member willing to supervise. *The Staff*

193. Field Study. F,W,S

Program of study arranged between a group of students and an instructor, which may involve work with an off-campus or non-departmental agency (e.g., internship or field work). Interview only; prior arrangement with instructor. Enrollment restricted to juniors and seniors. May be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S

Program of study arranged between a group of students and an instructor, which may involve work with an off-campus or non-departmental agency (e.g., internship or field work). Interview only; prior arrangement with instructor. Enrollment restricted to juniors and seniors. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and an instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and an instructor. Students submit petition to sponsoring agency. Enrollment restricted to juniors and seniors. May be repeated for credit. *The Staff*

195. Senior Thesis. F,W,S

Students submit petition to sponsoring agency. *The Staff*

198. Independent Field Study. F,W,S

Provides for college-sponsored individual study programs off campus, for which faculty supervision is not in person (e.g., supervision is by correspondence.) Up to three such courses may be taken for credit in any one quarter. Approval of student's adviser, certification of adequate preparation, and approval by provost required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Various topics to be arranged. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Crown College

College Office
(831) 459-2665
<http://www2.ucsc.edu/crown>

For college description and list of faculty, see page 93.

Lower-Division Courses

28. Crown Student Leadership Development Seminar (2 credits). W

Explore leadership as it relates to student development at Crown College. Examine how values, ethics, involvement, identity, and theory affect leadership in a variety of content areas. Evaluate student's leadership strengths to determine objectives for improvement. *The Staff*

31. Crown College Student Leadership in Action Seminar (2 credits). S

Focuses on developing and establishing leadership skills and styles for new leaders at Crown College. Explores communication styles, group dynamics, community development, programming, moral development and con-

flict resolution concepts and strategies. Applies theory to action. Enrollment limited to college members and by permission of instructor. *The Staff*

60. The Environment on Film: Rhetoric of Ecocriticism. W

Examines the overt as well as the subtle cinematic elements that depict, ponder, and persuade concerning issues of the environment and the role of humans regarding nature, animals, and the human-made landscape. Enrollment restricted to college members during priority enrollment. Enrollment limited to 24. (General Education Code(s): IM, IH.) *M. Foster*

80A. University Discourse: Ethical Issues in Emerging Technologies. F

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Examines ethical challenges brought about by rapidly changing science and technology. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. (General Education Code(s): T6-Natural Sciences or Humanities and Arts, C1.) *F. Ferguson*

80B. Rhetoric/Inquiry: Ethical Issues in Emerging Technologies. F

Explores intersection, interpretation, and persuasion and hones strategies for writing and research. Examines ethical challenges brought about by rapidly changing science and technology. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year Crown College members. (General Education Code(s): T6-Natural Sciences or Humanities and Arts, C2.) *F. Ferguson*

80F. Seminar in Science Fiction. W

In this seminar, students examine science fiction's major themes and look at how those themes function as cultural criticism, technological prophecy, and metaphysical questions. Using a variety of science fiction as well as critical texts, students explore how science fiction contributes to understanding the human condition and the nature of reality. (Formerly "Science Fiction/Science Fact.") Enrollment restricted to college members or by permission of instructor. Enrollment limited to 20. (General Education Code(s): T7-Natural Sciences or Social Sciences.) *A. Rava*

80J. Cyborg Society: Myths, Realities, Choices. W

Examines content and methodologies of the emerging field of cyborgology. Includes social studies of science, anthropology, sociology, philosophy, politics, art, biology, and informatics. Enrollment limited to 25. (General Education Code(s): PE-T, T5-Humanities and Arts or Social Sciences.) *C. Gray*

80L. Food Safety and Environmental Quality: The Complexities of a Safe Salad. W

In recent years, outbreaks of food-borne illness have alarmed farmers and consumers alike. This course examines the complexities of ensuring food safety in the complex natural, economic, and social settings that characterize U.S. food-production systems. Enrollment limited to 24. (General Education Code(s): PE-E, T7-Natural Sciences or Social Sciences.) *K. Lowell*

80S. Undergraduate Seminar in Science, Technology, and Society. *

An honors seminar for first year students on selected topics that examine the relationship between science, technology, and society. Precise focus of each seminar varies and is announced by the college. Preference given to Crown

College students. Enrollment restricted to first-year and sophomore students. Enrollment limited to 20. (General Education Code(s): T2-Natural Sciences.) *The Staff*

93. Field Study. F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Students should review plans with an appropriate fellow of the college. A proposal should be presented to the college academic preceptor no later than the seventh week of the preceding quarter. Credit is granted by the sponsor upon approval of the work performed. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

93F. Field Study (2 credits). F,W,S

Provides for individual field study in the vicinity of the campus under the direct supervision of a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Individual study for lower-division students directed by a fellow of Crown College. Students submit petition to sponsoring agency. Enrollment restricted to college members. *The Staff*

Upper-Division Courses

123. Science and Human Values. S

Study and application of ideas and practices that social scientists and therapists have empirically shown empower people to choose to create better lives rather than just follow old habits. Course is personally challenging, writing-intensive, and discussion-intensive. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; permission of instructor after written letter, and interview with instructor during the preceding winter quarter. Enrollment limited to 48. (General Education Code(s): W.) *F. Andrews*

185. Career and Internship Preparation (1 credit). S

For juniors and seniors preparing for an internship experience or career position. Subjects include: self-assessment of career objectives and/or internship goals; exploration of resources and techniques for finding and evaluating potential positions; resume writing; interview techniques; techniques to maximize learning in an internship and advancement in a job; communication; conflict resolution and problem solving in the organizational setting. Enrollment limited to 40. *The Staff*

198. Independent Field Study. F,W,S

Provides for college-sponsored individual study programs off campus. Approval of student's faculty sponsor and college academic provost required. *The Staff*

199. Tutorial. F,W,S

Individual study for upper-division students directed by a fellow of Crown College. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual study for upper-division students directed by a fellow of Crown College. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Digital Arts New Media

DARC 204
(831) 459-1919
<http://digitalarts.usc.edu>

Faculty and Professional Interests

RALPH H. ABRAHAM, Professor Emeritus,
Mathematics

NEDA ATANASOSKI, Assistant Professor, Feminist
Studies
*U.S. and Eastern European film and media; cultural studies
and critical theory; war and nationalism; gender, ethnicity,
and religion*

ELLIOT W. ANDERSON, Assistant Professor, Art
Electronic art, digital arts/new media

LAWRENCE ANDREWS, Associate Professor, Film
and Digital Media
Film, video, installation and media art

AMY C. BEAL, Associate Professor, Music
*American music, 20th-century music, experimental and
improvisatory performance practices, postwar and Cold War
culture, German new music festivals and radio stations,
piano performance, contemporary music ensemble*

TANDY BEAL, Lecturer, Theater Arts (Dance)
*Choreography, improvisation, technique, performance skills,
collaborations with classical and jazz composers, circus,
theater and video, children's productions*

GOPAL BALAKRISHNAN, Associate Professor,
History of Consciousness
*Classics of political thought from Plato to Rousseau, early
modern and modern European intellectual history, historical
sociology, the history and future of capitalism, nationalism*

JAMES H. BIERMAN, Professor, Theater Arts
(Drama)
*Playwriting, theater history and literature, classical and
Renaissance drama, Chicano theater, digital media*

BENJAMIN L. CARSON, Assistant Professor, Music
*Theories of consciousness and cognition, rhythm perception,
Schoenberg, history of compositional method, subjectivity
and identity*

DAVID H. COPE, Professor Emeritus, Music

E. G. CRICHTON, ASSOCIATE PROFESSOR OF ART
Intermedia, electronic arts, photography, installation

DAVID L. CUTHBERT, Associate Professor, Theater
Arts
Lighting design, CADD, projection design, scenic design

SHARON A. DANIEL, Professor, Film and Digital
Media
*Community-based public art in information and
communications environments, social and political aspects of
information technology, community networks, participatory
culture, digital inclusion, net art, human-computer
interface design*

JAMES E. DAVIS, Associate Professor, Computer
Science
*Computer graphics and computer vision, methods for
acquiring and manipulating complex graphical models from
the real world*

KATE EDMUNDS, Assistant Professor, Theater Arts
Set design for theater and film

PETER Q. ELSEA, Lecturer, Music
Electronic music and music technology

SHELLY E. ERRINGTON, Professor, Anthropology
*Globalization of folk art, visual and social semiotics,
photography, film, the Internet and digital media, Southeast
Asia, and Latin America*

MARY K. FOLEY, Professor, Theater Arts (Drama)
*Asian theater, Southeast Asian studies, performance studies,
maskwork, puppetry, multicultural theater*

MARK FRANKO, Professor, Theater Arts (Dance)
*Dance history and theory, choreography, technique,
performance studies, theatrical theory in historical and
critical perspective*

PATTY GALLAGHER, Assistant Professor, Theater
Arts (Dance)
*Movement training for actors, circus and clown traditions,
and Indonesian dance/performance*

JENNIFER A. GONZÁLEZ, Associate Professor,
History of Art and Visual Culture
*Contemporary theories of visual culture, semiotics, critical
museum studies, photography, public and activist art in the
U.S.*

IRENE GUSTAFSON, Assistant Professor, Film and
Digital Media
*Producing across the boundaries between "theory" and
"practice," non-fiction media, experimental film/video,
production design, gender and queer studies*

BARNEY HAYNES, Lecturer, Digital Arts and New
Media
*Video art, performance, reactive installation, and invasive
media recombining themes and industrial surplus into
media machines that evolve and mutate*

KARLTON HESTER, Associate Professor, Music
*Premeditated, electroacoustic, and spontaneous composition;
flutes, saxophones, and interdisciplinary performance;
improvisational and Afrocentric music theory, analysis and
history*

ELI E. HOLLANDER, Professor, Film and Digital
Media
*Film and video directing; ethnographic documentary
directory, editing, cinematography, and videography; digital
image generation; screenwriting*

DEE HIBBERT-JONES, Assistant Professor, Art
Public art, sculpture

DONNA M. HUNTER, Associate Professor, History
of Art and Visual Culture
*European painting (especially French) from 1600 to the
1960s; German art and visual culture between the two
world wars; art as social practice, portraiture*

KIMBERLY JANNARONE, Associate Professor,
Theater Arts (Drama)
*Directing, dramaturgy, dramatic theory and criticism,
theater history, acting*

DAVID E. JONES, PROFESSOR, MUSIC; PROVOST,
PORTER COLLEGE
*Composition and analysis, chamber opera, Balkan music,
language and music, timbre and orchestration*

SRI KURNIAWAN, Assistant Professor, Computer
Engineering
*Human-computer interaction; human factors and
ergonomics; accessibility; assistive technology; usability;
empirical studies; user-centered design*

JOHN JOTA LEANOS, Assistant Professor, Social
Documentation
*Social documentation, social art practice, community arts,
Chicano cultural studies, fine arts and animation*

NORMAN LOCKS, Professor, Art
Photography

CHARLES L. LORD, Professor Emeritus, Film and
Digital Media

PAUL M. LUBECK, Professor, Sociology
*Political sociology; political economy of development,
globalization, labor and work; logics of methodology;
religion and social movements; Islamic society and identities;
information and networks*

IRENE LUSZTIG, Assistant Professor, Film and
Digital Media
*Film and video production, experimental documentary,
ethnographic film, autobiographical film, editing*

DOMINIC W. MASSARO, Professor Emeritus,
Psychology

MICHAEL J. MATEAS, Associate Professor,
Computer Science
*Artificial Intelligence (AI) for art and entertainment, game
AI, AI and creativity, AI-based interactive storytelling,
autonomous characters*

CHARLES E. McDOWELL, Professor, Computer
Science
*Programming languages, parallel computing, and computer
science education*

MARGARET E. MORSE, Professor, Film and Digital
Media
*Digital and electronic media theory and criticism, media
art, media history, technology and culture, film history and
theory, German cinema, documentary, science fiction, and
silent comedy*

DEREK C. MURRAY, Assistant Professor, History of
Art and Visual Culture
*Contemporary art, globalization, theory and criticism,
African-diaspora art, visual-culture studies, cultural theory*

SORAYA MURRAY, Lecturer, History of Art and
Visual Culture
*Contemporary art with emphasis in new media art and
theory; African diaspora and globalization*

PAUL NAUERT, Professor, Music
*Theory, composition; rhythm and meter; music cognition;
mathematical and computer models of the compositional
process*

DARD A. NEUMAN, Assistant Professor, Music;
Kamil and Talat Hasan Endowed Chair in
Classical Indian Music
*Ethnomusicology; Hindustani music; colonialism,
nationalism, technology and performance; sitar*

A. TODD NEWBERRY, PROFESSOR EMERITUS,
ECOLOGY AND EVOLUTIONARY BIOLOGY

MARCIA OCHOA, Assistant Professor, Community
Studies
*Gender and sexuality, race and ethnicity, Latino studies,
media and cultural studies, ethnography of media,
feminism, queer theory, geography, multimedia production,
graphic design, colonialism and modernity, Latin American
studies—Colombia and Venezuela*

ALEX PANG, Professor, Computer Science
*Uncertainty visualization, tensor visualization, scientific
visualization, collaboration software, virtual reality
interfaces*

JENNIFER PARKER, Assistant Professor, Art
Sculpture, installation, video, and performance art

ERIC PORTER, Professor, American Studies
*Black cultural and intellectual history; U.S. cultural history
and cultural studies; comparative ethnic studies; popular
music and jazz studies*

ISABEL REICHERT, Lecturer, Film and Digital
Media
Video, conceptual art, and new genres

B. RUBY RICH, Professor, Community Studies
Documentary film and video, post-9/11 culture, new queer cinema, feminist film history, Latin American and Latin/a cinema, U.S. independent film and video, the essay film, the politics of film festival proliferation and the marketing of foreign films in the U.S.

PHILIP ROSS, Lecturer, Art
Sculptural installation, video, bioart

WARREN SACK, Associate Professor, Film and Digital Media
Software design and media theory

DANIEL SCHEIE, Professor, Theater Arts (Drama)
Acting, directing, dramatic literature, theater history, Shakespeare, Wagner, gay studies

BARRY R. SINERVO, Professor, Ecology and Evolutionary Biology
Animal behavior, evolution, physiological ecology

CATHERINE M. SOUSSLOFF, Professor, History of Art and Visual Culture
European cultural theory, aesthetics, and the historiography of art; performance studies; early modern Italian art; media history including film; Jewish identity and representation

ELIZABETH STEPHENS, Professor, Art
Intermedia, electronic art, sculpture, and performance art

RENEE TAJIMA-PENA, Associate Professor of Community Studies
Documentary film and video focusing on Asian American and immigrant communities, media, and social change

HAI TAO, Assistant Professor, Computer Engineering
Image and video processing, computer vision, vision-based graphics, and human-computer interaction

GUSTAVO VAZQUEZ, Associate Professor, Film and Digital Media
Film and video production, directing drama, documentary and experimental cross-cultural experiences in film, film curator

EDWARD C. WARBURTON, Associate Professor, Theater Arts
Development of dance thought in action, creative processes, and technology in theater arts; dance technique, movement research and composition, and applied dance practices

NOAH WARDRIP-FRUIIN, Assistant Professor, Computer Science
Digital media, computer games, electronic literature, software studies

LEWIS G. WATTS, Associate Professor, Art
Photography

EMMET J. WHITEHEAD, Associate Professor, Computer Science
Software engineering, software configuration management, web, hypertext, collaborative authoring, hypertext versioning, Internet information systems

DON WILLIAMS, Director, Cultural Arts and Diversity Center
African American Theater Arts Troupe, Rainbow Theatre

ROB WILSON, Professor, Literature
Transnational and postcolonial literatures, especially as located in Asia/Pacific emergences as posited against American empire of globalization; cultural poetics of America; the sublime, Longinus to Hiroshima; mongrel poetics of experimental writing, especially poetry

RICHARD WOHLFEILER, Lecturer, Art
Printmaking, drawing

DAVID YAGER, Professor, Art
Photography, design, and print media

Program Description

New technologies have profoundly changed contemporary culture and inevitably altered the role of the arts in society. The Digital Arts and New Media (DANM) Master of Fine Arts (M.F.A.) Program serves as a center for the development and study of digital media and the cultures that they have helped create. Faculty and students are drawn from a variety of backgrounds, such as the arts, computer engineering, humanities, the sciences, and social sciences, to pursue interdisciplinary artistic and scholarly research and production in the context of a broad examination of digital arts and cultures.

The Digital Arts and New Media M.F.A. Program is a two-year program organized into four interdependent and equally important pursuits:

New Praxis—The term “praxis” has many meanings, which include “translating ideas into action” and “action and reflection upon the world in order to change it.” New Praxis in DANM is comprised of “critique” and “practicum” which provide students with both the practical training and critical dialogue necessary to pursue their own individual goals as artists and cultural practitioners.

Studies—DANM “studies” include required core seminars that allow students first to explore an array of recent methods and approaches in digital arts and culture, and then to pursue the construction of specific genealogies and theories with a sustained focus on a particular topic, by engaging in various dialogues at the intersection of theory and practice while developing their thesis project and paper.

Collaborative Research—Students and faculty engage in research collaborations resulting in publications and exhibitions in one of four possible focused research areas: mechatronics, participatory culture, performative technologies, and playable media described below.

Mechatronics

Mechatronics is the functional integration of mechanical, electronic, and information technologies. In DANM this framework may be employed for the development and production of physical, systems-based artwork that incorporates elements of robotics, motion control, software engineering, and hardware design. DANM mechatronics research involves the use of a variety of media including video, performance, and sculpture for the creation of complex, kinetic, audio-visual systems for the exploration of temporality, materiality, experience, and perception.

Participatory Culture

Participatory culture studies and research efforts explore the role of information and communication technologies in the current shift from “top-down” culture to a culture of participation and social engagement. Within the social register, the human/computer interface acts as both a boundary and a bridge. Participatory culture research in DANM encompasses a range of projects in social computing and community-media activism which involve the design of new technologies to address social problems and facilitate broader participation in culture and politics.

Performative Technologies

Research in performative technologies explores new methods for combining media and technology to create the visual, aural, and connective material of performance. DANM performance research generates new public and performative spaces where digital media, communication networks, and interactive systems may be fused with lighting, movement, and

stage and sound design to create real-time shared multimedia experiences for audiences and performers at both local and remote locations. Ongoing projects in this area may include work in telematics; performance-driven, real-time graphics; algorithmic composition of sound and image; computer vision and motion capture; and studies of ritual, performativity, embodiment, interactivity, and subjectivity.

Playable Media

Playable media research explores the potential of computational systems for the creation of new media forms that invite and structure play. This group works to understand and create new ways for computer games and related forms to engage audiences, make arguments, tell stories, and shape social space. Ongoing playable-media work combines game-design and artificial-intelligence research with writing, art, and media authoring.

Prospective students are asked to identify their choice of research group in their application and statement of purpose. Admissions are tied to DANM project group foci. New students are admitted into a specific project group based on the quality and relevance of the student’s prior work and expertise to the group project in their chosen area of focus. Students collaborate on faculty-initiated and -directed research projects. This work is intended to provide the student with the opportunity to learn collaborative and practical research methodologies, and to participate in a professional-level research project. The collaborative-project group experience is intended to inform, but not necessarily contribute to, the student’s thesis project.

Pedagogy—DANM trains future arts academics through practical experience. Students are awarded teaching assistantships as part of their overall support package as well as opportunities to assist faculty in workshops.

Requirements

The DANM M.F.A. Program requires 72 credits of academic course work. In the first year, students generally take three courses each term—one course in each of the program areas, New Praxis, Studies, and Collaborative Research. In the second year, students primarily take elective courses, work with their thesis committees, and pursue independent and directed research leading to the completion of the thesis project and paper.

New Praxis

New Praxis in DANM is comprised of “critique” and “practicum.”

New Praxis—Year One

Practicum—This area of praxis is designed to allow students to develop the conceptual, technical, and practical skills they need to successfully complete projects that realize their own individual goals as digital media artists.

DANM 210—First-year students are required to take a *Project Design Studio* in the first quarter. This course guides the development of students’ individual studio practice, particularly in relation to the transition to digital media.

Electronic and programming requirements—First-year students also take basic courses in electronics and programming. Students with prior experience in programming and/or electronics should discuss their background with the instructor and their adviser to determine if the course is needed or if an alternative course should be taken to fulfill this credit requirement. Students seeking an alternative means to fulfill this

requirement may choose to:

- serve as assistants in workshops for beginning students;
- take electronics or programming electives offered in computer engineering; or
- enroll in independent studies, as approved by their adviser.

Critique—This area of praxis is designed to allow students to present their own work and review the work of their fellow students as a means of engaging in the critical dialogue necessary to pursue their own individual goals as digital media artists. First-year students are required to present work-in-progress based on the projects developed in the project-design course in both individual studio and group critiques, and participate in group critique discussion.

During the spring quarter, first-year students identify and engage a thesis committee under the supervision of the program director.

New Praxis—Year Two

Practicum—During the fall quarter, second-year students work on the development of their thesis project proposal and abstract under the supervision of their thesis committee. Second-year students are encouraged to take practice-based electives and independent studies that facilitate the development of their thesis projects.

DANM 299—In the winter and spring quarters, second-year students enroll in a minimum of 10 credits of independent thesis research which is supervised by one or more members of their thesis committee.

DANM 215—Students work with faculty curator/coordinator on development of thesis projects specifically for the group exhibition context. Students contribute to development of exhibition design and collateral materials, while studying the unique presentation and curatorial challenges of new media.

Studies

Students are required to take four core seminars over two years and have the option to take two studies electives.

Studies—Year One

DANM 201 *Recent Methods and Approaches to Digital Arts and Culture*—In this seminar students examine an array of methods and approaches to research and writing in digital media art and culture and explore key theories concerning digital media and cultures.

DANM 202 *Dialogues and Questions in Digital Arts and Culture*—A pre-thesis course in which students engage in dialogues at the intersection of theory and practice with the goal of producing a pre-thesis proposal and preparatory essay. Readings and seminar discussions will inform the development of pre-thesis project proposals and essays.

Studies—Year Two

DANM 203 *Frameworks and Arguments in Digital Arts and Culture*—This course is intended to help students develop and write the M.F.A. thesis. Students conduct research on the thesis topic, design outlines, construct strong theoretical arguments, and draft the final document. The course is intended to help students structure and develop their thesis papers which are intended to theoretically contextualize their thesis projects.

Elective—Students may choose to take an elective offered by the program or choose an elective from a broad array of graduate courses offered on campus with

the approval of their adviser.

Collaborative Research

Students participate in a three-quarter-long, collaborative-research project group in one of four possible DANM research focus areas, which begins in the winter quarter of the first year. In the second year, students continue with the final two quarters of their project group (spring and fall). This work is intended to provide the student with the opportunity to learn collaborative and practical research methodologies, and to participate in a professional-level research project.

Thesis Requirement

Students are required to complete a thesis project and written paper under the supervision of their thesis committee. The thesis will be an arts project with digital documentation accompanied by a written paper. Thesis projects may be individual or collaborative and are expected to grow out of the research pursued in the project groups during the three quarters prior as well as work developed in new praxis courses. Each student will be expected to complete a 20- to 30-page paper discussing the student's preparatory research as well as the theoretical significance of the project. In the case of collaborative projects, each student will be required to submit his or her own paper. During the thesis year, students will make at least two progress presentations to their thesis committee. The chair will be senate faculty and at least two members of the three-person committee will be members of the DANM program faculty. A completed thesis project and paper must be submitted to and approved by the thesis committee before the degree can be awarded.

Applications

Prospective students in the Digital Arts and New Media program will have a foundation in the arts with some demonstrated interest in technology or a foundation in technology with demonstrated background in the arts. Many, but not all, entering students will have completed a Bachelor of Arts (B.A.) program in one or more of the arts disciplines (art or art history, film, multimedia, music, theater, video, etc.) or a Bachelor of Science (B.S.) program in computer science or computer or electrical engineering. Other successful applicants will have a B.A. or B.S. in another field but will be able to show substantial achievement in the arts, in technology, or in digital arts.

In certain cases, students who demonstrate excellent potential for the program but lack proficiency in a "cross discipline" will be admitted to the program with the understanding that they will take courses during their first two quarters of study to make up that deficiency. An arts student lacking sufficient programming experience, for example, will be expected to take one or two programming courses in their first two quarters in addition to the DANM program requirements.

Students will apply online through the Division of Graduate Studies web site between October and February for the following fall quarter. In addition to submitting an online application, students will be expected to submit an online portfolio. Further information can be found at: <http://graddiv.usc.edu>.

Graduate Courses

201. Recent Methods and Approaches to Digital Arts and Culture. F

Students examine methods and approaches to research and writing in digital art and new media, while explor-

ing key theories concerning technology, art, and culture. Focus is on the interaction between digital technologies and socio/cultural formations. Enrollment restricted to graduate students. *S. Murray*

202. Dialogues and Questions in Digital Arts and Culture. S

Students engage in dialogues at the intersection of theory and practice with the goal of producing a pre-thesis proposal and essay. Readings and seminar discussions inform the development of project proposals and essays, which theoretically contextualize students' work. (Formerly course 203.) Enrollment restricted to graduate students. *B. Carson*

203. Frameworks and Arguments in Digital Arts and Culture. S

Intended to help students develop and write the MFA thesis. Students conduct research on the thesis topic, design outlines, construct strong theoretical arguments, and draft the final document. (Formerly course 202, *Genealogies and Theories of Digital Arts and Culture*.) Enrollment restricted to graduate students. *The Staff*

204. Ways of Seeing and Hearing. F

Graduate-level advanced seminar explores ways that seeing, hearing, and knowing are influenced by culture, power, race, and other factors. Readings emphasize how documentary subjects are constituted and known, addressing questions of epistemology, social constructivism, objectivity, and method. (Also offered as Social Documentation 204. Students cannot receive credit for both courses.) Enrollment restricted to social documentation and digital arts new media graduate students. *The Staff*

205. Approaches to Social Documentation. F

Comprehensive review and analysis of documentary strategies aimed at societal critique and social change, evaluating changes in argument, evidence, and process over development of the discipline. (Also offered as Social Documentation 200. Students cannot receive credit for both courses.) A concurrent media lab is required. Enrollment restricted to digital arts and new media graduate students. Enrollment limited to 15. *The Staff*

206. Practice of Social Documentary. F

Introduction to social documentary genres including video, photography, new media and other mediums, which addresses social-scientific research and methodology in the context of these processes. (Also offered as Social Documentation 202. Students cannot receive credit for both courses.) A concurrent media lab is required. Enrollment restricted to digital arts and new media graduate students. Enrollment limited to 15. *The Staff*

207. Video Production of the Social Documentary. W

Intensive directing and producing course that covers conceptualization, research, treatment and proposal writing, interview technique, camera, editing, production, and distribution. (Also offered as Social Documentation 280. Students cannot receive credit for both courses.) A concurrent media lab is required. Enrollment restricted to digital arts and new media graduate students. Enrollment limited to 15. *The Staff*

208. Special Topics in Social Documentation. F

Designed to provide supplemental instruction on specific topical and/or technical matters related to social documentation. Topics include technical standards and innovations within the field of social documentation, documentary subjects, location production, and/or the work of individual professional documentarians. (Also offered as Social Documentation 290. Students cannot receive credit for both courses.) Enrollment restricted to digital arts and new media graduate students. Enrollment limited to 15. May be repeated for credit. *The Staff*

210. Project Design Studio. F

Students work on the design of individual projects by developing project proposals, budgets, "proof of concept" design documents and/or prototypes and exploring tools, technologies, programming languages, hardware, software, and electronics techniques relevant to their projects. Enrollment restricted to graduate students. *The Staff*

211. Critique. S

First-year digital arts and new media graduate students are required to present work-in-progress based on the projects developed in earlier courses and during the current quarter in individual studio critiques with the instructor as well as in group critiques. (Formerly course 211B, *Critique/Lecture II*) Enrollment restricted to graduate students. Enrollment limited to 18. *J. Gonzalez*

212. Thesis Proposal (no credit). S

First-year digital art and new media graduate students work on the development and completion of their thesis-project proposal and abstract under the supervision of the program chair and their thesis committees. Enrollment restricted to DANM students. *The Staff*

215. MFA Exhibition Production. W

Second-year digital arts and new media graduate students work with faculty curator/coordinator to develop thesis projects specifically for the group exhibition context. Students contribute to exhibition design and collateral materials while studying the unique presentation and curatorial challenges of new media. Enrollment restricted to graduate students. *S. Murray*

216. Digital Bodies. *

Explores the appearance, form, and theoretical status of the human body/political subject in online art. Focuses on representations of race and gender, family resemblances, and local communities, as well as the political and colonial metaphors of spatial interaction operating on the World Wide Web. Visual representations of bodies that take the form of avatars, advertising, robots, and anime studied in their contextual usage. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 17. *J. Gonzalez*

217. Concepts in Electronic Art. *

Study of concepts developed in contemporary conceptual art practice and their application to technological media. Review a broad spectrum of electronic art—the Internet, digital video, interactive systems, kinetics and robotics, biotechnological work—that hold conceptual art practice in the foreground. Use concepts cultivated by early conceptual artists and apply them to individual projects using electronic media. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 17. *I. Reichert*

218. Interactive Game Design. *

As a team, students design a working prototype of a game including the Design Document, Prototypes, and Game Implementation. Introduced to advanced media types including 3D animation, principles of object-oriented programming, digital music, and video. Strongly recommended that students have a working knowledge of programming language, preferably an object-oriented language (Macromedia Lingo preferred). Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 17. May be repeated for credit. *B. Sinervo*

219. Introduction to Electronics for Artmaking. F

Intensive introduction to electronic devices used in art-making, providing hands-on experience with sensors,

motors, switches, gears, lights, simple circuits, microprocessors, and hardware storage devices to create kinetic and interactive works of art. Students are billed a materials fee. Enrollment restricted to graduate students. *E. Anderson*

220. Introduction to Programming for the Arts. W

Covers aspects of computer programming necessary for digital art projects. Students learn to manipulate digital media using program control for installations, presentations, and the Internet. No prior programming experience required. Enrollment restricted to graduate students. *P. Elsea*

221. Mathematics and the Arts. *

Examines the role of mathematics in the arts since the computer revolution with an emphasis on chaos, fractals, and symmetry. Covers abstract animation and algorithmic music, including the history of leading innovators and techniques from 1950 to the present. Student projects explore the creative process today using cutting-edge technologies. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 30. May be repeated for credit. *R. Abraham*

224. Digital Arts Project Studio. *

Provides a context for significant development of digital arts projects: in the first year, individual and collaborative; in the second year, resolution of thesis projects. Individuals and collaborative groups meet with the instructor for focused critical feedback. Students create a public exhibition of their work-in-progress. Enrollment restricted to graduate students. Enrollment limited to 18. *E. Crichton*

225. Theater, Drama, and the Pixar Feature. *

Viewing of the Pixar Animation Studios canon combined with lectures on the major art history movements within discipline of theater history and its attendant dramatic literature: The Marxist Epic: *A Bug's Life* and the Backstage Musical; Shakespeare's Comedic Weltanschauung: *Finding Nemo*; Postmodern Criticism: *Toy Story*; French Romanticism and the Hugo Hero: *Monsters, Inc.*; Alger, Albee, and *The Incredibles'* American Dream. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 17. *D. Scheie*

226. Creativity, Collaboration, and Professionalism in Art. *

Exploration of the practice of making a living, as well as a life, in art. Examines strategies for connecting with the community using outreach projects and the joys and sorrows of working collaboratively. Compares corporate and nonprofit funding paths and the business of showing work while maintaining creative challenges. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 17. May be repeated for credit. *T. Beal*

227. Projected Light in Performance. *

Exploration of projected light in performance and art. The history of lighting as art is covered in a hands-on demystifying format from the shadow of a bare light bulb to the latest in automated and projection equipment and techniques. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 20. *D. Cuthbert*

228. Techniques of Modernity and Aesthetic Formations. *

Explores the transformations and aesthetic possibilities of the digital age through a study of perceptual shifts of the past, from orality to literacy, gift to commodity, pre-colonial to colonial, "pre-modern" to "modern," and the technological revolutions that accompanied these shifts. (Also

offered as Music 228. Students cannot receive credit for both courses.) Enrollment restricted to graduate students; upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 18. *D. Neuman*

229. Interactive Digital Design for Theater. *

Examination of the integration of graphic and sound designs with live theatrical performance. Create a dazzling array of images, animations, video, and sounds that work as an ensemble to create a performance environment that responds to the cues of the performers. Offered in conjunction with Theater Arts 151 and results in a live performance. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 20. May be repeated for credit. *J. Bierman*

231. Human-Computer Interaction. W

Theory and hands-on practice to understand what makes user interfaces usable and accessible to diverse individuals. Covers human senses and memory and their design implications, requirement solicitation, user-centered design and prototyping techniques, and expert and user evaluations. Individual research project. Interdisciplinary course for art, social science and engineering graduate students. Students cannot receive credit for this course and course 131. (Also offered as Psychology 223 and Computer Engineering 231. Students cannot receive credit for three courses.) Enrollment restricted to graduate students. *S. Kurniawan*

233. The Object as Interface. W

Combination theory and studio-based exploration into the role of the object in real and virtual space. Provides a broad conceptual and theoretical examination of issues relating to object-making on a physical and dematerialized plane. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Hibbert-Jones*

247. Performance/Performativities. *

Performance acts and theories of performativity in visual culture from modernity to present. Major theoretical positions subtending the emergence of performances/performativities: subjectivity, identity, temporality, media, ritual, the event, the body and embodiment, collaboration, and politics. (Also offered as History of Consciousness 247. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Qualified seniors accepted with permission of instructor. Enrollment limited to 15. *C. Soussloff*

249. Faculty Seminar (2 credits). *

Faculty lectures to familiarize first-year DANM graduate students with program faculty members and their creative work and research so the students can select their faculty advisers and thesis committee members. Enrollment restricted to graduate students. Enrollment limited to 18. *The Staff*

250A. Collaborative Research Project Group: Mechatronics. F,W,S

Three-quarter collaborative research project group involves faculty-initiated research in the use of a variety of media including video, performance, and sculpture, for the creation of complex, kinetic, audio-visual systems exploring temporality, materiality, experience, and perception. Enrollment restricted to graduate students. Enrollment limited to 8. May be repeated for credit. *The Staff*

250B. Collaborative Research Project Group: Participatory Culture. F,W,S

Three-quarter collaborative research project group encompasses a range of faculty-initiated projects in social computing and community-media activism, which involve the design of new technologies to address social problems and facilitate broader participation in culture and politics.

Enrollment restricted to graduate students. Enrollment limited to 8. May be repeated for credit. *The Staff*

250C. Collaborative Research Project Group: Performative Technologies. F,W,S

Three-quarter collaborative research project group generates faculty-initiated new public and performative spaces where digital media, communication networks, and interactive systems may be fused with lighting, movement, stage, and sound design to create shared multimedia experiences for audiences and performers. Enrollment restricted to graduate students. Enrollment limited to 8. May be repeated for credit. *The Staff*

250D. Playable Media. W

Focuses on media, such as computer games, that invite and structure play. Work includes building and critiquing a series of prototypes; studying major examples in the field; and discussing both theoretical and practice-oriented texts. (Also offered as Computer Science 290). Students cannot receive credit for both courses.) Enrollment restricted to graduate students. May be repeated for credit. *N. Wardrip-Fruin, M. Mateas*

254I. Empirical Approaches to Art Information. *

Reading and practice in empirical methods, as applied to the study of music, visual art, multimedia production, and performance arts. Topics include semiotics, critiques of empiricism, cultural determinants and contingents of perception, the psychophysics of information, sensory perception (visual and auditory), memory, pattern recognition, and awareness. Students apply existing knowledge in the cognitive sciences to a developing creative project, or develop and conduct new experiments. (Also offered as Music 254I. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 17. May be repeated for credit. *B. Carson*

254L. John Cage: Innovation, Collaboration, and Performance Technologies. S

In-depth examination of John Cage's interdisciplinary work, his pioneering activity in live electronic technology, and his influence in current multimedia creativity. Approximately one-half of the seminary is devoted to student research and creative projects and reflect Cage's legacy. (Also offered as Music 254L. Students cannot receive credit for both courses.) Enrollment restricted to juniors, seniors, and graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 12. *The Staff*

267. Workshop in Computer Music and Visualization (2 credits). F,W,S

Graduate-level techniques and procedures of computer music composition and visualization. Practical experience in the UCSC electronic music studio with computer composition systems and software, including visualization and interactive performance systems. Extensive exploration of music and interactive graphic programs such as Max/MSP/Jitter. Enrollment by permission of instructor; appropriate graduate experience required. Enrollment restricted to graduate students. (Also offered as Music 267. Students cannot receive credit for both courses.) Enrollment limited to 12. May be repeated for credit. *P. Elsea*

290. Interactivity in Performance. *

Examines use of interactive technologies to bring about collaboration among visual, performance, and sound art. Goal is to collaboratively produce an interactive live-performance work. Explores methodologies and technologies of interactivity, space, and time and addresses aesthetic and compositional concerns that arise when using interactive digital tools, including critical discussions about how technology itself shapes form and content of an artwork.

Meets 3 1/2 hours/week for combination lab and lecture. Enrollment restricted to graduate students. Upper-division undergraduates may enroll with permission of instructor. *E. Anderson*

297. Independent Study. F,W,S

Independent digital arts and new media research project under the guidance of a digital arts and new media faculty member or other faculty with approval of adviser. Project includes readings, research, and a written report. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. Maximum 10 credits. May be repeated for credit. *The Staff*

297G. Independent Study (3 credits). F,W,S

Independent digital arts and new media research project under the guidance of a digital arts and new media faculty member or other faculty with approval of adviser. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for a maximum 6 credits. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students carry out a master's of fine arts thesis in digital arts and new media research, under the guidance of a thesis committee. The thesis will be an arts project with digital documentation accompanied by a written paper discussing the student's preparatory research as well as the theoretical significance of the project. Enrollment restricted to graduate students. Maximum 10 credits. May be repeated for credit. *The Staff*

Earth and Planetary Sciences

A232 Earth and Marine Sciences Building
(831) 459-4089
<http://www.es.usc.edu>

Faculty, Researchers, and Professional Interests

ERIK ASPHAUG, Professor
Asteroids, comets, the moon and planetary surface evolution

EMILY E. BRODSKY, Associate Professor
Earthquakes, volcanoes, fluid flow in fractured media

KENNETH L. CAMERON, Professor Emeritus

PATRICK Y. CHUANG, Associate Professor
Clouds, aerosols and climate

MATTHEW E. CLAPHAM, Assistant Professor
Paleobiology, geobiology

ROBERT S. COE, Professor
Geophysics, paleomagnetism, tectonics

DANIEL FARBBER, Lecturer
Paleogeomorphology using short-lived nuclides; high-pressure experiments with applications to Earth's deep interior

NOAH J. FINNEGAN, Assistant Professor
Geomorphology, active tectonics

ANDREW T. FISHER, Professor
Hydrogeology, crustal studies, coupled flows, modeling

IAN GARRICK-BETHELL, Assistant Professor
Planetary interiors, paleomagnetism

ROBERT E. GARRISON, Professor Emeritus

JAMES B. GILL, Professor Emeritus

GARY A. GLATZMAIER, Professor
Computer simulation of geodynamics and planetary dynamics

GARY B. GRIGGS, Distinguished Professor, Earth Sciences; Director, Institute of Marine Sciences
Coastal processes, hazards and engineering

JEREMY K. HOURIGAN, Assistant Professor
Thermochronology, structural geology, tectonics

ELISE KNITTLE, Professor
Mineral physics, experimental geophysics

PAUL L. KOCH, Professor
Isotope biogeochemistry, vertebrate paleontology

DON G. KORYCANSKY, IGPP Associate Research Planetary Scientist
Planetary impacts, asteroid dynamics

MARC G. KRAMER, IGPP Assistant Research Earth Scientist
Biogeochemistry, Earth surface process, remote sensing

MIKHAIL KRESLAVSKY, IGPP Assistant Research Planetary Scientist
Mars surface evolution and planetary data analysis

LEO F. LAPORTE, Professor Emeritus

THORNE LAY, Distinguished Professor
Seismology, geophysics

KAREN C. MCNALLY, Professor Emerita

J. CASEY MOORE, Professor Emeritus

FRANCIS NIMMO, Associate Professor
Icy satellites, accretion, Mars, planetary geophysics

ADINA PAYTAN, IMS Research Scientist
Biogeochemistry, paleoceanography, environmental and aquatic chemistry

HILDE L. SCHWARTZ, Senior Lecturer
Vertebrate paleontology, environmental geology, paleoecology, chemosynthetic ecosystems

SUSAN Y. SCHWARTZ, Professor
Seismology, geophysics, active tectonics

ELI A. SILVER, Professor
Marine geology and geophysics, active tectonics, remote sensing

LISA SLOAN, Professor
Paleoclimatology and climate change, Earth system science, surficial processes

OTHMAR T. TOBISCH, Professor Emeritus

SLAWEK M. TULACZYK, Professor
Glaciology and glacial geology, geomorphology, soil mechanics

STEVEN N. WARD, IGPP Research Geophysicist
Seismology, geophysics

GERALD E. WEBER, Lecturer Emeritus

QUENTIN C. WILLIAMS, Professor
Mineral physics, tectonophysics, experimental geochemistry

RU-SHAN WU, IGPP Research Geophysicist
Seismology, geophysics; wave propagation and subsurface imaging

XIAO-BI XIE, IGPP Research Geophysicist
Theoretical and applied seismology

JAMES C. ZACHOS, Professor
Paleoceanography, marine stratigraphy

XIXI ZHAO, Lecturer, Earth Sciences; IGPP
Research Geophysicist
*Paleomagnetism and rock magnetism and their application
to the history of Earth's magnetic field*



KENNETH W. BRULAND, Professor, Ocean Sciences
*Chemical oceanography, biogeochemistry of trace metals and
radionuclides, aquatic chemistry, geochemistry*

WEIXIN CHENG, Associate Professor,
Environmental Studies
*Soil ecology, agroecology, biogeochemistry, global change
ecology*

MARGARET (PEGGY) L. DELANEY, Professor, Ocean
Sciences
Paleoceanography, marine geochemistry

A. RUSSELL FLEGAL, Professor, Microbiology and
Environmental Toxicology
*Anthropogenic perturbations of biogeochemical cycles,
applications of isotopic tracers in anthropology and
archaeology*

JONATHAN FORTNEY, Assistant Professor,
Astronomy
Planetary atmospheres and interiors, extrasolar planets

A. CHRISTINA RAVELO, Professor, Ocean Sciences
*Stable isotope geochemistry and chemical oceanography,
paleoclimatology*

Program Description

The Earth and Planetary Sciences Department teaches and conducts research in a wide array of topics. We seek to answer questions such as:

- How did the Earth form? How has it evolved since then? What makes up the interior of the Earth?
- What is the history of life on Earth? What are the causes and effects of past mass extinctions?
- How do mountain ranges form? What causes earthquakes? What causes island chains to form? What controls the evolution of glaciers? How do we prevent coastal erosion? How well can we predict tsunamis?
- What has Earth's climate been like in the past? How will climate change in the future?
- What controls the supply and quality of our freshwater resources?
- How are other planets in our solar system different from Earth? How did they evolve to their present state? How have the impacts of asteroids on Earth and other planets affected their evolution?

A variety of methods and tools are used to help us address these questions. Geologists examine rocks and geologic formations in order to understand the processes that control their formation and evolution. Geochemists and mineralogists examine the chemical and mineral composition of rocks, sediments, and fossils using a variety of sophisticated analytical instruments. Geophysicists use seismometers to not only record earthquakes, but also to learn about the deeper parts of the Earth. Environmental scientists collect samples of the atmosphere, rivers, lakes, and the oceans, sometimes requiring the use of aircraft and ships. Spacecraft have visited and explored all of the planets in our solar system. Space-based satellites have provided a massive amount of data about Earth over the past few decades. Scientists from

all disciplines use computer models to help them understand these complex systems.

The Department of Earth and Planetary Sciences offers a number of degrees that teach undergraduate and graduate students the knowledge and skills necessary to address these questions. Along with the standard Earth sciences major, we offer degrees with concentrations in environmental geology, ocean sciences, planetary sciences, and science education. We also offer combined majors with environmental studies and anthropology. A minor in Earth sciences is also available. We offer courses across a wide range of topics, allowing students to tailor the curriculum to their interests. Courses are comprised of not only classroom lectures, but frequently field trips, laboratories, and computer exercises are involved. Many related courses are offered by other departments such as Ocean Sciences, Microbiology and Environmental Toxicology, Environmental Studies, Biological Sciences, Chemistry and Biochemistry, and Astronomy and Astrophysics. The university capstone requirement is often fulfilled by attending the departmental field camp, or by completing a senior research thesis, but other choices are also possible.

Graduates of our department continue on to a variety of careers, such as:

- Business and industry
- Geological and environmental consulting
- Governmental agencies at the federal, state, and local level
- Non-profit organizations
- Research at universities, governmental research institutions, or other scientific agencies
- Graduate/professional school in areas such as science, engineering, teaching, law, public health, business

For more information about the people in the department, their areas of interest, departmental facilities, contact e-mails and phone numbers, and how to apply to join our department as an undergraduate or graduate student, please see our web site: <http://es.ucsc.edu>.

Academic Advising

A student who wants to become an Earth sciences major should contact the Earth and Planetary Sciences Department undergraduate degree adviser as soon as possible. After developing a formal study plan on a declaration of major petition, students are required to meet with staff and faculty advisers who can help the student plan his or her program in detail and provide information about independent study, thesis research, advanced study, career options, and other educational opportunities. Relevant courses taken at UCSC or other institutions may be substituted for degree requirements by approved petition. Please see the undergraduate adviser for the substitution petition form and more information about this process.

Transfer Students

Transfer students planning to major in Earth sciences are encouraged to call for advice about courses they should complete before arrival at UCSC. It is important that students have completed as many as possible of the required chemistry, biology, calculus, and calculus-based physics courses. Having this coursework completed elsewhere allows students greater flexibility in scheduling and completing their UCSC Earth and planetary sciences courses. Junior transfer Earth and planetary sciences majors and prospective majors should meet with department advisers during summer orientation or

shortly after their arrival on campus to plan their next two years' schedule of courses.

Bachelor of Science Degree

The bachelor of science (B.S.) program is designed for students who intend to pursue professional careers in Earth and planetary sciences, engineering, policy, law, teaching, or business or who otherwise desire the broad, quantitative training available at UCSC. In addition to providing comprehensive preparation in the basic physical sciences, and particular breadth and depth in Earth and planetary sciences, the curriculum is structured to prepare students for the competitive graduate school and career marketplace.

The core of the major includes calculus, physics, chemistry, and a group of comprehensive Earth and planetary sciences courses. For the standard B.S., students then select at least four additional courses from a diverse list of upper-division electives, with at least two that involve significant laboratory or field data acquisition and analysis. These electives, often in combination with additional upper-division courses from this and related departments, provide the student with expertise in one or more subdisciplines within Earth sciences.

Elective distributions can be designed to emphasize earthquake and faulting studies, Earth surface processes, Earth system sciences, geologic hazards, geology, crustal and deep-Earth geophysics, marine geophysics, and water resources. Four formal concentrations, all with specific course requirements and leading to an Earth and planetary sciences B.S., are available: environmental geology, ocean sciences, science education, and planetary sciences. A senior comprehensive experience (senior thesis, or geologic field camp, or exemplary performance in a graduate course) is required of all majors.

Prerequisites for Declaring the Major

We recommend that you consult with the department's staff adviser to discuss options for degree concentrations and coursework priorities before you start the process of officially declaring your major. A student may not officially declare the Earth sciences major until he or she completes (with a minimum grade of C) one of the following introductory courses in physical geology:

Earth Sciences 5, *California Geology*

Earth Sciences 10, *Geologic Principles*

Earth Sciences 20, *Environmental Geology*

Transfer students may take an approved substitution for one of the above courses.

The process for declaring the major starts at the college office where you may pick up a Declaration of Major petition (also available online at <http://advising.ucsc.edu/student/declaration/Declaration.pdf>).

Preparation for the Standard Major (B.S.)

Chemistry 1A, 1B/M and 1C/N

Mathematics 11A and 11B or 19A and 19B, and 22 or 23A or Earth Sciences 111

Physics 6A/L and 6B/M (preferred), or 5A/L and 5B/M, and 6C/N or 5C/N or Chemistry 108A/L or 112A/L

Requirements for the Standard Major (B.S.)

5/L, or 10/L, or 20/L; 110A/L, 110B/M, and 110C/N, 190 (optional, 1-unit)

At least four elective courses from upper-division Earth and planetary sciences offerings, or Ocean Sciences 102 or 120, must be completed. Two of the four upper-division electives must be selected from this subset of courses, which involve signifi-

cant laboratory or field data acquisition/analysis: 109/L, 116, 117/L, 119, 120/L, 130/L, 140/L, 142, 146, 148, 150/L; 168.

Five (5) credits of internship (Earth Sciences 198) or independent study (Earth Sciences 199) may be substituted for one upper-division elective.

Students also complete the comprehensive requirement described below.

Students are encouraged to take more than the minimum number of elective courses and may craft an elective distribution from many areas of specific research and career interests. The following are examples of suggested elective distributions that develop expertise in important areas (an asterisk (*) indicates that the course satisfies the laboratory or field data acquisition/analysis requirement).

Earth system sciences. Focuses on terrestrial, marine, and atmospheric processes and their relations through time; may include paleoclimatic and paleoenvironmental dynamics, global change issues, and surface geological processes such as weathering, erosion, and hydrology: 100/L, 101/L, 102, 107, 109/L*, 116*, 119*, 120/L*, 121, 125, 128, 148*, 208, Ocean Sciences 102, 120

Earthquake and faulting studies. Focuses on crustal deformation and faulting processes and related phenomena such as plate motions, earthquakes, and stress in the lithosphere: 109/L*, 117/L*, 119*, 150/L*, 162, 168*, 172

Geologic hazards. Focuses on Earth processes that impact society, including earthquakes, volcanoes, coastal erosion, and landslides: 104, 105, 107, 109/L*, 116*, 140/L*, 142*, 146*

Geology. Emphasizes a traditional broad background with field skills, rock genesis and interpretation, and structural relations: 109/L*, 117/L*, 120/L*, 130/L*, 140/L*, 150/L*

Geophysics. Develops breadth in geophysical techniques, composition and structure of Earth's deep interior, and gravitational and magnetic fields: 117/L*, 119*, 150/L*, 160, 162, 168*, 172

Marine geophysics. Emphasizes a breadth of geological and geophysical background for continuing study of the processes involved in the growth, evolution, and destruction of the ocean floor and margins: 107, 117/L*, 146*, 150/L*, 152, 168*

Surface processes. Emphasizes understanding the fluxes of energy, water, mass, and chemicals within and across Earth's surface and the relations to climatic and tectonic forcing processes: 107, 109/L*, 116*, 119*, 120/L*, 140/L*, 128, 142*, 146*, 148*, 163, Environmental Toxicology 144

Water resources. Focuses on water resources quality and quantity and relations between climate and water in and on the crust: 105, 109/L*, 116*, 119*, 121, 140/L*, 142*, 146*, 148*, Environmental Toxicology 144, Ocean Sciences 120

Comprehensive Requirement (B.S.)

Students complete one of the following three options:

- Satisfactory completion of 188A-B, *Senior Field Internship*
- Satisfactory completion of a senior thesis, which must include a significant element of independent research or original work and can only be undertaken after agreement is obtained from a faculty member to supervise it (approximately three quarters in advance of completion)

- Exemplary performance, including a major written report, in a 5-credit graduate course or seminar (which requires permission from the instructor in order to enroll)

Earth Sciences Standard B.S. Major Planner

Students planning a professional career in the Earth and planetary sciences should take more than the minimum number of courses required for the major if possible. Four-year students have ample flexibility to take additional electives if they begin with the required courses in their second year. Junior transfers also have flexibility if they have taken most of their preparatory courses in calculus, chemistry, and physics before entry. Further advice can be obtained from the undergraduate adviser and from faculty members.

Note: Chemistry 1A, 1B/M and 1C/N are offered fall-winter-spring and winter-spring-fall. Physics 6A/L and 6B/M and 6C/N are offered fall-winter-spring and winter-spring-fall, and Mathematics 11A-B and 19A-B and 22 and 23A are offered every quarter.

| Year | Fall | Winter | Spring |
|------------|---|------------------------------|-----------------------------------|
| 1st (frsh) | CHEM 1A College core | MATH 11A or 19A CHEM 1B/M | EART 10/L CHEM 1C/N |
| 2nd (soph) | EART 110A/L* MATH 11B or 19B | EART 110B/M* PHYS 6A/L | EART 109/L* PHYS 6B/M |
| 3rd (jr) | MATH 22A or 23A or EART 111 PHYS 6C/N or CHEM 108A/L | EART elective | EART 110C/N |
| 4th (sr) | EART 190 (optional) | senior thesis † | EART 188A-B or senior thesis † |

*EART 109/L, 110A/L, and 110B/M are required for participation in EART 188A-B

†Students expecting to write a senior thesis for their comprehensive requirement are required to contact the department approximately three quarters before graduation to identify the intended project and faculty adviser. Senior theses usually require at least two or three quarters for completion.

Earth Sciences Major with Concentration in Environmental Geology (B.S.)

The environmental geology concentration is designed to provide quantitative preparation for career pathways involving interdisciplinary study of the environment with a geological emphasis. Additional biology and environmental studies courses are required for this concentration along with other distributions of upper-division requirements and electives.

Required Lower-Division Courses

Earth Sciences 20/L (recommended) or 10/L or 5/L
Environmental Studies 25

Biology: Molecular, Cell, and Developmental Biology (MCD) BIOL 20A; Biology: Ecology and Evolutionary Biology (EEB) BIOE 20B; BIOE 20C (Environmental Studies 24 may be substituted for BIOE 20C)

Chemistry 1A, 1B/M, and 1C/N

Mathematics 11A or 19A, and 11B or 19B

Physics 6A/L and 6B/M (preferred), or 5A/L and 5B/M

Required Upper-Division Courses

Earth Sciences 110A/L and 110B/M, BIOE 107

At least four of the following Earth and planetary sciences courses: 100/L, 101/L, 102, 104, 105, 107, 109/L, 110C/N, 111, 116, 119, 120/L, 121, 125, 128, 140/L, 142, 146, 148, 150/L

Two additional upper-division electives with environmental topics from biology, chemistry, Earth and planetary sciences, environmental studies, environmental toxicology, or ocean sciences

Students also complete a comprehensive requirement from the list described above.

Earth Sciences (Environmental Geology) B.S. Major Planner

| Year | Fall | Winter | Spring |
|------------|--|------------------------------------|---|
| 1st (frsh) | CHEM 1A College core | MATH 11A EART 20/L CHEM 1B/M | EART 10/L MATH 11B |
| 2nd (soph) | EART 110A/L* BIOL 20A | EART 110B/M* EART 109/L* | BIOE 20B |
| 3rd (jr) | BIOC 20C PHYS 6A/L | EART elective PHYS 6B/M | EART 110C/N elective |
| 4th (sr) | elective senior thesis † EART 190 (optional) | elective senior thesis † | elective senior thesis † or EART 188A-B |

* EART 109/L, 110A/L, and 110B/M are required for participation in EART 188A-B.

† Students expecting to write a senior thesis for their comprehensive requirement are required to contact the department approximately three quarters before graduation to identify the intended project and faculty adviser. Senior theses usually require two or three quarters for completion.

Earth Sciences Major with Concentration in Ocean Sciences (B.S.)

The ocean sciences concentration is intended to provide quantitative preparation for career pathways that include oceanography and biogeochemistry. Additional biology and chemistry courses are required for this concentration along with other distributions of upper-division requirements and electives.

Required Lower-Division Courses

Earth Sciences 5/L or 10/L, or 20/L

BIOL 20A and BIOE 20B

Chemistry 1A, 1B/M and 1C/N

Mathematics 11A and 11B or 19A and 19B, and
Mathematics 22 or 23A or Earth Sciences 111

Physics 6A/L and 6B/M (preferred), or 5A/L and 5B/M

Required Upper-Division Courses

Earth Sciences 110A/L, 110B/M, 110C/N; Chemistry 108A/L and 108B/M, or 112A/L and 112B/M and 112C/N; Ocean Sciences 101 or 102

Four electives from the following list: Earth Sciences 101/L, 102, 105, 107, 109/L, 111, 116, 119, 120/L, 121, 128, 130/L, 148, 172; Chemistry 122; Ocean Sciences 101, 102, 118, 120, 130, 200, 220, 260

Students also complete a comprehensive requirement from the list described above. A topic emphasizing ocean sciences is recommended.

Earth Sciences (Ocean Sciences) B.S. Major Planner

| Year | Fall | Winter | Spring |
|------------|-------------------------|-----------------------|------------------------------------|
| 1st (frsh) | CHEM 1A College core | CHEM 1B/M MATH 11A | EART 10/L CHEM 1C/N MATH 11B |

| Year | Fall | Winter | Spring |
|---------------|--|-----------------------------|---|
| 2nd (soph) | EART 110A/L* MATH 22 or 23A or EART 111 | EART 110B/M* PHYS 6A/L | EART 110C/N* BIOE 20B |
| 3rd (jr) | BIOC 20A CHEM 108A/L | OCEA 101 CHEM 108B/M | elective elective |
| 4th (sr) | EART 109/L* senior thesis † EART 190 (optional) | senior thesis † elective | elective senior thesis † or EART 188A-B |

* EART 109/L, 110A/L, and 110B/M are required for participation in EART 188A-B.

† Students expecting to write a senior thesis for their comprehensive requirement are required to contact the department approximately three quarters before graduation to identify the intended project and faculty adviser. Senior theses usually require two or three quarters for completion.

Earth Sciences Major with Concentration in Planetary Sciences (B.S.)

The planetary sciences concentration is designed to provide students with a quantitative background appropriate for career pathways in the interdisciplinary study of planets and their satellites. The upper-division elective courses can be tailored for students interested in planetary interiors, atmospheres, and/or surfaces.

Required Lower-Division Courses

Earth Sciences 10/L (preferred); or 5/L; or 20/L

Astronomy 14; or 16; or 18

Chemistry 1A, 1B/M, and 1C/N

Mathematics 19A-B (preferred) or 11A-B

Mathematics 22; or 23A; or Earth Sciences 111

Physics 5A/L, 5B/M, 5C/N (preferred); or 6A/L, 6B/M, 6C/N; 5D recommended

Required Upper-Division Courses

Earth Sciences 110A/L, 110B/M, 110C/N, 119, 160

One elective from the following Earth sciences courses: 162, 163, 164

Three electives from the following courses: Earth Sciences 107, 109/L, 116, 117/L, 121, 128, 130/L, 140/L, 148, 150/L, 152, 162, 163, 164, 172, 209, 210; Astronomy 112, 118; Mathematics 130

Students also complete the comprehensive requirement from the list described above.

Earth Sciences (Planetary Sciences) B.S. Major Planner

| Year | Fall | Winter | Spring |
|---------------|--|-----------------------------|---|
| 1st (frsh) | MATH 19A College core CHEM 1A | MATH 19B CHEM 1B/M | EART 10/L CHEM 1C/N ASTR 14 or 16 or 18 |
| 2nd (soph) | EART 110A/L* PHYS 5A/L MATH 22 or 23A or EART 111 | EART 110B/M* PHYS 5B/M | EART 110C/N* EART 5C/N elective |
| 3rd (jr) | EART 160 PHYS 5D (2 credits) | EART 119 | elective |
| 4th (sr) | senior thesis † EART 109/L* EART 190 (optional) | senior thesis † elective | elective senior thesis † or EART 188A-B |

* EART 109/L, 110A/L, and 110B/M are required for participation in EART 188A-B.

† Students expecting to write a senior thesis for their comprehensive requirement are required to contact the department approximately three quarters before graduation to identify the intended project and faculty adviser. Senior theses usually require two or three quarters for completion.

Earth Sciences Major with Concentration in Science Education (B.S.)

The science education concentration provides future K-12 science teachers with coursework aligned with the California K-12 Earth and planetary science standards; a broad background across the sciences; and a thorough introduction to educational theory and practice including a sequence of three classroom-based internships. Additional biology, astronomy, and ocean science courses required for this concentration ensure that students are very well prepared to enter a rigorous teaching-credential program and, ultimately, a career in education. The senior comprehensive requirement involves a curriculum-development project jointly overseen by faculty in Earth and planetary sciences and UCSC's California Teach (Cal Teach) program.

Students may start with either the Cal Teach or Earth and Planetary Sciences Department for degree and course information, but must stay in contact with both for dual advising and development of study plans as well as approval for formally declaring the major.

Required Lower-Division Courses

Earth Sciences 5/L (strongly recommended) or 10/L or 20/L

Astronomy 2 (recommended) or another lower-division course in astronomy

Molecular, Cell, and Developmental Biology (BIOL) 20A

Ecology and Evolutionary Biology (BIOE) 20B and 20C (Environmental Studies 24 may be substituted for BIOE 20C)

Education 50C

Mathematics 11A and 11B, or 19A and 19B

Physics 6A/L and 6B/M

Required Upper-Division Courses

Ocean Sciences 102

Earth Sciences 110A/L and 110B/M

Earth Sciences 109/L, or both 120/L and 150/L

Earth Sciences 111, or Mathematics 21 or 22, or Applied Mathematics and Statistics 5

Two upper-division courses in Earth sciences or ocean sciences, one of which must involve significant laboratory or field data acquisition/analysis

Education 100C, 185C, 185L

One upper-division education course from the following list: Education 128, 141, 164, or 181

Students complete a comprehensive requirement by doing an independent project through the Earth and Planetary Sciences Department, which applies knowledge of Earth and planetary sciences to K-12 curriculum development (Earth Sciences 194F).

Earth Sciences (Science Education) B.S. Major Planner

| Year | Fall | Winter | Spring |
|---------------|---|--|------------------------------|
| 1st (frsh) | CHEM 1A EART 5/L College core | CHEM 1B/M MATH 11A or 19B EDUC 50C | CHEM 1C/N MATH 11B or 19B |
| 2nd (soph) | EART 110A/L* EDUC 100C (2 credits) | EART 110B/M* PHYS 6A/L | ASTR 2 PHYS 6B/M |
| 3rd (jr) | EART 109/L* EART 111 or MATH 21 | EDUC 185C BIOL 20A | OCEA 102 BIOE 20B |
| 4th (sr) | EART/OCEA upper-division BIOE 20C or ENVS 24 | EART/OCEA upper-division EART/OCEA upper-division EDUC elective EDUC 185/L (2 credits) | EART 194F capstone |

* EART 109/L, 110A/L, and 110B/M are required for participation in EART 188A-B.

Combined Major in Environmental Studies/Earth Sciences (B.A.)

The combined major in environmental studies and Earth sciences is designed to provide enhanced exposure to geological concepts and processes for students emphasizing environmental policy and social science topics. Students are advised to plan carefully and to contact academic advisers in both the Environmental Studies and Earth and Planetary Sciences Departments early if they have questions. For the requirements of the combined environmental studies/Earth sciences bachelor of arts (B.A.) degree, see http://reg.ucsc.edu/catalog/html/programs_courses/09_10update/envsPS.html.

Combined Major in Earth Sciences/Anthropology (B.A.)

The Earth sciences/anthropology combined major is intended for students with interests in Earth sciences and the laboratory-based aspect of anthropology. These include anthropology students interested in archaeology or paleoanthropology who desire more intensive training in natural sciences and Earth sciences students interested in paleobiology or archaeology. The combined major provides a rigorous training in both anthropology and Earth sciences and will permit students to enter graduate programs in Earth sciences, archaeology, or paleoanthropology. The combined major has a significantly different set of cognate science and required lower- and upper-division courses than the standard major; therefore, students are advised to plan carefully and to contact academic advisers in the Earth and Planetary Sciences and Anthropology Departments early if they have questions.

Required Lower-Division Courses

Anthropology 1, 2, and 3

Earth Sciences 5/L, or 10/L, or 20/L

Mathematics 11A or 19A, and 11B or 19B

Five lower-division science cognate courses (plus laboratories) chosen from the following:

BIOL 20A, BIOE 20B, BIOE 20C

Chemistry 1A, 1B/M, 1C/N

Physics 6A/L, 6B/M

Required Upper-Division Courses

Earth Sciences 110A/L

Any three upper-division electives (5+ credits) in Earth sciences

Any four five- to seven-credit upper-division electives listed under the Anthropology Department's Physical Anthropology and Archaeology Courses subdivision.

Comprehensive Requirement

One of the following:

Anthropology 194-series (any senior seminar in physical anthropology or archaeology) or

Earth Sciences 188A-B* or

Earth Sciences 195 and a senior thesis with faculty readers from both departments or any approved anthropology or Earth sciences field program

* Earth Sciences 188A-B has as prerequisites courses 109/L, 110A/L, and 110B/M.

Earth Sciences/Anthropology Combined Major Planner

| Year | Fall | Winter | Spring |
|---------------|--------------------------|--------------------------|--------------------------------|
| 1st (frsh) | ANTH 1 College core | ANTH 2 | ANTH 3 EART 10/L |
| 2nd (soph) | MATH 11A Cog sci | MATH 11B Cog sci | Cog sci ANTH elective |
| 3rd (jr) | EART 110A/L Cog sci | EART elective Cog sci | ANTH elective EART elective |
| 4th (sr) | ANTH elective Sr comp | EART elective Sr comp | ANTH elective Sr comp |

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division disciplinary communication (DC) requirement. All degree options for the Earth sciences major except science education require students to pass at least two of the following designated DC courses (totaling 10 credits), all of which entail writing assignments:

Earth Sciences 100, *Vertebrate Paleontology*

Earth Sciences 101, *The Fossil Record*

Earth Sciences 102, *Marine Geology*

Earth Sciences 104, *Geologic Hazards*

Earth Sciences 109, *Field Geology*

Earth Sciences 116, *Hydrology*

Earth Sciences 120, *Sedimentology and Stratigraphy*

Earth Sciences 125, *Analytical Paleobiology*

Earth Sciences 140, *Geomorphology*

Earth Sciences 146, *Groundwater*

Earth Sciences 148, *Glaciology*

Earth Sciences 150, *Structural Geology*

Earth Sciences 152, *Active Tectonics*

Earth Sciences 160, *Planetary Science*

Earth Sciences 188A, *Summer Field Internship*

Earth Sciences 195, *Senior Thesis*

Students in the science education concentration are required to take Education 185L and at least one of the DC courses designated above (totaling eight credits).

Students in the combined major in Earth sciences/anthropology are required to pass two courses in any combination from the above list of Earth sciences courses or the following anthropology courses: 100, 170, 194B, 194L, and 194Y.

Honors

Honors in the major are determined by a review of grades and narrative evaluations at the time a student applies for graduation. A faculty committee makes the decision based on the quality of all coursework, but especially in the courses required for the major. Extra coursework or independent study as well as more intensive or rigorous coursework and the quality of a capstone project may also be taken into consideration. Honors in the combined majors with environmental studies and anthropology will be granted only when the committees in both departments are in agreement. Highest honors may also be awarded in exceptional cases when a student's overall grade point average (GPA) is at 4.0 and performance in the senior capstone requirement is equally outstanding.

Honors on the senior thesis are determined independently of major honors, and must be approved by two faculty readers. Honors in capstone courses (i.e., EART188A and 188B) are awarded if the grade(s) are at A- level or above.

Disqualification from the Major

Students will be disqualified from the major if they are unsuccessful in two attempts to pass (minimum grade C) any of the Earth Sciences 110 foundation series courses or associated 2-unit laboratories:

Earth Science 110A/L, Evolution of the Earth;

Earth Science 110B/M, Earth as a Chemical System;

Earth Science 110C/N, The Dynamic Earth

Any two failures of the same lecture or laboratory course will implement disqualification. Warning of disqualification notification will be sent upon each failed course.

Minor Requirements

Students can earn a minor in Earth sciences by taking courses 5/L or 10/L or 20/L and five upper-division Earth sciences courses. Courses offering less than 5 credits (such as Earth Sciences 190 or 2-credit laboratories and independent studies) may not be counted toward the minor requirements, although additional coursework is always encouraged.

Graduate Program

The graduate program in Earth and planetary sciences is designed to prepare students for research, industry, consulting, teaching, and numerous other career paths, including business and law. The aim is to develop habits of critical analysis and thorough documentation; skills in quantitative field, computational, and/or laboratory research; and proficiency in one or more fields of research. The fundamental requirement for admission to the program is substantial evidence of superior scholarship, dedication and determination to do quality work, and aptitude for original research. Preparation in the basic sciences and in Earth and planetary sciences equivalent to the requirements for the Earth sciences bachelor's degree at UCSC is expected, but graduates in chemistry, physics, engineering, biology, or other disciplines who meet the requirement of superior scholarship are eligible and encouraged to apply. Gaps in knowledge can be made up through coursework. Prospective students should take the Graduate Record Examination (GRE) General Test and have the scores sent to the UCSC Division of Graduate Studies.

UCSC awards both the master of science (M.S.) and the doctor of philosophy (Ph.D.) degrees. The M.S. degree may be the terminal degree for some seeking

careers in industry, government, and teaching at the secondary level. It may also be an initial step toward the Ph.D. degree, in which the student gains knowledge and confidence in carrying out and completing a more complex scientific project.

Thesis Track (Ph.D., M.S.). In their first year, all thesis-track graduate students register for courses 203, *Introductory Teaching Seminar*; 204, *Fundamentals of Earth and Planetary Sciences*; 205, *Introductory Graduate Seminar*; 206, *Great Papers in the Earth Sciences*; and, in consultation with the graduate advising committee, choose at least one from among courses 207, *Tectonics*; 208, *Methods in Paleoclimatology*; 209, *Solid Earth Geochemistry*; 210, *Overview of Stellar and Planetary Formation and Evolution*; 220, *Ground Water Modeling*; 231, *Igneous Petrology*; 254, *The Climate System*; 262, *Planetary Interiors*; 265, *Order of Magnitude Estimation*; 270, *Global Seismology*; or 275, *Magnetohydrodynamics*. Additionally, all students will be required to take one course in quantitative analysis from an approved list (available at the department office). In subsequent years, all students participate in course 293, *Graduate Research Seminar*. Other course requirements are tailored to the individual student's academic background, professional experience, and plans for research. No specific number of course credits is required for the Ph.D., but, ordinarily, students put more of their effort into coursework during the first year of graduate study. It is recommended that all thesis-track graduate students attain some teaching experience while at UCSC.

Late in the fall quarter, each first-year, thesis-track student has an interview with a representative committee of the faculty. Interview topics are drawn from the broad field of Earth and planetary sciences and can include elementary mathematics, physics, chemistry, or biology. The interview is used to determine the student's understanding of basic scientific principles and ability to apply these principles to specific problems. Following the interview, students will be given a list of course requirements and recommendations.

To qualify for candidacy in the Ph.D. program, each student must pass an oral examination in his or her area of specialization by the end of their third year of graduate study, although students are strongly encouraged to take the examination earlier. The examination is based on a research proposal presenting one or more specific questions to be researched by the student in the course of completing their Ph.D. thesis. Students are expected to have in-depth knowledge of fields relevant to the proposal, including familiarity with the professional literature.

The Ph.D. dissertation is a scholarly contribution to knowledge that embodies the results of original and creative effort by the student. Students are urged to prepare their dissertations for publication in peer-reviewed professional journals. A public oral defense of the thesis is required prior to completion of the Ph.D.

The M.S. thesis is a scholarly contribution consisting of results of an original research project by the student. Students are strongly encouraged to prepare their results for publication in the peer-reviewed literature. The M.S. thesis must be completed by the end of the third year after entering the program, and students are strongly encouraged to complete their thesis earlier and to present the results of this work publicly.

Coursework M.S. Track. The coursework M.S. track is a professional program designed to allow students to increase their breadth, quantitative depth, or emphasis on a particular specialty; to provide the student with a stronger background toward competition for jobs or an enhancement of skills for current employment (e.g., K-14 teaching); and to allow students from other dis-

ciplines (e.g., biology, physics, chemistry, mathematics, environmental studies) to acquire advanced training in Earth and planetary sciences. Prior to the first quarter of study, students have a meeting with their faculty adviser in which they develop a study plan of at least nine courses, no more than one of which may be 297 or 298, and a statement of objectives. The plan must be approved by the graduate representative. Students are also limited to one Earth Sciences 290 pro-seminar course. It is expected that the course plan will comprise mainly graduate-level and quantitative, upper-level, undergraduate elective courses.

Coursework master's students are required to fulfill one of the following capstone options: a substantial review/research manuscript or a comprehensive oral examination based on their coursework.

There is no foreign-language requirement for either the M.S. or Ph.D. degree. However, many students in the Earth and planetary sciences find knowledge of one or more foreign languages necessary in their particular research and therefore study the appropriate language.

Details regarding admission to graduate standing, financial aid, examinations, and the requirements for the master of science and doctor of philosophy degrees are available from the Division of Graduate Studies. For more information, see Graduate Studies at <http://www.es.usc.edu/grad/index.html>.

Lower-Division Courses

1. Oceanography. W

An introduction to the physical environment of the ocean. Origin and evolution of ocean basins; sea-floor morphology; origin, distribution, historical record, and economic significance of marine sediments; ocean currents, waves, tides, and changing sea level; beaches, shorelines, and coastal processes; marine resources, pollution, and human impacts on the oceans. Students may also enroll in and receive credit for Ocean Sciences 1. Laboratory/discussion-1.5 hours. (General Education Code(s): PE-E, IN.) *G. Griggs*

2. Earth Catastrophes. F

The role of catastrophic processes in shaping Earth and the environment in which we live. The physical processes causing earthquakes, volcanic eruptions, tsunamis, floods, windstorms, landslides, and meteorite impacts will be described, along with the role played by these rapid processes in the geological and biological evolution of the planet. Interdisciplinary approaches to understanding these phenomena will be discussed. The entire time scale from formation of the universe to the present Earth system will be considered. (Formerly course 80A.) (General Education Code(s): SI, T-2 Natural Sciences.) *T. Lay*

3. Geology of National Parks. W

Geologic concepts and processes responsible for shaping our national parks including mountain building, volcanic and earthquake activity, sedimentation, weathering, erosion, and glaciation. An understanding of how geology impacts our lives is emphasized. Appropriate for both science and non-science majors who wish to enhance their knowledge, enjoyment, and appreciation of our national parks. (General Education Code(s): SI, IN.) *S. Schwartz*

4. Earth's Environment and the Cinema. S

Exploration of cinema's role in defining societal awareness of Earth sciences (underlying concepts and factual basis) for disaster and adventure movies and in more subtle presentations. Topics include evolution of life, surface environment and the planet's deep interior, natural hazards, global warming, and meteorite impacts. (Formerly course 80D, *Earth Sciences and the Cinema*.) (General Education Code(s): PE-E, T-2-Natural Sciences.) *T. Lay*

5. California Geology. F

An introduction to physical geology emphasizing the minerals, rocks, volcanoes, mountains, faults, and earthquakes of California. In-class field trips to study the caves, rocks, and landforms of the campus and the Monterey Bay area. Discussion-1 hour. Concurrent enrollment in 5L required for majors and minors. (General Education Code(s): SI, IN.) *E. Knittle*

5L. California Geology Laboratory (1 credit). F

Laboratory sequence illustrating topics covered in course 5 with particular emphasis on rock and mineral identification and map interpretation. Field trip. Laboratory three hours. Students are billed a materials fee. *E. Knittle*

6. Concepts in Environmentalism. *

Learn scientific concepts required to be an informed environmentalist. Topics include urban smog; water resources and pollution; waste treatment; acid rain; global climate change; fossil fuel, nuclear, and renewable energy; overpopulation; and how an individual can minimize his or her environmental impact. Offered in alternate academic years. (General Education Code(s): IN.) *P. Chuang*

7. The History of Life. W

An examination of the major events in the history of life, from the origin of life approximately four billion years ago, to the wave of extinctions that has decimated plants and animals around the globe over the past 30,000 years. (General Education Code(s): SI, IN.) *M. Clapham, P. Koch*

8. Planetary Discovery. W

An introductory look at modern solar system exploration, focusing on spacecraft missions presently underway. We will examine the scientific context of each mission, the instrumentation and dynamics of each voyage, and the importance of their discoveries. Open to all students. (Formerly course 80G.) (General Education Code(s): SI, T-2 Natural Sciences.) *E. Asphaug*

9. Earth History and Global Change. F

Over the past 4.5 billion years, planet Earth has evolved in exciting ways. Environments, climates, and life forms have come and gone in fascinating combinations. Course examines changing physical, biological, and climatological conditions through geologic time, beginning with the evolution of the Earth through changes leading to the current state of the planet, and considers prospects for Earth's future. (Formerly course 80F). Offered in alternate academic years. (General Education Code(s): PE-E, T-2-Natural Sciences.) *L. Sloan*

10. Geologic Principles. S

Introduction to the scientific study of Earth, the materials composing it, and the processes shaping it. Topics include minerals and rocks, Earth's internal structure, plate tectonics, earthquakes and volcanoes, oceans and the atmosphere, the formation of landscapes and global change. A one-day, optional field trip is included. Concurrent enrollment in 10L required for majors and minors. (General Education Code(s): SI, IN.) *A. Fisher*

10L. Geologic Principles Laboratory (1 credit). S

Laboratory sequence illustrating topics covered in course 10, with particular emphasis on rock and mineral identification and map interpretation. Laboratory 3 hours. In-lab field trips. Students are billed a materials fee. *A. Fisher*

11. Earthquakes. *

Causes and effects of earthquakes. How do we measure, mitigate, and try to predict earthquakes? Plate motion, frictional faulting, earthquake triggering, wave propagation, earthquake damage, related hazards, and other social effects. Hazard reduction through earthquake forecasting

and earthquake-resistant design. Class includes one full day weekend field trip to local faults. Advanced algebra and high school geometry recommended. Students are billed a materials fee. (Formerly course 80B.) (General Education Code(s): MF, T-2 Natural Sciences, Q.) *E. Brodsky*

12. Introduction to Weather and Climate. *

Many meteorological phenomena are familiar to us: clouds, fog, rain, snow, wind, lightning, and severe storms. Climate is the sum of weather over long periods and is changing (e.g., greenhouse warming, ozone depletion, urban smog) due to mankind's activities. Conceptual understanding of how and why the present-day atmosphere behaves as it does and how this may change in the future is the primary goal of this course. (Formerly course 80C.) Offered in alternate academic years. (General Education Code(s): MF, T-2 Natural Sciences, Q.) *P. Chuang*

20. Environmental Geology. W

Introduction to aspects of geology which affect and are affected by humans. Addresses a broad range of topics including resource management, geologic hazards, air and water issues, population and land use, energy costs and effectiveness, and global change, all from a unique geological/environmental perspective. Lectures include strategies for mitigating these issues. Includes a one-day field trip. Concurrent enrollment in 20L required for majors and minors. (General Education Code(s): SI, IN.) *S. Tulaczyk*

20L. Environmental Geology Laboratory (1 credit). W

Laboratory sequence illustrating topics covered in course 20, with emphasis on rock and mineral identification, geologic hazard assessment, geologic resource management, and land use planning. In-lab field trip. Laboratory 3 hours. Students are billed a materials fee. *S. Tulaczyk*

65. Natural History of Dinosaurs. S

Explores the origin, evolution, and extinction of dinosaurs with emphasis on paleobiology and paleoecology. Covers fundamental paleontological and evolutionary principles, dinosaur anatomy and behavior, the hot-blooded/cold-blooded debate, dinosaur-bird relationships, diversity, and exploits of the great dinosaur hunters. One and a half hour of discussion each week. (General Education Code(s): SI, IN.) *P. Koch, H. Schwartz*

81B. Fundamentals of Environmental Science. W

Addresses major issues in physical and biological environmental sciences and provides tools to critically evaluate, debate, and make informed choices regarding one's own impact on the environment. Topics include: climate change, water resources, air pollution, evolution, ecology (from populations to ecosystems), and conservation. Quantitative problem solving is an integral part of this course. (Also offered as College Eight 81B. Students cannot receive credit for both courses.) (General Education Code(s): MF, IN, Q.) *P. Chuang, I. Parker*

98. Earth Sciences Internship. F,W,S

A supervised learning experience involving practical application of lower division Earth sciences knowledge while working with approved companies, governmental agencies, or research organizations. Students consult weekly with supervising faculty and prepare a final report of their work, to be evaluated both by the sponsoring agency and the faculty supervisor. Consult sponsoring agency for enrollment criteria; after instruction on resume preparation and interview skills, student must interview and be selected for internship by approved sponsoring organizations. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***100. Vertebrate Paleontology.** *

Introduction to vertebrate history, with an emphasis on vertebrate relationships and the co-evolution of organisms and environments. Specific topics include vertebrate origins, systematics and classification, adaptive revolutions, mass extinctions, and the rise and fall of dinosaurs. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 10, 20, 5, Biology 20C, or Anthropology 1. Concurrent enrollment in course 100L is required. *H. Schwartz*

100L. Vertebrate Paleontology Laboratory (2 credits). *

Comparative anatomy and functional morphology of vertebrates, and preservation of vertebrate hard parts, using modern and fossil specimens. Laboratory three hours and one 1-day field trip. Concurrent enrollment in course 100 is required. *H. Schwartz*

101. The Fossil Record. F

An introduction to paleobiology; the use of fossil evidence to pose and solve evolutionary and geologic questions. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 10 or 5 or 20 or Biology 20C or Anthropology 1. Concurrent enrollment in course 101L is required. *M. Clapham*

101L. The Fossil Record Laboratory (1 credit). F

Systematics, ecology, and evolutionary history of the major groups of fossil-forming animals. Laboratory 3 hours and one 1-day field trip. Concurrent enrollment in course 101 is required. *M. Clapham*

102. Marine Geology. F

Geology of the marine environment. Topics include controls on the types, origin, and distribution of marine sediments; geology of oceanic crust; evolution of continental margins and plate boundaries; introduction to paleoceanography. Discussion: 1 hour. Students cannot receive credit for this course and Ocean Sciences 280. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 5 or 10 or 20 or Biology 20C. *M. Delaney*

104. Geologic Hazards. F

The recognition, evaluation, and mitigation of geologic hazards: earthquakes and faulting, tsunamis, volcanism, landslides and mass movements, and flooding. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 10/L or 5/L or 20/L. *S. Schwartz*

105. Coastal Geology. S

An investigation of the evolution, morphology, and processes in the coastal zone including the terrestrial (marine terraces, dunes, estuaries, sea cliffs) and marine (beaches, continental shelves, sea level changes, shoreline erosion and protection, waves, tides) components and their interaction. Laboratory: 3 hours. Students are billed a materials fee. Prerequisite(s): course 10 or 5 or 20. Course 10L or 5L or 20L is suggested as an optional preparation for non-Earth sciences majors. *G. Griggs*

107. Remote Sensing of the Environment. W

Introduction to geographic information systems (GIS) and remote sensing (RS) as valuable tools in the study of geology. Covers application of GIS/RS to study of surface processes, including landslides, hydrologic basins, coastal erosion, modern floods, volcanic activity and surface deformation. Prerequisite(s): course 5 or 10 or 20. Enrollment limited to 36. *E. Silver*

109. Elements of Field Geology. F,S

Basic tools and techniques used in geologic fieldwork. Preparation, analysis, and interpretation of geologic maps. Nine to 10 days of weekend field trips required, including a six-day geologic mapping exercise. Laboratory: 3 hours. Recommended for courses 120, 130, 150, and required for 188A-B. May not be taken concurrently with course 120, 150, or 188. Students are billed a materials fee. (General Education Code(s): W satisfied by taking this course and courses 188A and 188B.) Prerequisite(s): Satisfaction of the Entry Level Writing Requirement, course 10 or 5 or 20, and 10L or 5L or 20L. Concurrent enrollment in 109L is required. Enrollment limited to 25. (F) *H. Schwartz*, (S) *J. Hourigan*, (S) *P. Koch*

109L. Field Geology Laboratory (2 credits). F,S

Laboratory exercises essential to the successful completion of fieldwork required in course 109. Topics include topographic maps, Brunton compass, rock identification and description, geologic map analysis, structure section "construction," and landslide recognition. Concurrent enrollment in course 109 required. Enrollment limited to 25. (General Education Code(s): PR-E.) (F) *H. Schwartz*, (S) *J. Hourigan*, (S) *P. Koch*

110A. Evolution of the Earth. F

Investigation of the processes and mechanisms that have produced the present Earth system, with an emphasis on the temporal evolution of the earth from the Archean to the present. Specific topics covered include cyclicity in Earth processes and the evolution of, and interplay between the planet's crust, atmosphere, hydrosphere, and biosphere. Prerequisite(s): courses 5 or 10 or 20, and 5L or 10L or 20L, and Mathematics 11A or Mathematics 19A or Applied Mathematics and Statistics 15A. (General Education Code(s): PE-E.) *Q. Williams*, *J. Zachos*

110B. Earth as a Chemical System. W

The chemical properties of Earth materials and the chemical processes by which the planet has evolved to its present state. Specific topics covered include properties of minerals; the genesis of igneous, metamorphic, and sedimentary rocks; and the linkage between the solid Earth and the hydrosphere. Enrollment is permitted by permission code with equivalent or exceptional background, or if enrolled concurrently in Chemistry 1B. Prerequisite(s): courses 5, or 10, or 20, and 5L, or 10L, or 20L, and Chemistry 1B. *E. Knittle*

110C. The Dynamic Earth. S

Physical processes occurring in the interior of the earth, at its surface and in the oceans and atmospheres including plate tectonics, structural deformation of rocks, and material and heat transport. Students are billed a materials fee. Prerequisite(s): course 5 or 10 or 20; and 5L or 10L or 20L; and course 111 or Mathematics 22 or 23A; and Physics 6A or 5A. *E. Brodsky*

110L. Evolution of the Earth Laboratory (2 credits). F

Laboratory sequence illustrating topics covered in course 110A. Emphasis is on quantifying and evaluating different phenomena related to thermal, tectonic, climatic, and evolutionary processes. Prerequisite(s): concurrent enrollment in course 110A. (General Education Code(s): PR-E.) *Q. Williams*, *J. Zachos*

110M. Earth as a Chemical System Laboratory (2 credits). W

Laboratory sequence illustrating topics covered in course 110B. Emphasizes identification of the major rock-forming minerals and common rock types; principles of basic

crystallography. Prerequisite(s): concurrent enrollment in course 110B. *E. Knittle*

110N. The Dynamic Earth Laboratory (2 credits). S

Laboratory sequence illustrating topics covered in course 110C. Prerequisite(s): concurrent enrollment in course 110C. *E. Brodsky*

111. Mathematics in the Earth Sciences. F

Series and sequences, vectors, 3D analytic geometry, partial differentiation, matrix algebra, and differential equations with applications in the Earth sciences. Topics include matrix manipulation, systems of linear equations, least-squares, Taylor series, gradients, optimization, analytic and numerical solutions to differential equations. Prerequisite(s): courses 5 or 10 or 20, and Mathematics 11B or Mathematics 19B or Applied Mathematics and Statistics 15B. (General Education Code(s): Q.) (F) *W. Nimmo*

116. Hydrology. W

Introduces processes involving water on and near Earth's surface, including meteorology, water properties, surface flows in streams and runoff, flood analysis, ground water, water budgets, sediment transport, erosion, and water quality. Problem set and laboratory each week. Laboratory/field: 3 hours. Students are billed a materials fee. Alternates annually with course 146. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 10 or 5 or 20, and Mathematics 11A or Mathematics 19A or Applied Mathematics or Statistics 15A. Course 5L or 10L or 20L recommended. *A. Fisher*

117. Paleomagnetism. S

How the fossil magnetism of rocks is used to decipher Earth's history: applications to tectonics, geochronology, stratigraphy, structural geology, geomagnetism, and archeology. Includes an overnight field trip to collect samples for a class research project. Students are billed a materials fee. Prerequisite(s): course 5, 10 or 20; Mathematics 11A or Mathematics 19A or Applied Mathematics or Statistics 15A; course 117L must be taken concurrently. *R. Coe*

117L. Paleomagnetism Laboratory (2 credits). W

A hands-on research project in the Paleomagnetic Laboratory. Students collectively drill oriented cores in the field (one–two days), prepare and measure the samples, and analyze and interpret the data. Each student writes an individual final report based on the class results. Prerequisite(s): concurrent enrollment in course 117 is required. *R. Coe*

119. Introduction to Scientific Computing. W

Introduction to solving scientific problems using computers. A series of simple problems from Earth sciences, physics, and astronomy are solved using a user-friendly scientific programming language (IDL). Prerequisite(s): Mathematics 11A or Mathematics 19A or Applied Mathematics or Statistics 15A. (General Education Code(s): IN.) *M. Krumholz*, *G. Glatzmaier*

120. Sedimentology and Stratigraphy. S

Stratigraphic principles used in classifying sedimentary rocks. Fundamentals of sedimentary mechanics. Analysis and interpretation of facies and depositional systems. Introduction to seismic facies and basin analysis. Course includes four Saturday field exercises. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 110A. Course 110B is recommended as preparation. May not be taken concurrently with course 109. *M. Clapham*, *L. Sloan*

120L. Sedimentology and Stratigraphy Laboratory (2 credits). S

Laboratory sequence illustrating topics in course 120, including sedimentary petrology, sedimentary structures, sequence stratigraphy, and geohistory analysis. Prerequisite(s): concurrent enrollment in course 120. *M. Clapham, L. Sloan*

121. The Atmosphere. W

Course focuses on understanding basic atmospheric weather and climate phenomena starting from the fundamentals of physics and chemistry. Using this approach, covers topics such as atmospheric circulation, precipitation, clouds, storms, urban and regional air quality, atmospheric aerosols, and climate and global change. Prerequisite(s): Mathematics 11B or Mathematics 19B or Applied Mathematics or Statistics 15B, and Chemistry 1C. Offered in alternate academic years. *P. Chuang*

125. Analytical Paleobiology. *

Project-based introduction to analytical methods in paleobiology and paleoecology, including univariate and multivariate statistics, cluster analysis and ordination approaches, and morphometrics. Requires one week-end field trip at the start of the quarter. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 101. Offered in alternate academic years. (General Education Code(s): SR.) *M. Clapham*

128. Isotopes: Fundamentals and Applications in Earth and Marine Sciences. W

Explores the fundamentals and concepts of stable, radiogenic, and cosmogenic isotope chemistry with applications relevant to Earth, marine, and biological sciences. Prerequisite(s): course 110B or permission of instructor. *J. Zachos*

130. Magmas and Volcanoes. *

Introduction to the relationship between tectonic environments and the genesis of rock assemblages, primarily igneous and metamorphic. Examples from California and elsewhere are used to illustrate petrogenetic processes and characteristic petrologic features of rocks from all major tectonic settings. Students are billed a materials fee. Prerequisite(s): course 110B. Concurrent enrollment in course 130L is required. Offered in alternate academic years. *The Staff*

130L. Magmas and Volcanos Laboratory (2 credits). *

An introduction to optical mineralogy and the petrography of igneous rocks. Prerequisite(s): course 110B. Concurrent enrollment in 130 is required. Offered in alternate academic years. *The Staff*

134. Thermochemistry of Geologic Systems. S

Introduction to the thermodynamic and kinetic principles with a strong emphasis on applications to Earth materials. Implications for phase equilibria, geothermometry/geobarometry, element partitioning, and physical properties of minerals, magmas, and solutions. Will be offered in the 2010-11 academic year. Prerequisite(s): course 110B. Offered in alternate academic years. *Q. Williams*

140. Geomorphology. W

An introduction to the evolution of the Earth's landscape, with emphasis on the processes responsible. Review of climatic and tectonic forcing followed by detailed discussion of weathering, glaciers, hillslopes, wind, rivers, and coastal processes with emphasis on their geographic distribution. One single day and one three-day field trip. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 110A. Concurrent enrollment in 140L is required. *N. Finnegan*

140L. Geomorphology Laboratory (2 credits). W

Laboratory sequence illustrating topics covered in course 140. These extensive laboratory exercises emphasize the quantification of the geomorphic processes and forms, and on the writing of concise summaries of the science in the form of abstracts. Students are billed a materials fee. Prerequisite(s): Concurrent enrollment in course 140 is required. *N. Finnegan*

142. Engineering Geology for Environmental Scientists. S

Introduction to the formation, composition, and classification of soils; the chemical interaction of soil and groundwater; and basic soil mechanics: stress-strain behavior, effective stress concept, consolidation, soil testing methods. Applications to problems including slope stability, landslides, liquefaction, subsidence, soil creep, debris flows. Laboratory: 3 hours. Students are billed a materials fee. Prerequisite(s): course 5 or 10 or 20; Mathematics 11A or Mathematics 19A or Applied Mathematics or Statistics 15A. Offered in alternate academic years. *S. Tulaczyk*

146. Ground Water. *

Explores saturated and unsaturated fluid flow below Earth's surface, well hydraulics, and recourse evaluation and development. Introduces modeling, field techniques, geochemistry, and contaminant transport and remediation. Problem set and laboratory each week; final paper. Laboratory: 3 hours. Students are billed a materials fee. Alternates annually with course 116. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 5 or 10 or 20, and Mathematics 11A or Mathematics 19A or Applied Mathematics or Statistics 15A. Course 5L or 10L or 20L recommended. *A. Fisher*

148. Glaciology. *

Introduction to the role of snow and ice in the dynamics of the earth surface system. Snow deposition and metamorphosis. Heat and mass balance at snow and ice surfaces. Flow of glaciers, ice sheets, and sea ice. Methods of climate reconstruction. Ice age theories. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and courses 5 or 10 or 20; and Mathematics 11A or Mathematics 19A or Applied Mathematics or Statistics 15A. Offered in alternate academic years. *S. Tulaczyk*

150. Structural Geology. F

Principles and methods of analysis of brittle and ductily deformed rocks. Includes descriptions of structures, field analysis of structures, and mechanics of deformation. Three day-long field trips on weekends. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 110A or 110B; course 109 recommended; concurrent enrollment in course 150L is required. *J. Hourigan*

150L. Structural Geology Laboratory (2 credits). F

Structural analysis of faults, folds, and maps. Use of stereographic projections. Cross section construction and balancing from field data. Concurrent enrollment in course 150 is required. *J. Hourigan*

152. Tectonics. S

The processes, techniques, and interpretations involved in the study of active crustal movements; constraints from plate tectonics; horizontal and vertical motions and rates; geodesy, including GPS; stress measurement; image interpretation; fault system analysis; paleoseismicity; fluid effects. Examples from the circum-Pacific. Laboratory-3

hours. Students cannot receive credit for this course and course 207. Students are billed a materials fee. (Formerly *Active Tectonics*.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 10 or 5 or 20 and 10L or 5L or 20L, and Physics 5A or 6A or equivalent per instructor permission. *E. Silver*

160. Planetary Science. F

Broad introduction to planetary science. Topics include the fundamental characteristics of solar system bodies; space exploration of these bodies; formation and evolution of surfaces, atmospheres and interiors of planets, satellites and small bodies. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and Mathematics 11B or Mathematics 19B or Applied Mathematics and Statistics 15B; and Physics 5A or 6A. *I. Garrick-Bethell*

162. Planetary Interiors. *

The chemical and thermal structure and evolution of silicate planet interiors. Topics include equation of state of mantle and core materials, thermal history of the mantle and core, dynamics of mantle convection, geophysical determination of interior structure. Students cannot receive credit for this course and course 262. Prerequisite(s): course 160; and course 111 or Mathematics 22 or 23A; and Physics 5C or 6C. Offered in alternate academic years. *W. Nimmo*

163. Planetary Surfaces. S

Comparative study of surfaces and atmospheres of planetary bodies in solar system, focusing on comparative planetology and geophysical processes at work, including differentiation, impact cratering, tectonics, volcanism, and geomorphic evolution. Explores terrestrial planets, giant planets and their moons. Students cannot receive credit for this course and course 263. Prerequisite(s): course 160. Enrollment limited to 20. Offered in alternate academic years. *E. Asphaug*

164. Planetary Atmospheres. *

A quantitative study of the origin, chemistry, dynamics, and observations of the atmospheres of terrestrial and gas-giant planets. Students cannot receive credit for this course and course 264. Prerequisite(s): course 160. Enrollment limited to 18. *W. Nimmo*

168. Reflection Seismology. †

Introduction to reflection seismology, presenting an overview of data acquisition, processing, and interpretation; common depth point method; velocity determinations; filtering; migration; display. Applications to seismic stratigraphy and structure of the crust and of continental margins. Laboratory: 3 hours. Prerequisite(s): course 111; or Mathematics 11A and B; or Mathematics 19A and B; or Applied Mathematics and Statistics 15A and B. Offered in alternate academic years. *The Staff*

172. Geophysical Fluid Dynamics. S

Introduces fluid motion influenced by rotation. Topics include the Coriolis force, geostrophic flow, potential vorticity, the shallow water model, quasigeostrophic approximation, planetary waves, Ekman theory, thermal wind, models of the large-scale oceanic and atmospheric circulation, and equatorial dynamics. Taught in conjunction with course 272. Students cannot receive credit for this course and course 272. (Also offered as Ocean Sciences 172. Students cannot receive credit for both courses.) Prerequisite(s): Physics 107 or Applied Mathematics and Statistics 107; Mathematics 22 or 23B recommended. Offered in alternate academic years. *C. Edwards*

188A. Summer Field Internship. S

Three weeks of summer field study in geologically complex regions in the White-Inyo Mountains of eastern California.

Activities include geologic field mapping on topographic and photographic base maps, stratigraphy, petrology, and structure analysis. A fee is required for participation. Contact sponsoring agency for details. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 110A/L, 110B/M, and 109/L. Enrollment restricted to Earth sciences majors. Concurrent enrollment in course 188B is required. (General Education Code(s): W satisfied by taking this course and courses 109 and 188B.) (Formerly *Summer Field Internship, Part A*.) Interview only via application filed with department. (General Education Code(s): PR-E.) *H. Schwartz*

188B. Geographic Information Systems with Applications to the Earth Sciences. S

Introduction to basic principles of geographic information systems (GIS). Visualization of earthscapes with applications to problem-solving in the Earth sciences. Laboratory exercises in loading, manipulation, and interpretation of data sets. Field investigations of phenomena visualized in laboratory, including geological description, interpretation, and written report preparation. Lecture and laboratory portions of course occur during spring quarter. Field investigations and report-writing occur in the summer following spring quarter. A fee is required for participation. Contact sponsoring agency for details. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 110A/L, 110B/M, and 109/L. Enrollment restricted to Earth sciences majors. Concurrent enrollment in course 188A is required. (General Education Code(s): W satisfied by taking this course and courses 188A and 109.) (Formerly *Summer Field Internship, Part B*.) Interview only via application filed with department. Enrollment limited to 25. *N. Finnegan*

190. Earth Sciences Mentorship (1 credit). F

Faculty research activity, analytic facilities, and career counseling in three separate Earth sciences laboratories are offered with varied formats including field trips, discussions, and equipment demonstrations. Three different faculty participate in each offering. Enrollment restricted to Earth sciences, Earth sciences/anthropology, and environmental studies/Earth sciences majors. Enrollment limited to 24. May be repeated for credit. *The Staff*

194F. Education Capstone (2 credits). F,W,S

Students write a paper on a lesson plan developed after their CalTeach internship courses. This independent study is supervised by Earth and planetary sciences faculty or ocean sciences faculty, as well as a member of the CalTeach staff or Education Department. Prerequisite(s): Education 185C and 185L. Enrollment restricted to Earth and planetary sciences majors with a concentration in science education. *The Staff*

195. Senior Thesis. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to seniors. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. May be repeated for credit. (General Education Code(s): W.) *The Staff*

196B. Teaching Earth Sciences in the University. F,W,S

Students facilitate laboratory and field exercises in conjunction with faculty and teaching assistants in various Earth sciences courses. May not count toward upper-division major requirements. Approval of sponsoring agency; interview and selection by primary instructor of specific courses required. Participation in course 196A is expected. Enrollment restricted to Earth sciences, Earth sciences/anthropology, and environmental studies/Earth sciences majors. *The Staff*

196C. Teaching Earth Sciences in the University (2 credits). F,W,S

Students facilitate laboratory and field exercises in conjunction with faculty and teaching assistants in various Earth sciences courses. May not count toward upper-division major requirements. Approval of sponsoring agency; interview and selection by primary instructor of specific courses required. Participation in course 196A is expected. Enrollment restricted to Earth sciences, Earth sciences/anthropology, and environmental studies/Earth sciences majors. May be repeated for credit. *The Staff*

198. Earth Sciences Internship. F,W,S

A supervised learning experience involving practical application of Earth sciences through working with approved companies, governmental agencies, or research organizations. Students consult weekly with supervising faculty and prepare a final report of their work. Consult sponsoring agency for enrollment criteria. After instruction on resume preparation and interview skills, students must interview and be selected for internship by approved sponsoring organizations. Enrollment restricted to Earth sciences, Earth sciences/anthropology, and environmental studies/Earth sciences majors. May be repeated for credit. *E. Silver*

198F. Earth Sciences Internship (2 credits). F,W,S

A supervised learning experience involving practical application of Earth sciences through working with approved companies, governmental agencies, or research organizations. Students consult weekly with supervising faculty and prepare a final report of their work. May not be counted toward upper-division major requirements. Consult sponsoring agency for enrollment criteria. After instruction on resume preparation and interview skills, student must interview and be selected for internship by approved sponsoring organizations. Enrollment restricted to Earth sciences, Earth sciences/anthropology, and environmental studies/Earth sciences majors. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Introduction to research in laboratory, field, or theoretical subjects. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Introduction to research in laboratory, field, or theoretical subjects. May not be counted toward upper-division major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*
Graduate Courses

203. Introductory Teaching Seminar (1 credit). F

Intended for new Earth sciences graduate students. Focus on preparation, assessment, and feedback. Classroom techniques, organizational and time management strategies, practice teaching sessions specific to laboratory and/or science instruction. Required follow-up meetings to discuss practical teaching experience. Enrollment restricted to graduate students. *E. Brodsky*

204. Earth and Planetary Sciences Foundations (4 credits). F

Provides a comprehensive overview of key concepts, dominant paradigms, and research frontiers in Earth and planetary sciences in plenary talks by multiple faculty. Provides a required foundation course for all incoming students pursuing graduate degrees in Earth and planetary sciences. Enrollment restricted to Earth sciences graduate students. Enrollment limited to 20. *T. Lay*

205. Introductory Graduate Seminar (2 credits). F

Lecture and seminar-style class intended to welcome new graduate students to the department and to introduce students to the research and interests of departmental faculty and researchers. Includes exercises to develop skills in reading scientific abstracts and papers and in writing abstracts and proposals. Two weekend field trips. Students are billed a materials fee. Enrollment restricted to Earth sciences graduate students. *E. Brodsky*

206. Great Papers in the Earth Sciences. W

Exposure to the most important ideas in the Earth sciences through exploration of the primary literature. Seminal papers in different subdisciplines of the Earth sciences are read and analyzed to provide breadth and improve students' ability to think critically. Enrollment restricted to Earth sciences graduate students. *The Staff*

207. Tectonics. S

An overview of tectonic theory and processes for application to the Earth sciences. The course explores the primary tools of tectonic interpretation including plate kinematics, rheology, plate boundary dynamics, and the behavior of active fault systems. Taught in conjunction with course 152. Students cannot receive credit for this course and course 152. Prerequisite(s): graduate standing or permission of instructor. *E. Silver*

208. Methods in Paleoclimatology. *

Addresses methods used to reconstruct aspects of paleoclimates and paleoenvironments from the geologic record, focusing primarily on terrestrial records. Topics to be covered include dendrochronology and dendroclimatology, paleopalynology, paleobotany, ice cores, and paleosol studies. Lectures, discussions, and laboratory work. Enrollment restricted to graduate students. Offered in alternate academic years. *L. Sloan*

209. Solid Earth Geochemistry. *

Origin and distribution of the elements in the earth and meteorites; bulk and isotopic composition and differentiation of terrestrial planets, core, mantle, and crust; Sr-Nd-Pb-Hf-U isotopic tracers. Course designed for graduate students, but available to qualified Earth sciences majors per instructor permission. Enrollment restricted to graduate students. *The Staff*

210. Overview of Stellar and Planetary Formation and Evolution. *

Overview of current understanding of star and planet formation and evolution. Examines our solar system in the context of the galactic planetary census. Provides a uniform introduction to astronomy and Earth science planetary students. Enrollment restricted to graduate students. *G. Laughlin*

213. Biogeochemical Cycles. F

Overview of biogeochemical cycles, present and past, and geochemical models. Topics include: marine, terrestrial, and global views of the carbon, nitrogen, phosphorus, silicon, sulfur, and oxygen cycles, and the evolution of these cycles and Earth's redox balance through geologic time. (Also offered as Ocean Sciences 213. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Upper-division undergraduates may enroll with instructor approval. College-level chemistry and an upper-division course in at least one relevant discipline are recommended. *M. Delaney*

220. Ground Water Modeling. *

Introduction to building and using models to solve hydrogeologic problems. Modeling methods include mainly analytical and finite-difference. Emphasis on using mod-

els rather than the details of their functioning, although some coding is required. Comfort with mathematical methods and computers expected. Course designed for graduate students, but available to qualified Earth science majors. Prerequisite(s): graduate standing or permission of instructor required. One year of calculus and courses in differential equations and basic hydrologic principles are recommended as preparation. Offered in alternate academic years. *A. Fisher*

229. Isotopic Methods in Environmental Science. *

Explores how natural variations in stable isotope ratios answer questions in ecology, paleobiology, and other environmental sciences. Format includes lectures by the instructor and student presentations on applications following literature-based research on each topic. Enrollment restricted to graduate students. Enrollment limited to 25. *P. Koch*

231. Igneous Petrology. †

Systematic study of the major igneous rock suites, combining petrography, experimental petrology, major and trace elements, volatiles, and isotopic characteristics. Laboratory: three hours. Course designed for graduate students but available to qualified earth sciences majors. Course 130 is recommended as preparation. *The Staff*

240. Communicating Science (3 credits). F

Introduces inquiry-based instructional strategies for communicating a passion for science. These strategies, combined with content knowledge and enthusiasm for sharing it, equips college students to introduce science to K-8 students and teachers in local schools. Enrollment restricted to graduate students. Enrollment limited to 20. *A. Paytan*

251. Photogrammetry. †

Introduces photogrammetry's basic principles of imaging systems and digital-image processing for both terrestrial and planetary data, leading to the application of photogrammetry techniques to a final project of the student's choosing. Enrollment restricted to graduate students or by permission of instructor. *The Staff*

254. The Climate System. S

Focuses on atmospheric and oceanic processes that are important within the Earth's climate system, especially those that operate on annual to centennial time scales. Format includes lectures by the instructors, paper readings, and discussion. Enrollment restricted to graduate students. Offered in alternate academic years. *P. Chuang, A. Ravelo*

256. Paleoclimate Modeling: Methods and Applications. *

Addresses methods of paleoclimate modeling on global and regional scales, from both surface and atmospheric perspectives. Applications of models to current significant paleoclimate problems will be examined. Includes both lecture and seminar formats. Enrollment restricted to graduate students; undergraduates by permission of instructor only. *The Staff*

258. Deep Time Paleoclimates. *

Weekly lectures/readings/presentations focused on the key events in the long-term evolution of Earth's climate (i.e., before the Pliocene), including early Archean, faint, young-sun period; Proterozoic snowballs; Paleozoic glaciations and greenhouse events; the mid-Cretaceous oceanic anoxic events (OAEs); and Paleogene thermal maxima and glacial intervals. Considerable emphasis on evaluating the proxies of climate and mechanisms of climate change (e.g., greenhouse gasses, paleogeography). Enrollment restricted to graduate students. Enrollment limited to 15. Offered in alternate academic years. *J. Zachos*

260. Introductory Data Analysis in the Ocean and Earth Sciences. *

Introduces data analysis methods regularly encountered within the ocean and earth sciences. Topics include: error propagation; least squares analysis; data interpolation methods; empirical orthogonal functions; and Monte Carlo methods applied to problems drawn from oceanographic and earth sciences datasets. Introduces and uses a high-level computing and visualization package, MATLAB. Student project consists of analysis of the student's own dataset. (Formerly course 264, *Ocean Data Analysis*) (Also offered as Ocean Sciences 260. Students cannot receive credit for both courses.) Prerequisite(s): previous course in ocean or earth sciences is recommended. Enrollment restricted to graduate students; undergraduates with permission of instructor. *C. Edwards*

262. Planetary Interiors. *

The chemical and thermal structure and evolution of silicate planet interiors. Topics include equation of state of mantle and core materials, thermal history of the mantle and core, dynamics of mantle convection, geophysical determination of interior structure. Students cannot receive credit for this course and course 162. Enrollment restricted to graduate students. Enrollment limited to 20. Offered in alternate academic years. *W. Nimmo*

263. Planetary Surfaces. S

Comparative study of surfaces of planetary bodies in our solar system, focusing on comparative planetology and geophysical processes at work, including differentiation; on-impact cratering; tectonics; volcanism and geomorphic evolution; and exobiology. Explores terrestrial planets, giant planets and their moons, and trans-Neptunian objects, focusing on modern exploration. Students cannot receive credit for this course and course 163. Enrollment restricted to graduate students. Offered in alternate academic years. *E. Asphaug*

263L. Planetary Field Course (2 credits). †

Field class in comparative planetology. Three- to four -day field trip plus planning and debriefing sessions. Students are billed a materials fee. Enrollment restricted to graduate students. Enrollment limited to 12. Offered in alternate academic years. *E. Asphaug*

264. Planetary Atmospheres. †

Quantitative study of the origin, chemistry, dynamics, and observations of the atmospheres of terrestrial and gas giant planets. Students cannot receive credit for this course and course 164. Enrollment restricted to graduate students. *W. Nimmo*

265. Order of Magnitude Estimation. *

Practice in making rough estimates and leading-order approximations in physical and chemical processes. Enrollment restricted to graduate students. Offered in alternate academic years. *W. Nimmo, P. Chuang*

266. Geologic Signal Processing and Inverse Theory. S

Theoretical and practical aspects of digital signal analysis including data sampling, spectral estimation, digital filtering, statistical estimation, correlation tools, and principle-component analysis. Emphasis on practical examples of geophysical time series. Multivariable calculus and linear algebra are required and used extensively in the course. (Formerly *Geological Signal Processing*.) Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *S. Schwartz*

269. Advanced Marine Stratigraphy: Techniques and Applications. †

Explores concepts and methods of correlating marine sedimentary sequences. Emphasis on the integration of

techniques and development of the Cenozoic stratigraphic record. One 2-hour laboratory each week. Upper-division students who have completed course 120 may enroll in this course. Enrollment restricted to graduate students. *J. Zachos*

270. Global Seismology. W

Introduction to quantitative earthquake and global Earth structure seismology. Topics include basic elasticity, wave characteristics, seismic ray theory, wave reflection, surface waves, normal modes, seismic instrumentation, application of seismic waves to reveal Earth structure and resulting models, representation of earthquake sources such as explosions and faulting, earthquake rupture scaling, modern methods of modeling seismic recordings to study source complexity, and an introduction to seismotectonics. Laboratory: 3 hours. Enrollment restricted to graduate students. Offered in alternate academic years. *T. Lay*

271. Current Research Topics in Deep Earth Processes. †

Students and instructor lead discussions of recent and significant publications in geophysics and chemistry of deep Earth. Articles structured around current theme of interest are selected by participants and approved by instructor. Emphasis on defining multidisciplinary significance of each article and its relationship to fundamental processes in deep Earth, including core and mantle. Designed for graduate students but available to qualified Earth sciences majors. May be repeated for credit. *T. Lay*

272. Geophysical Fluid Dynamics. S

Introduces fluid motion influenced by rotation. Topics include the Coriolis force, geostrophic flow, potential vorticity, the shallow water model, quasigeostrophic approximation, planetary waves, Ekman theory, thermal wind, models of the large-scale oceanic and atmospheric circulation, and equatorial dynamics. Students cannot receive credit for this course and course 172. (Also offered as Ocean Sciences 272. Students cannot receive credit for both courses.) Physics 227 is recommended as preparation. Enrollment restricted to graduate students. Offered in alternate academic years. *C. Edwards*

275. Magnetohydrodynamics. *

Study of fluid dynamics and magnetic fields with a focus on convection and magnetic field generation in planets and stars. Students develop a computer program for modeling magneto-convection. Computer programming experience required. Enrollment restricted to graduate students. Offered in alternate academic years. *G. Glatzmaier*

276. Geology of the Peopling of the Americas. †

Using a multidisciplinary approach, examines physical geology, paleoenvironment, human biology, linguistics, and culture history of Americas at end of last Ice Age. Particular emphasis on reconstructing timing, routes, and context of first peopling of the American continents. Taught in conjunction with Anthropology 276D. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *P. Koch*

278A. Advanced Seismology. *

Elastic wave propagation. Advanced topics in ray theory, WKB solutions in seismology, singularities and nonlinearities, surface wave theory, propagating matrices, normal modes, and inversion theory. Selected topics in time series analysis and seismic signal processing, seismic wave dispersion. Course designed for graduate students but available to qualified Earth sciences majors. Physics 110B and 114B are recommended as preparation. Enrollment restricted to graduate students. May be repeated for credit. *T. Lay*

280D. Short Course in Atmospheric/Climate Science (3 credits). †

Addresses specialized topics in atmospheric and/or climate science that are too narrow for a full (5-credit) format. Examples include: cloud physics; atmospheric boundary layer; aerosol physics and chemistry; atmospheric radiation; atmospheric thermodynamics. Enrollment restricted to graduate students. May be repeated for credit. *P. Chuang*

290. Proseminar.

Special topics offered from time to time by visiting professors or staff members. May be repeated for credit. *The Staff*

290B. Topics in Glaciology. F

Advanced review of the physics and chemistry of ice and snow. Mass and heat balance of ice masses. Motion of glaciers and ice sheets. Subglacial and englacial hydrology. Thermodynamics of ice masses and the linkage to climate. Enrollment restricted to graduate students. May be repeated for credit. *S. Tulaczyk*

290C. Topics in Geophysics. W,S

Different problems and approaches will be stressed from year to year such as geotectonics, paleomagnetism, or properties and processes in the mantle and core. Course designed for graduate students but available to qualified Earth sciences majors. *I. Garrick-Bethell, (W) R. Coe, (S) W. Nimmo*

290D. Petrology and Plate Tectonics. *

Selected topics illustrating relationships between igneous and metamorphic rocks and plate tectonics are explored in detail. Designed for graduate students but available to qualified Earth sciences majors. May be repeated for credit. *The Staff*

290E. Topics in Planetary Science. F

We examine one well-defined topic in planetary science, beginning with a summary of current knowledge and concluding with the latest research literature. Topics will vary from year to year and may include planetary collisions, terrestrial planets, origin of planetary systems, small bodies, the New Mars, and satellites of Jupiter. Achievement will be evaluated based on class participation, exams, and a research project. Open to undergraduate majors with permission of instructor. Enrollment restricted to graduate students. May be repeated for credit. *E. Asphaug*

290F. Topics in Coastal Processes (2 credits). F,W,S

Instructor and students lead discussions and make presentations on current research, problems, and publications in coastal processes. These topics include littoral drift, sediment transport and storage on the inner shelf, shoreline erosion/change and its documentation, and related issues. Enrollment restricted to graduate students. May be repeated for credit. *G. Griggs*

290G. Topics in Global Tectonics. *

Explores different problems of special interest in global tectonics with the approach of integrating marine and terrestrial geologic and geophysical information. Course designed for graduate students but available to qualified Earth sciences majors. May be repeated for credit. *E. Silver*

290H. Topics in Hydrogeology. *

Selected topics in groundwater, hydrothermal systems, and related subjects. Discussion of theoretical models, field and laboratory approaches, and recent research. Topics vary from year to year. Course designed for graduate students but available to qualified Earth sciences majors. Offered in alternate academic years. May be repeated for credit. *A. Fisher*

290I. Topics in Geomorphology. S

Discussion of journal articles focused on a theme in contemporary geomorphology. Topics include: coupling of climate; tectonics and landscape evolution; mechanics of bedrock river channels; fundamentals of fluvial gravel transport; and inference of tectonic rates and processes from analysis of topography. Enrollment restricted to graduate students; qualified undergraduates may enroll by permission of instructor. May be repeated for credit. *N. Finnegan*

290J. Topics in Earthquake Physics. F

Why do earthquakes happen? Topics include friction, fracture, earthquake triggering, stress in the crust, observed source scalings, and seismicity statistics. Emphasis on observations and current research topics. Enrollment restricted to graduate students and advanced undergraduates. *E. Brodsky*

290K. Paleontology Seminar (3 credits). W

Seminar discussion based on current readings in the literature around some topic in the history and evolution of life. Course designed for graduate students but available to qualified upper-division science students. Offered in alternate academic years. May be repeated for credit. *M. Clapham, P. Koch*

290L. Topics in Climate Change. W

Explores current issues and recent developments in the field of past, present, and future climate change. Topic is different each year, but focuses on the interaction between different components of Earth's environment and the effect of that interaction on climate change. Designed for graduate students but open to qualified undergraduates. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *L. Sloan*

290M. Topics in Atmospheric Science. *

Selected topics encompassing atmospheric physics and chemistry. Topics vary from year to year. Sample topics include: atmospheric physics, atmospheric chemistry, boundary layer meteorology, aerosol science, and atmospheric thermodynamics. (Formerly *Topics in Atmospheric Chemistry*.) Designed for graduate students, but qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *P. Chuang*

290N. Topics in Mineral Physics. S

Selected topics encompassing the physics and chemistry of Earth's interior, planetary physics, high-pressure experimental geophysics and material properties at high pressure and temperature. Topics vary from year to year. Enrollment restricted to graduate students and qualified Earth sciences majors by permission of instructor. May be repeated for credit. *E. Knittle*

290P. Interdisciplinary Topics in the Earth Sciences. *

An understanding of the chemical and physical properties and processes in the earth is sought by integrating information from several subdisciplines in the Earth sciences. Topics vary from year to year, focusing on areas of active research. Course designed for graduate student but available to qualified Earth sciences majors. Prerequisite(s): graduate standing or permission of instructor. Course designed for graduate student but available to qualified Earth sciences majors. May be repeated for credit. *S. Schwartz*

290Q. Topics in Outer Solar System. W

Exploration of the planets and satellites beyond the asteroid belt, with an emphasis on the underlying physical processes at work. Course includes lectures, computer practicals, and student presentations. Enrollment restricted to graduate students. May be repeated for credit. *W. Nimmo*

290R. Topics in the Chemistry and Physics of the Earth. *

Explores problems and current research developments in the application of physics and chemistry to planetary interiors. Topics differ from year to year and include, but are not limited to, research related to the accretion, differentiation, evolution, and structure of the terrestrial planets. Course designed for graduate students but available to qualified Earth sciences majors. May be repeated for credit. *Q. Williams*

290T. Current Research Topics in Paleoclimatology and Paleoclimatology. W

Students and instructor lead discussions of recent and significant problems in paleoclimatology and paleoclimatology. Articles structured around current themes of interest are selected by the instructor. Emphasis on major climatic transitions or events which noticeably influenced evolution of biota. Course designed for graduate students but available to qualified Earth sciences majors. *P. Koch, J. Zachos*

290U. Topics in Thermochronology. W

Surveys the use of thermochronometry to quantify the rates of tectonic processes. Topics include heat conduction and diffusion; radioactive decay; analytical methods; and modeling of thermochronologic data. Seminars review seminal papers from the literature. Enrollment restricted to graduate students. Enrollment limited to 20. *J. Hourigan*

292. Seminar (no credit). F,W,S

Weekly seminar attended by faculty, graduate students, and upper-division undergraduate students. *The Staff*

293. Graduate Research Seminar (1 credit). S

Weekly seminar series covering a broad spectrum of topics in the Earth sciences. Graduate students give 15- to 20-minute oral presentations on current or anticipated research. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S

Permission of instructor required. *The Staff*

297. Independent Study. F,W,S

Permission of instructor required. *The Staff*

298. Earth Sciences Internship. F,W,S

A supervised learning experience involving practical, graduate-level application of Earth sciences through working with approved companies, governmental agencies, or research organizations. Students consult weekly with supervising faculty and prepare a final report of their work. Consult sponsoring agency for enrollment criteria. After instruction on resume preparation and interview skills, students must interview and be selected for internship by approved sponsoring organizations. *The Staff*

299. Thesis Research. F,W,S

Permission of instructor required. *The Staff*

East Asian Studies

Department of History
201 Humanities
(831) 459-2982
<http://eastasianstudies.ucsc.edu>

Program Description

East Asian studies addresses the three societies of China, Japan, and Korea in northeast Asia. We recognize that

they compose a meaningful regional designation that contains a diverse range of peoples, languages, and cultures. Linked by centuries of common use of the Chinese writing system, a shared textual canon, general principles of statecraft, and the continual circulation of people and goods, the three societies nevertheless also possess distinctive languages, histories, and social identities, making it necessary to explore each society in its own right.

In recognition of this diversity within the common bonds, East Asian studies at UCSC encourages students to explore East Asia in both depth and breadth. Building first upon developing language skills in Chinese or Japanese, students also begin their studies in one of two historical surveys—History 40A, *Early Modern East Asia*, or History 40B, *The Making of Modern East Asia*—which explore the broad regional forces that contextualize each society's particular trajectory. From these foundations, students are encouraged to investigate a broad range of questions pertinent to each society in classes across the university, including anthropology, economics, education, feminist studies, film and digital media, history, history of art and visual culture, languages, linguistics, literature, music, politics, sociology, and theater arts.

Requirements for the Minor

Language. Completion of the Chinese or Japanese language sequence, at least two of which must be upper-division. A student who wishes to complete the East Asian studies program should enroll in beginning Chinese or Japanese no later than the sophomore year.

Required courses. One core course: History 40A, *Early Modern East Asia*, or History 40B, *The Making of Modern East Asia*.

Three additional upper-division courses from the East Asian studies curriculum, one of which may be an individual study (course 199).

Study Abroad

Because the minor is designed to support the integration of language training with exploration of East Asian societies, we strongly endorse participation in one of the many education abroad programs available for UC students in East Asia where language skills acquired at the university are put to practical use in daily life and research. At present, there are UC education abroad programs in China, Japan, Hong Kong, Korea, and Taiwan. For more information on the program, see the UC Education Abroad program (EAP) web sites: UCSC—<http://oie.ucsc.edu/sa/apply.html>, and UC system-wide—<http://eap.ucop.edu/>.

Associated Faculty

NORIKO ASO, Assistant Professor of History
DILIP BASU, Associate Professor of History
RAOUL BIRNBAUM, Professor of History of Art and Visual Culture
NANCY CHEN, Professor of Anthropology
ALAN CHRISTY, Associate Professor of History
CHRISTOPHER CONNERY, Professor of Literature
SAKAE FUJITA, Lecturer of Languages
HIROSHI FUKURAI, Professor of Sociology
K.C. FUNG, Professor of Economics
PER GJERDE, Professor of Psychology
JUNE GORDON, Professor of Education

GAIL B. HERSHATTER, Professor of History
CHRISTINE HONG, Assistant Professor of Literature
EMILY HONIG, Professor of History
MINGHUI HU, Assistant Professor of History
JUNKO ITO, Professor of Linguistics
STACY KAMEHIRO, Associate Professor of History of Art and Visual Culture
HI KYUNG KIM, Associate Professor of Music
L.S. KIM, Associate Professor of Film and Digital Media
PAUL LUBEK, Professor of Sociology
BORETH LY, Assistant Professor of History of Art and Visual Culture
DAVID KEENAN, Lecturer of Languages
SHIGEKO OKAMOTO, Professor and Chair of Languages
BENJAMIN READ, Assistant Professor of Politics
LISA ROFEL, Professor of Anthropology
DANA Y. TAKAGI, Professor of Sociology
YIMAN WANG, Assistant Professor of Film and Digital Media
ROB WILSON, Professor of Literature
KAREN YAMASHITA, Professor of Literature
ALICE YANG, Associate Professor of History

Ecology and Evolutionary Biology

See Biological Sciences, page 154.

Economics

401 Engineering 2
(831) 459-2743
<http://economics.ucsc.edu>

Faculty and Professional Interests

Professor

ROBERT F. ADAMS, Emeritus
JOSHUA AIZENMAN
International economics, economic development
YIN-WONG CHEUNG
Applied econometrics and international finance
MICHAEL P. DOOLEY
International finance, monetary theory and policy
ROBERT W. FAIRLIE
Labor economics, public policy, entrepreneurship, applied econometrics
DANIEL FRIEDMAN
Microeconomic theory, experimental economics, evolution and learning, behavioral economics, financial markets
K.C. FUNG
International trade and finance, WTO, foreign direct investment and Asia/Pacific economies

RONALD E. GRIESON, Emeritus
MICHAEL M. HUTCHISON
International finance, macroeconomics, emerging markets
JOHN W. ISBISTER, Emeritus
DAVID E. KAUN
Economics of art and culture; political economy of capitalism (including the quality of public discourse and its impact on public policy)
KENNETH KLETZER
International economics, macroeconomics, economic development
LORI G. KLETZER
Employment and wage determination, impact of globalization on the domestic labor market, industrial relations, government labor market policies, higher education and the labor market
JACOB B. MICHAELSEN, Emeritus
PEGGY B. MUSGRAVE, Emerita
NIRVIKAR SINGH
Industrial organization, political economy, economic development, technology and innovation, South Asian immigrants in the U.S., Indian economy
CARL E. WALSH
Monetary theory and policy, macroeconomics
DONALD A. WITTMAN
Economic theory, politics, law

Adjunct Professor

SHARATH SURY
Investment management and research, portfolio theory, strategic asset allocation, active risk budgeting, hedge funds, alpha/beta risk separation

Associate Professor

CARLOS E. DOBKIN
Public health, public policy, and econometrics
BERNARD L. ELBAUM
Economic history
PHILLIP MCCALMAN
International trade, intellectual property rights, industrial organization
FEDERICO RAVENNA
Open economy macroeconomics, international finance, monetary economics

Assistant Professor

AI-RU CHENG
Finance (asset pricing) and econometrics
RICARD GIL
Industrial organization, organizational economics, and applied microeconomics
ASPEN GORRY
Macroeconomics, search theory, employment and labor market policies
JUSTIN G. MARION
Public economics, empirical industrial organization
RYAN OPREA
Experimental economics, industrial organization, applied game theory, and financial markets
JENNIFER POOLE
International trade; Latin American economics; applied microeconomics
JONATHAN ROBINSON
Economic development, with an emphasis on field experiments and primary data collection

ALAN SPEAROT*International trade; industrial organization***THOMAS WU***International finance, macroeconomics, Brazilian macroeconomic policy***HUIBIN YAN***Economic theory, game theory, microeconomic theory, applied microeconomic theory, industrial organization, experimental economics***Senior Lecturer****ROBERT J. SHEPHERD***Financial, managerial, cost accounting; intermediate accounting; and certified public accountant examination***Lecturer****MARY FLANNERY***Economics of the telecommunications industry, applied microeconomics, business strategy and marketing***PAUL M. LUBECK, Professor of Sociology***Political sociology; political economy of development, globalization, labor and work; logics of methodology; religion and social movements; Islamic society and identities; information and networks***JOHN T. MUSACCHIO, Assistant Professor of Information Systems Management***Control, analysis, and pricing of communications networks; applications of game theory in networking; wireless ad-hoc networks; and management of technology***KEVIN G. ROSS, Assistant Professor of Information Systems Management***Service engineering and management; resource allocation; operations research, pricing, scheduling; queueing theory; networks***HELEN SHAPIRO, Associate Professor of Sociology***Political economy, Latin American economic history and development (with an emphasis on Brazil), industrial policy, the auto industry, the state and transnational corporations***YI ZHANG, Assistant Professor of Information Systems Management***Information retrieval, knowledge management, natural language processing, machine learning***Program Description**

An understanding of economics is a vital component of a liberal arts education and a necessity for anyone interested in such areas as business, environmental policy, welfare reform, unemployment, international competitiveness and trade, or transformations in the global economy.

The programs offered by the UCSC Economics Department are designed to acquaint students with the broad range of issues studied by economists and with the tools they use. The department offers the following majors:

- Economics B.A.
- Business management economics B.A.
- Global economics B.A.

The department also offers the following combined majors:

- Environmental studies/Economics B.A.
- Latin American and Latino studies/Global economics B.A.
- Economics/Mathematics B.A.

A minor in economics is also available.

The economics curriculum begins at the introductory level; no specific high school preparation is required. All economics majors study a substantial core of economic theory and mathematical and statistical methods, and then choose among a wide variety of upper-division electives.

Economics majors may combine their upper-division elective choices in a variety of ways to achieve specialization in a number of possible areas, including environmental economics, public policy, political economy, international economics, economic development, and quantitative methods. Highly qualified seniors may take appropriate graduate courses and earn a master of science (M.S.) as well as a bachelor of arts (B.A.) degree in five years.

General Requirements**Admission into an Economics Major and Minor**

The Economics Department administers four undergraduate majors: economics, business management economics, global economics, and economics/mathematics. The admission requirements are the same for all four.

Students must take two courses prior to petitioning for entry to an economics major: Economics 1 (*Introductory Microeconomics*) and Economics 2 (*Introductory Macroeconomics*). Equivalent courses may be taken at other universities or community colleges. Students should check on *assist.org* for already established equivalency agreements. Transfer students may have these requests reviewed by the department prior to matriculation at UCSC.

Students may petition for admission to the major by filling out the UCSC declaration of major form and by supplying evidence of their grades in the two pre-major courses.

Admission to the major is automatic for students with a combined grade point average (GPA) of at least 2.8 in courses 1 and 2. Students with a GPA below 2.8 in these courses may submit a GPA letter of appeal. Letters of appeal should describe any extenuating circumstances that might affect the student's record. Please come by the Economics Office, Engineering 2, Room 401, to receive guidelines on the appeal process.

Students should take courses 1 and 2 for letter grades. In the case of courses taken on a Pass/No Pass basis, the department will use unofficial grades assigned by the instructor but not reported to the Office of the Registrar, in its assessment of eligibility for the major.

Courses for which the grade of W (withdraw) is given are not counted in the computation of the GPA. If courses 1 or 2 are repeated, the department will consider the grades from the first attempt in determining whether students qualify for admittance into the major.

For purposes of advising, students who are interested in pursuing an economics major are encouraged to declare the pre-economics major with the understanding that this does not automatically provide entry to the economics major.

Major Disqualification Policy

Students are expected to maintain good academic standing in the major. Only courses with a grade of P or a letter grade of C or better will satisfy the major requirements. Students who fail any of the upper-division core courses (Economics 100A (or 100M), 100B (or 100N), and 113) twice will be disqualified from the major. Disqualified students will be notified by the first day of instruction in the subsequent quarter following the disqualifying failure. The Office of the Registrar and the student's college will

be notified of the disqualification.

Students may appeal their disqualification by submitting a letter to the Economics Department. This appeal must be filed no later than 15 days after the disqualification notification was mailed, or the 10th day of classes in the quarter of their disqualification, whichever is later.

Core Requirements for All Economics Majors

Economics 1 and 2, 11A, 11B, 100A (or 100M), 100B (or 100N), 113, and Applied Mathematics and Statistics 5 are required for all economics majors and are prerequisites for most upper-division courses. Students are urged to complete these courses as soon as possible. Students who are committed to the major early in their academic career, or who are considering the combined B.A./M.S. program, should plan to complete at least Economics 1, 2, 11A, 11B, and preferably 100A, 100B, and 113 by the end of their sophomore year.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in economics is under review. Please refer to updated DC information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

Mathematics and Statistics Content Requirement

Mathematics: Successful completion of Economics 11A and 11B, also offered as Applied Mathematics and Statistics 11A and 11B, (or equivalent) is required of all economics majors and is prerequisite to Economics 100A (or 100M), 100B (or 100N), and 113. Therefore, students are advised to take Economics 11A and 11B or their equivalent as early as possible in their undergraduate career. Mathematics 11A-B and 22 or 23A, or 19A-B and 22 or 23A, are acceptable equivalents to Economics 11A and 11B. Students may also complete the mathematics requirement by taking Mathematics 11A or Mathematics 19A, and then Economics 11B or Applied Mathematics and Statistics 11B. Students planning to do graduate work in economics or business should seriously consider more intensive mathematical training; consult an adviser.

Statistics: Applied Mathematics and Statistics 5

Comprehensive Requirement

The comprehensive requirement may be satisfied in one of the following ways: 1) by passing the intermediate core courses with grades of C or better (Economics 100A or 100M, 100B or 100N, 113); 2) by completion of a senior thesis with consent of an instructor.

Note that item 2 (senior thesis) has been rare. Most students who write a senior thesis have already met the comprehensive requirement.

Minor Requirements

Students earn a minor in economics by completing all of the requirements for the major with the following differences:

- The number of additional upper-division courses is reduced from five to three.
- There is no comprehensive requirement.
- Economics 191, 192, 193, 193F, 198, and 198F may not be used to meet minor requirements.

Independent Study

Students are encouraged to petition for independent study on topics of special interest to them. Economics 199, *Tutorial*, may be used as only one of the upper-division courses required for the major or minor.

Field-Study Program

The Economics Department offers its majors the opportunity to integrate their academic knowledge with career-related work. The field-study program places students in internships under the supervision of a faculty sponsor and a professional at the workplace. Students can select from a wide variety of field placements such as accounting firms, community non-profits, government agencies, brokerage firms, marketing agencies, banks, and businesses in Santa Cruz and beyond. Students apply for field study a quarter in advance. Participation in the field-study program requires at least junior standing, completion of courses 100A (or 100M), 100B (or 100N), and 113 as well as good academic standing. Students may earn a maximum of 10 academic credits and complete up to two quarters in a field placement. A field study requires 12 hours per week spent working on internship duties. Time spent toward the academic requirements set by the faculty sponsor is not included in the 12 hours spent at the field placement.

Along with the training and supervision by a professional at the workplace, students receive guidance from a faculty sponsor who directs their academic project. Students earn credit through the completion of this project and the job supervisor's evaluation of performance. Economics field-study courses (193 and 198) do not satisfy any upper-division requirements for the major and are available as Pass/No Pass only.

Interested students should make an appointment or stop by the Economics Field Study office at 401B Engineering 2; or call (831) 459-2028; or e-mail econintern@ucsc.edu. Web address: <http://econ.ucsc.edu>.

Transfer Students

A student transferring to UCSC may fulfill some of the requirements for the major by completing equivalent courses, with a grade of C or better, at another recognized institution. Students should check on assist.org for already established equivalency agreements between UC and the California community colleges. For courses not already articulated through assist.org, transfer students must present their Transfer Credit Summary (available on the student portal) and course syllabi or descriptions to an Economics Department adviser. The department approves courses applicable for economics prerequisites and major requirements. All transfer students must complete the comprehensive requirement at UCSC. Economics and global economics majors must take at least three of their upper-division economics electives at UCSC. Business management economics majors must take at least four of their upper-division economics electives at UCSC, one of which must be 101, 133, or 135. Courses taken for credit elsewhere may not be repeated for credit here.

Combined Majors

The Economics Department offers the following combined majors: environmental studies/economics, economics/mathematics, and Latin American and Latino studies/global economics. Requirements for these majors may be reviewed under their separate entries in this catalog.

Economics Program Description

Economics is the study of a vast range of human behavior and its social implications, ranging from how individuals and businesses make financial and consumption decisions

to how society organizes production and makes allocation decisions over time and place.

Economics majors study a substantial core of economic theory and mathematical and statistical methods. Focusing on these two areas provides the foundation for graduate studies in economics. The required core courses may also be combined with electives in a general economics major program especially suitable for students who plan either to enter law school or to go into more specialized programs emphasizing areas such as applied economics, environmental economics, public policy, political economy, international economics, economic development, and quantitative methods.

Economics Major Requirements

Students who major in economics are required to take the following courses:

- 1 *Introductory Microeconomics: Resource Allocation and Market Structure*
 - 2 *Introductory Macroeconomics: Aggregate Economic Activity*
 - 11A *Mathematical Methods for Economists I* (or equivalent)
 - 11B *Mathematical Methods for Economists II* (or equivalent)
 - 100A *Intermediate Microeconomics*
(or 100M *Intermediate Microeconomics, Math Intensive*)
 - 100B *Intermediate Macroeconomics*
(or 100N *Intermediate Macroeconomics, Math Intensive*)
 - 113 *Introduction to Econometrics*
- Applied Mathematics and Statistics 5 *Statistics*
- and five additional upper-division economics courses, at least three of which must be selected from the following:
- 104 *Is There Truth in Numbers: The Role of Statistics in Economics*
 - 105 *Macroeconomic Theory*
 - 106 *Evolutionary Thought in the Social Sciences*
 - 114 *Advanced Quantitative Methods*
 - 120 *Economic Development*
 - 121 *Economic Growth*
 - 125 *Economic History of the U.S.*
 - 126 *Why Economies Succeed or Fail*
 - 128 *Poverty and Public Policy*
 - 130 *Money and Banking*
 - 137 *Performing Arts in the Public and Private Economy*
 - 140 *International Trade*
 - 141 *International Finance*
 - 142 *Advanced Topics in International Finance*
 - 143 *Policy Issues in the International Economy*
 - 148 *Latin American Economies*
 - 149 *The Economies of East and Southeast Asia*
 - 150 *Public Finance*
 - 152 *Setting Domestic Priorities*
 - 153 *Cost-Benefit Analysis*
 - 156 *Health Care and Medical Economics*
 - 157 *The Economics of Organizations*
 - 160A *Industrial Organization*
 - 160B *Government and Industry*
 - 165 *Economics as an Experimental Science*
 - 166A *Game Theory and Applications I*
 - 166B *Game Theory and Applications II*
 - 169 *Economic Analysis of the Law*
 - 170 *Environmental Economics*

- 171 *Natural Resource Economics*
- 175 *Energy Economics*
- 180 *Labor Economics*
- 183 *Women in the Economy*
- 184 *Labor Wars in Theory and Film*
- 185 *The Value and Support of the Arts: Challenges and Opportunities in American Society*
- 189 *Political Economy of Capitalism*
- 190 *Senior Proseminar*

Courses 191, 192, 193, 193F, 198, and 198F may not be used to meet major requirements. Either course 195 or 199 may be used to fill one of the five upper-division major requirements. Other electives are listed under the Business Management Economics program description.

Business Management Economics Program Description

The business management economics major provides students who are interested in careers in business or management with a foundation in economics and a selection of applied fields related to business management. Particular areas of strength of the program are accounting, finance, and technology management. This course of study prepares students for entrance into the business world or admission to graduate programs—either the master's program in applied economics and finance at UCSC or graduate programs in business and management at other universities.

The program provides a business and management education embedded within a broader economics and liberal arts context and is closely related to the economics and global economics majors and the information systems management major (page 272).

The UCSC business management economics curriculum begins at the introductory level; no specific high school preparation is required. All majors study a substantial core of economic theory and mathematical and statistical methods, and they are then able to choose among a wide range of business and management electives.

This major has several important elements. First, it combines the strong analytic approach of economics with the technical aspects of management. Second, it recognizes that computing is intrinsic to business and is an essential skill for those who wish to enter this field. Students in this major gain knowledge about using computing as a tool of analysis for economic, statistical, and financial data. Third, the major offers field placements (arranged with the economics field-study program coordinator) which provide an excellent way to apply academic economics, business, and management to issues and problems in the real world; they provide marketable skills as well as important job contacts.

In cooperation with the UC Education Abroad Program (EAP), opportunities are available for students to take some business courses (taught in English) in Europe, Mexico, and Hong Kong. Students should ask the Economics Department for additional information about these programs.

Students who are committed to the major early in their academic career or who are considering the combined B.A./M.S. program should plan to complete Economics 1, 2, 10A, 10B, 11A, 11B and preferably 100A, 100B, and 112 no later than the end of their sophomore year.

Business Management Economics Major Requirements

Introductory and core requirements. Students who major in business management economics are required to take the following courses:

- 1 *Introductory Microeconomics: Resource Allocation and Market Structure*
- 2 *Introductory Macroeconomics: Aggregate Economic Activity*
- 10A *Economics of Accounting* (or equivalent, see under General Requirements)
- 10B *Economics of Accounting* (or equivalent, see under General Requirements)
- 11A *Mathematical Methods for Economists I* (or equivalent)
- 11B *Mathematical Methods for Economists II* (or equivalent)
- 100A *Intermediate Microeconomics*
(or 100M *Math Intensive Intermediate Microeconomics*)
- 100B *Intermediate Macroeconomics*
(or 100N *Math Intensive Intermediate Macroeconomics*)
- 113 *Introduction to Econometrics*
Applied Mathematics and Statistics 5 *Statistics*

Computer literacy requirement. Students must complete a minimum of two courses from the following list (with department approval, a student may substitute other computing courses):

Computer Engineering

- 12/L *Computer Systems and Assembly Language*
- 80N *Introduction to Networking and the Internet*

Computer Science

- 10 *Introduction to Computer Science*
- 12A/L *Introduction to Programming*
- 5C *Introduction to Programming in C++* (formerly CMPS 60 N)
- 5J *Introduction to Programming in Java* (formerly CMPS 60 G)
- 5P *Introduction to Programming in Python*
- 80B *Systems and Simulation*

Information Systems Management

- 50 *Business Information Systems*
- 58 *Systems Analysis and Design*

Linguistics

- 80G *Introduction to Unix*

Economics

- 216 *Applied Econometric Analysis I* (with permission of instructor)

Note: Students with no prior programming experience are encouraged to take Computer Science 5J and Computer Science 11 rather than Computer Science 12A/L.

Upper-division electives. Students are required to take six additional courses: four in business management and two other economics electives. Students must choose four courses from the following list; at least one of these four must be a course designated with an asterisk (*).

- *101 *Managerial Economics*
- 102 *Forecasting*
- 110 *Managerial Cost Accounting and Control*
- 111A *Intermediate Accounting I*
- 111B *Intermediate Accounting II*
- 112 *Auditing and Attestation*
- 115 *Introduction to Management Sciences*
- 117A *Tax Factors for Individuals*
- 117B *Tax Factors for Business and Investment*
- 118 *Fraud Examination*

- 119 *Advanced Accounting*
- 131 *International Financial Markets*
- *133 *Security Markets and Financial Institutions*
- *135 *Corporate Finance*
- 136 *Business Strategy*
- 138 *The Economics and Management of Technology and Innovation*
- 139A *Economics of Electronic Commerce*
- 139B *E-Commerce Strategy*
- 161A *Marketing*
- 161B *Marketing Research*
- 164 *Economics and the Telecommunications Industry*
- 181 *Economics of Real Estate*
- 188 *Management in the Global Economy*
- 194 *Advanced Topics in Management*

Students must choose the remaining two courses from the upper-division economics electives listed for the economics major (see page 202).

Courses 191, 192, 193, 193F, 198, and 198F may not be used to meet major requirements. Either course 195 or 199 may be used to fill one of the six upper-division major requirements.

Field study. One quarter of field study is strongly recommended. Placements and credit for course 193 or 198 are arranged through the economics field-study coordinator. See above under Field-Study Program description.

Global Economics Program Description

Global economics is an interdisciplinary major designed to prepare students to participate in the global economy; the program aims to deepen the student's knowledge of economics within a culturally and linguistically diverse world. The major is particularly useful to students contemplating careers at home or overseas in international relations, in international business, or with international organizations. Hence the major requires overseas study, regional area study, and second-language proficiency in addition to the basic economics requirements.

The UCSC global economics curriculum begins at the introductory level; no specific high school preparation is required. The global economics major program is closely related to the economics major program. See above under the general economics program description for more information.

Global Economics Major Requirements

Introductory and core requirements. Students who major in global economics are required to take the following courses:

- 1 *Introductory Microeconomics: Resource Allocation and Market Structure*
- 2 *Introductory Macroeconomics: Aggregate Economic Activity*
- 11A *Mathematical Methods for Economists* (or equivalent)
- 11B *Mathematical Methods for Economists* (or equivalent)
- 100A *Intermediate Microeconomics*
(or 100M *Math Intensive Intermediate Microeconomics*)
- 100B *Intermediate Macroeconomics*
(or 100N *Math Intensive Intermediate Macroeconomics*)
- 113 *Introduction to Econometrics*
Applied Mathematics and Statistics 5 *Statistics*

Students are strongly recommended to complete courses 100A (or 100M), 100B (or 100N), and 113 prior to study abroad. In addition, majors must have

language study, area study, and overseas study, as described below.

Courses 191, 192, 193, 193F, 198 and 198F may not be used to meet major requirements. Either course 195 or 199 may be used to fill one of the five upper-division major requirements.

Upper-division requirements. Five additional upper-division courses are required. Please see courses listed under the Economics and Business Management majors as well. These may include approved courses offered by other departments.

At least one of the five courses must be selected from the following three:

- 120 *Economic Development*
- 140 *International Trade*
- 141 *International Finance*

In addition, at least one course must be chosen from the following departmental listings:

Economics

- 120 *Economic Development*
- 126 *Why Economies Succeed or Fail: Lessons from Western and Japanese History*
- 131 *International Financial Markets*
- 140 *International Trade*
- 141 *International Finance*
- 142 *Advanced Topics in International Economics*
- 148 *Latin American Economies*
- 149 *The Economies of East and Southeast Asia*
- 188 *Management in the Global Economy*

Latin American and Latino Studies

- 140 *Rural Mexico in Crisis*
- 168 *Economic History of Latin America*
- 169 *Latin American Industrialization in a Global Perspective: Past, Present, Future*

Politics

- 140B *Comparative Post-Communist Politics*
- 176 *International Political Economy*

Sociology

- 163 *Global Corporations and National States*
- 167 *Development and Underdevelopment*

The other three required upper-division electives are determined by the student's interests. See advisers for details.

The global economics major has three additional elements:

1. **Foreign Language Study:** The global economics major requires a foreign language since students who plan to work in the larger world must have fluency in a language other than English. This language should be relevant to their regional area of interest. Students can meet this requirement by completing two years of university-level language courses or by demonstrating an equivalent level of competence through a recognized language test.
2. **Area Study:** The major requires students to take two additional courses selected from the offerings of departments other than economics in order to learn about the history, political economy, or culture of some other part of the world. These can be lower- or upper-division courses; the courses should focus on the area of the student's language study and overseas study. The Economics Department provides a list of approved courses; substitute courses are welcomed when they are part of the student's overseas program or from other UCSC departments, but must be

approved by the adviser for the global economics major.

3. **Study Abroad:** All students are required to spend at least one term abroad in an approved course of study in their regional area of concentration; students may also choose a year-long program. Typically, a student will do this through the UC Education Abroad Program (EAP). Numerous overseas study sites are available through EAP. Students desiring to fulfill their required study abroad through EAP must apply directly to the EAP office for the selected program and are subject to the admission requirements determined by UC EAP. In countries and at universities where EAP programs are not available, students may make their own arrangements for study with the permission of the director of the program. Students may use the time abroad to further their language study, to meet the area study course requirements, to meet some of the upper-division economics course requirements, or to take courses unrelated to the major. Students who are not accepted to an overseas program or who cannot meet the language or area course requirements are advised to complete the general economics major as an alternative.

Combined Economics/Mathematics Program Description

The major in Economics and Mathematics is designed to meet the needs of undergraduate students who plan to pursue doctoral study in economics or business, or who wish to pursue a career as an actuary or other professional requiring a sophisticated understanding of economics and mathematics. The major combines the main undergraduate content of both Economics and Mathematics within a programmatic structure that joins the two disciplines. It provides a coursework combination required to prepare for an economics doctoral (Ph.D.) program, or for a group of technically demanding professional careers.

Economics/Mathematics Major Requirements

In addition to completing the University's general education requirements, students must complete 17 courses: 12 required (60 credits) and 5 electives (25 credits). The required courses include:

Economics Required Courses

- 1 *Introductory Microeconomics: Resource Allocation and Market Structure*
- 2 *Introductory Macroeconomics: Aggregate Economic Activity*
- 100A or 100M *Intermediate Microeconomics*
- 100B or 100N *Intermediate Macroeconomics*
- 113 *Introduction to Econometrics*
- Applied Mathematics and Statistics 5, *Statistics*

Economics elective courses

(choose three from the following list)

- 101 *Managerial Economics*
- 102 *Forecasting*
- 104 *Is There Truth in Numbers: The Role of Statistics in Economics*
- 114 *Advanced Quantitative Methods*
- 115 *Introduction to Management Science*
- 120 *Economic Development*

- 125 *Economic History of the U.S.*
- 126 *Why Economies Succeed or Fail*
- 128 *Poverty and Public Policy*
- 130 *Money and Banking*
- 131 *International Financial Markets*
- 133 *Security Markets and Financial Institutions*
- 135 *Corporate Finance*
- 136 *Business Strategy*
- 137 *Performing Arts in the Public and Private Economy*
- 138 *Economics and Management of Technology and Innovation*
- 139A *Economics of Electronic Commerce*
- 139B *E-Commerce Strategy*
- 140 *International Trade*
- 141 *International Finance*
- 142 *Advanced Topics in International Finance*
- 148 *Latin American Economies*
- 149 *The Economies of East and Southeast Asia*
- 150 *Public Finance*
- 160A *Industrial Organization*
- 161A *Marketing*
- 164 *Economics and the Telecommunications Industry*
- 165 *Economics as an Experimental Science*
- 169 *Economic Analysis of the Law*
- 170 *Environmental Economics*
- 171 *Natural Resource Economics*
- 175 *Energy Economics*
- 180 *Labor Economics*
- 183 *Women in the Economy*
- 184 *Labor Wars in Theory and Film*
- 188 *Management in the Global Economy*
- 189 *Political Economy of Capitalism*

Mathematics required courses

- Mathematics 19A *Calculus for Science, Engineering, and Mathematics*
- Mathematics 19B *Calculus for Science, Engineering, and Mathematics*
- Mathematics 21 *Linear Algebra*
- Mathematics 22 *Calculus of Several Variables or 23A-B, Multivariable Calculus*
- Mathematics 100 *Mathematical Proof*
- Mathematics 105A *Real Analysis*

Mathematics electives

(choose two from the following list)

- Mathematics 106 *Systems of Ordinary Differential Equations*
- Mathematics 107 *Partial Differential Equations*
- Mathematics 114 *Introduction to Financial Mathematics*
- Mathematics 117 *Advanced Linear Algebra*
- Mathematics 145/L *Chaos Theory*
- Mathematics 194 *Senior Seminar*
- Applied Mathematics and Statistics 114 *Introduction to Dynamical Systems*
- Applied Mathematics and Statistics 131 *Introduction to Probability Theory*
- Applied Mathematics and Statistics 132 *Statistical Inference*
- Applied Mathematics and Statistics 147 *Computational Methods and Applications*

Applied Mathematics and Statistics 162 *Design and Analysis of Computer Simulation Experiments*

Comprehensive Requirement

In addition to successfully completing program requirements, students need to satisfy the comprehensive requirement for this major; this can be satisfied by one of the following options:

- Mathematics 194 or 195;
- by passing the three intermediate core courses with grades of C or better: (Economics 100A or 100M, 100B or 100N, and 113); or
- by completion of a senior thesis in economics with consent of an instructor.

Major Admission Requirements

Although there are no specific requirements, high school students are encouraged to take four years of high school mathematics and an economics class. Transfer students are encouraged to complete as many lower-division (mathematics and economics) courses as they can at their junior college.

The admission requirements for the economics/mathematics major are the same as for the other economics major programs.

Major Disqualification Policy

Students are expected to maintain good academic standing. Only courses with a grade of P or a letter grade of C or better will satisfy the major requirements; students who receive a lower grade in upper-division core courses (Economics 100A (or 100M), 100B (or 100N), and 113; and Mathematics 100 and 105A) twice will be disqualified from the major. Students who are disqualified will be notified by the first day of instruction in the subsequent quarter, as well as the student's college and the Office of the Registrar.

Students may appeal their disqualification by submitting a letter to the Economics Department. This appeal must be filed no later than 15 days after the disqualification notification was mailed, or the 10th day of classes in the quarter of their disqualification, whichever is later.

Additional Preparation for the Major

Students interested in the combined major must meet a minimum GPA requirement in Economics 1 and 2. Transfer students should check *assist.org* for agreements with California community colleges about economics and mathematics courses. Students who have met all articulations before transferring will need at least six economics and four to five mathematics classes at UCSC to complete the major.

Honors in the Major

The Economics Department considers for honors and highest honors students who have completed a major program with superior or exceptional work. Honors decisions are made by the department's Honors and Scholarship Committee.

At the end of each quarter, faculty teaching the upper-division core courses submit to the department a list of students in their respective classes whose performance is at the honors level. At the time of graduation, all students who received an honors designation in one or more of these courses are reviewed by the department's honor committee, narrative evaluations are included, and the department's faculty honors com-

mittee reviews all files. The faculty committee looks for a record of excellence in courses offered towards the major, with a strong performance in the upper-division core (theory and econometrics—courses 100A/M, 100B/N, and 113) being a necessary condition for honors. Although a GPA is not computed for the economics courses, in general highest honors are awarded to students who have received a grade of at least an “A” throughout their economics program. Honors are awarded to students who have no more than two courses with grades of less than an “A-.” Students who have completed a portion of the major at another institution may be asked to submit a transcript for evaluation.

Students interested in being reviewed for honors may request that the department conduct a review, and such requests are always granted.

In general, honors have been awarded to between 10 and 15 percent of each year's graduating class.

Graduate Programs

Master's Program in Applied Economics and Finance

The master of science (M.S.) program in applied economics and finance is designed for students who wish to supplement their undergraduate work in economics with analytical graduate training that prepares them for careers in business, government, international and domestic banking, consulting firms, and nonprofit organizations. The program is unique in its focus on graduate-level economics training for practical application and its emphasis on communication skills. The curriculum stresses the application of micro and macro concepts, statistical techniques, finding and using data sources, working out substantial practical applications, developing writing and reporting skills, and presenting material orally before an audience. The program differs from typical master of business administration (M.B.A.) programs by preparing students to meet the increasing technical demands of private- and public-sector employers through comprehensive course work in economic analysis.

Requirements for admission include an undergraduate degree in economics or successful completion of undergraduate courses in intermediate microeconomics, macroeconomics, and statistics and adequate preparation in mathematics. At least two quarters of calculus and one of linear algebra are strongly recommended. Students are also expected to have basic computer skills.

Students normally complete the master's program in two years. All students must complete 12 courses (60 credits) of graduate study, including the following core courses which are taken in the first year:

- 200 *Microeconomic Analysis*
- 201 *Applications in Microeconomics*
- 202 *Macroeconomic Analysis*
- 216 *Applied Econometric Analysis I*
- 217 *Applied Econometric Analysis II*
- 233 *Finance*

In addition, first-year students take a two-credit workshop (course 294) in fall. Students normally enroll for 15 credits. The minimum for full-time is 12 credits. In the fourth and fifth quarters, students must take at least four elective courses numbered 200 or higher. Students may choose from among the following courses: finance (courses 234, 235, 236, and 239), international economics (courses 249A, 249B), public economics (courses 250, 259A, 259B), accounting (courses 209A, 209B), or any economics doctor of philosophy (Ph.D.) course. Note that these courses are not offered each year; elective courses vary from year to year and are dependent on the staffing capabilities of the Economics Department.

Second-year master's students may count no more than two upper-division economics courses toward the elective requirements.

Students may also satisfy elective requirements by taking relevant courses from another discipline. Students will need to file a departmental petition for review and approval of either their upper-division economics courses and/or courses from a related discipline. Please see the graduate adviser for the pre-approved list. Students should begin the approval process at least one quarter in advance.

In the final quarter, each candidate completes a major project in conjunction with course 291, *Workshop in Applied Economics*, and 10 credits of course 297, *Independent Study*. Students with graduate credit from other institutions may submit a written request for course substitution and/or credit to the graduate committee for review.

Applied Economics and Finance B.A./M.S. Dual-Degree Program for Undergraduates

Students entering UCSC as undergraduates may complete a combined B.A./M.S. in applied economics and finance in five years. To qualify for this program, students must complete all of the core courses for their specific major: courses 1, 2, 11A, 11B, 100A (or 100M), 100B (or 100N), and 113. Business management economics majors must also complete 10A and 10B. In addition, students are strongly advised to complete a minimum of three upper-division economics electives (business management economics majors must complete four) as well as the general education requirements before the end of their junior year. Students are also advised to take a course in linear algebra (Mathematics 21). Students majoring in business management economics or global economics should refer to those sections for the respective dual-degree requirements.

Students must also take the Graduate Record Examination General Test during the fall quarter of their junior year. Advance planning for the program is essential, and interested students should consult with a faculty adviser well in advance of applying to the dual-degree program.

A student in the program begins the first-year M.S. courses in the senior year while continuing to maintain undergraduate status. In the fifth year, the student is officially enrolled as a graduate student and completes the remaining graduate course work, culminating in the M.S. degree.

Admission to the dual-degree program is by formal application directly to the Economics Department; the application deadline is February 15 of the junior year. Undergraduates who plan to apply to quantitative-oriented Ph.D. programs at other institutions may take some of the first-year M.S. classes with the permission of the instructor.

Ph.D. Program in International Economics

The Ph.D. program in international economics provides students with training in modern microeconomics, macroeconomics, and econometrics, combined with specialized training in the fields of international finance and international trade. Students learn to bring an international perspective to all areas of economics and to conduct research on current and emerging international economic issues. The program offers more intensive course work in international trade and finance, as well as greater faculty depth in various aspects of international economics, than do traditional Ph.D. programs in economics that offer international economics as a single subfield. The large number of internationally recognized faculty in the department who are actively engaged in research in

international economics provides a unique focus to the program and the department. While the core emphasis is on international trade and finance, the program also offers courses in economic development and in special topics, and students in the program have conducted research on a wide variety of topics in other areas; examples include monetary economics, experimental economics, environmental economics, and economic growth and development. This makes graduates of the program particularly well prepared for academic careers and for research careers in both domestic and international policy institutions.

Courses and Program Requirements

| Fall | Winter | Spring |
|--|--|---|
| 1st Year | | |
| 204A <i>Advanced Micro Theory</i> | 204B <i>Advanced Micro Theory</i> | 204C <i>Advanced Micro Theory</i> |
| 205A <i>Advanced Micro Theory</i> | 205B <i>Advanced Micro Theory</i> | 205C <i>Advanced Micro Theory</i> |
| 210B <i>Math Methods</i> | 211B <i>Advanced Econometrics</i> | 211C <i>Advanced Econometrics</i> |
| 211A <i>Advanced Econometrics</i> | | 212 <i>Empirical Project</i> |
| | | Micro & Macro Prelim Exams |
| 2nd Year | | |
| 240A <i>Advanced International Trade</i> | 240B <i>Advanced International Trade</i> | 240C <i>Advanced International Trade</i> |
| 241A <i>Advanced International Finance</i> | 241B <i>Advanced International Finance</i> | 241C <i>Empirical Applications</i> |
| 212 <i>Empirical Project</i> | 243* <i>History of International Economy</i> | Trade & Finance Field Paper |
| 3rd Year | | |
| 295A <i>Directed Reading</i> | 295B <i>Directed Reading</i> | 295C <i>Directed Reading</i> |
| 296A <i>Third-Year Seminar</i> | 296B <i>Third-Year Seminar</i> | 296C <i>Third-Year Seminar</i> |
| Qualifying Exam (QE) | | |
| 4th Year | | |
| 298 <i>Dissertation Research</i> | 298 <i>Dissertation Research</i> | 298 <i>Dissertation Research</i> |
| 297A <i>Independent Study</i> | 297B <i>Independent Study</i> | 297C <i>Independent Study</i> |
| | | Last qtr to challenge QE without academic probation |

*ECON 243 is not offered every year; it may be taken in the 2nd or 3rd year.

Course requirements are satisfied by a letter grade of B or better or a grade of S (satisfactory). A letter grade of C in a course is not satisfactory for meeting a course requirement for the Ph.D. program.

Preliminary Requirements

Preliminary examinations are given in two parts: one test in micro theory and one test in macro theory. Students are expected to pass both examinations before the beginning of their second year. Preliminary examinations are currently offered in June and September, although scheduling is subject to change.

In the spring quarter of the first year and again in the fall quarter of the second year, each student must enroll in Economics 212. An econometrics paper is due at the end of the first full week of fall quarter of the second year. A field paper (in finance or trade) is due by the end of June in the second year of the program. The graduate handbook of the department details the evaluation procedure for the econometrics and the field papers.

Students who do not pass both preliminary examinations, the econometrics paper, and the field paper requirements will not be allowed to continue in the Ph.D. program.

Qualifying Examination

Advancement to candidacy for the Ph.D. degree requires completion with satisfactory grades or better of the required coursework, preliminary examinations, the econometrics paper, the field paper, and the oral examination. The oral examination is taken after all other requirements have been completed. A student cannot advance to candidacy before clearing any incomplete grades from their record.

Dissertation

The final requirement for the Ph.D. degree is acceptance of the student's dissertation under the rules of the Academic Senate. A three-member dissertation advisory committee, headed by the student's research adviser, evaluates the dissertation for the department. The dissertation advisory committee must be approved by both the Economics Ph.D. Committee and the Graduate Council. The committee may require a formal public defense of the dissertation.

Lower-Division Courses

1. Introductory Microeconomics: Resource Allocation and Market Structure. F,W,S

For all interested students as well as prospective economics majors. Examines how markets allocate resources in different kinds of economies. Topics include competitive markets, monopoly, financial markets, income distribution, market failures, the environment, and the role of government. (General Education Code(s): PE-H, IS.) *The Staff*

2. Introductory Macroeconomics: Aggregate Economic Activity. F,W,S

For all interested students and prospective economics majors. Examines how the overall level of national economic activity is determined, including output, employment, and inflation. Explores the roles of monetary and fiscal policies in stabilizing the economy and promoting growth, with a focus on contemporary policy debates. (General Education Code(s): PE-H, IS.) *The Staff*

10A. Economics of Accounting. F,W

Introduction to accounting principles and practice; preparation and analysis of financial statements; study of internal control procedures. Courses 10A and 10B satisfy the Accounting 1A-B requirement at UC Berkeley. *The Staff*

10B. Economics of Accounting. W,S

Managerial accounting emphasizing analysis and control; accounting for corporations; introduction to taxation, budgeting, and equity/debt financing; management decision making. Courses 10A and 10B satisfy the Accounting 1A-B requirement at UC Berkeley. Prerequisite(s): course 10A. *The Staff*

11A. Mathematical Methods for Economists I. F,W,S

Introduction to mathematical tools and reasoning, with applications to economics. Topics are drawn from differential calculus in one variable and include limits, continuity, differentiation, elasticity, Taylor polynomials, and optimization. (Also offered as Applied Math and Statistics 11A. Students cannot receive credit for both courses.) Students who have already taken Mathematics 11A and 19A should not take this course. Prerequisite(s): score of 31 or higher on Mathematics Placement Exam. Students who do not place into precalculus should enroll in Mathematics 2. (General Education Code(s): IN, Q.) *The Staff*

11B. Mathematical Methods for Economists II. F,W,S

Mathematical tools and reasoning, with applications to

economics. Topics are drawn from multivariable differential calculus and single variable integral calculus, and include partial derivatives, linear and quadratic approximation, optimization with and without constraints, Lagrange multipliers, definite and indefinite integrals, and elementary differential equations. (Also offered as Applied Math and Statistics 11B. Students cannot receive credit for both courses.) Prerequisite(s): course 11A, or Applied Mathematics and Statistics 11A, or Mathematics 11A, or Mathematics 19A. (General Education Code(s): MF, IN, Q.) *The Staff*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

80A. The Theory, Hope, and Crisis of Capitalism. W

Assessment of modern-day capitalism from the three major economic paradigms—liberal, conservative, radical. Theories of Smith, Marx, and Keynes are explored in contemporary writing, with focus on the U.S. from WW II to present. Students cannot receive credit for this course and course 189. (General Education Code(s): T3-Social Sciences.) *D. Kaun*

80G. Money and the Arts: Two All-Consuming Passions. *

Analysis of the performing arts: a commodity providing a rich and varied source of satisfaction, an occupation for thousands of talented and creative individuals, and an activity whose funding (public versus private) is the source of significant controversy. Students cannot receive credit for this course and course 137. (General Education Code(s): T3-Social Sciences.) *D. Kaun*

80H. Wall Street and the Money Game. *

Provides a demystifying introduction to financial markets. Examines the theory of stock market investment, the workings of the international money market, the implications of corporate takeovers, and the regulation of the economy by the Federal Reserve Board. (General Education Code(s): T3-Social Sciences.) *The Staff*

93. Field Study. F,W,S

Supervised fieldwork experience, off campus, in an area connected with economics or business. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

93F. Field Study (2 credits). F,W,S

Supervised off-campus fieldwork experience in an area connected with economics or business. Prerequisite(s): permission of instructor; students submit petition to sponsoring agency. *The Staff*

99. Tutorial. F,W,S

May be repeated for credit. *The Staff*

Upper-Division Courses

100A. Intermediate Microeconomics. F,W,S

Covers major theoretical issues arising in the study of resource allocation, the function of markets, consumer behavior, and the determination of price, output, and profits in competitive, monopolistic, and oligopolistic market structures. Also considers issues of welfare and public policy. Students cannot receive credit for this course and course 100M. Prerequisite(s): courses 1; 2; and 11B or Applied Mathematics and Statistics 11B or Mathematics 22 or 23A. *The Staff*

100B. Intermediate Macroeconomics. F,W,S

Covers major theoretical issues arising in the study of income, employment, interest rates, and the price level. Ex-

amines the role of monetary and fiscal policy in economic stabilization. Also considers these issues as they relate to the global economy. Students cannot receive credit for this course and course 100N. Prerequisite(s): courses 1; 2; and 11B or Applied Mathematics and Statistics 11B or Mathematics 22 or 23A. *The Staff*

100M. Intermediate Microeconomics, Math Intensive. W

Mathematically sophisticated version of course 100A. Provides analytically rigorous treatment of the subject using a calculus-intensive presentation of microeconomic theory. For specific topics, see course 100A. Students cannot receive credit for this course and course 100A. Prerequisite(s): courses 1; 2; and 11B or Applied Mathematics and Statistics 11B, or Mathematics 22 or 23A. *The Staff*

100N. Intermediate Macroeconomics, Math Intensive. S

Provides rigorous, mathematical-intensive treatment of topics covered in course 100B. Core is devoted to model-based analysis of questions in macroeconomics. Use of mathematical tools allows study of advanced topics and data-intensive applications. See course 100B for specific topics. Students cannot receive credit for this course and course 100B. Prerequisite(s): courses 1; 2; and 11B or Applied Mathematics and Statistics 11B, or Mathematics 22 or 23A. *The Staff*

101. Managerial Economics. F,S

Analysis of the theory and practice of decision making in business firms, applying the concepts and techniques of microeconomics. Topics may include pricing schemes, non-price competition, internal organization of firms, incentive contracts, asymmetric information, and game theory. Case studies are used to illustrate some topics. Prerequisite(s): courses 100A or 100M, and 113. *The Staff*

104. Is There Truth in Numbers: The Role of Statistics in Economics. *

Applies the techniques of econometrics and experimental economics to the understanding of economics. A "hands-on" course where real economic data is used in an interactive way so that students develop the art of empirical analysis. Prerequisite(s): courses 100A or 100M, 100B or 100N, and 113. *The Staff*

105. Topics in Macroeconomic Theory. S

A seminar in advanced macroeconomics focusing on a selection of theoretical issues. Emphasis is on detailed modeling and analysis of macroeconomic processes. Prerequisite(s): course 100B or 100N, and 113. *The Staff*

110. Managerial Cost Accounting and Control. S

Focuses on how cost data are used by managers in the planning and control of both private- and public-sector organizations. Specific topics include organization of the management and control function, use of cost data for the pricing of goods and services, the effect of cost systems on management performance, and capital budgeting. Prerequisite(s): course 10B. *The Staff*

111A. Intermediate Accounting I. F

Principles, control, and theory of accounting for assets; accounting as an information system; measurement and determination of income. Projects involving spreadsheet software required. Students cannot receive credit for this course and course 209A. Prerequisite(s): course 10B. *R. Shepherd*

111B. Intermediate Accounting II. W

Principles, control, and theory of accounting for liabilities and equities; preparation and analysis of cash flow statements and earnings per share computation. Projects involving spreadsheet software required. Students cannot receive credit for this course and course 209B. Prerequisite(s): course 10B. *R. Shepherd*

112. Auditing and Attestation. W

For business management economics majors interested in careers that emphasize accounting, finance, or technology management. Also for students who intend to take the CPA exam. Covers audit techniques, risk analysis, and development of control structures for major financial processes including cash, investments, accounts receivable, inventories, accounts payable, debt, equity capital, and related information systems security. Prerequisite(s): courses 10A and 10B. *The Staff*

113. Introduction to Econometrics. F,W,S

Practical methods for organizing and analyzing economic data, testing economic hypotheses, and measuring economic relationships. Regression analysis is the main empirical method, and basic statistical and probability theory is included. Students gain hands-on computer experience with an econometric software package. Students cannot receive credit for this course and Applied Mathematics and Statistics 113. Prerequisite(s): courses 1, 2, Applied Mathematics and Statistics 5, and either course 11B, Applied Mathematics and Statistics 11B, Mathematics 22, or Mathematics 23A. Courses 100A or 100B strongly recommended as preparation. (General Education Code(s): SR, Q.) *The Staff*

114. Advanced Quantitative Methods. S

Application of statistical methods to estimating and testing economic relationships, i.e., econometric techniques. Topics include the effects of misspecification, choice of functional form, serial correlation, heteroscedasticity, limited dependent variables, and simultaneous equations. Includes discussion of existing empirical work and econometric projects by students. Prerequisite(s): courses 100A or 100M, and 113. *The Staff*

115. Introduction to Management Sciences. F

The scientific study of management decision making. Topics include linear, integer, and non-linear programming. Special emphasis on a wide variety of practical applications, including production scheduling, optimal transportation assignments, and optimal inventory policy. Prerequisite(s): course 100A or 100M. *The Staff*

117A. Income Tax Factors for Individuals. F

Introduces federal taxation for individuals. Topics for study include taxable income, gross income exclusions and inclusions, capital gains, depreciation, business and itemized deductions, personal and dependency exemptions, passive activity losses, tax credits, and methods of accounting. Prerequisite(s): course 10B. *The Staff*

117B. Tax Factors of Business and Investment. W

Focuses on various tax subjects providing a strong foundation in tax concepts and preparation for work in either public or corporate accounting. Topics include historical perspective of the U.S. tax system, introduction to estate and gift taxes, employment and self-employment taxes, tax concepts and laws, business expenses, capital recovery, tax credits, capital gains and losses, capital investments, and corporate operations. (Formerly course 117.) Prerequisite(s): course 10B. *T. Moschetti*

119. Advanced Accounting. S

Accounting for business organizations; partnerships; government and non-profit organization funds; branches,

consolidations, and installment sales. Projects involving spreadsheet software required. Prerequisite(s): courses 111A and 111B. *The Staff*

120. Economic Development. F

A comparative approach to the study of the economic development of low-income countries. Various obstacles to growth are identified, and different types of solutions are analyzed. Prerequisite(s): courses 1, 2, and 113. (General Education Code(s): E.) *The Staff*

121. Economic Growth. *

Studies economic growth from theoretical, empirical, and historical perspectives. Topics include: theories of economic growth and their empirical importance, technology and innovation, social institutions and growth, and competing explanations of the global distribution of wealth. Prerequisite(s): courses 1, 2, 11A, and 11B (or the equivalent); course 100B is strongly recommended. *The Staff*

125. Economic History of the U.S. W

The development of the American economy from colonial times to the present, with emphasis on the interaction between institutional structure and economic development. Topics include the economics of slavery, the rise of big business, and the causes of the Great Depression. Prerequisite(s): courses 1 and 2. Related course work in history also helpful. *B. Elbaum*

126. Why Economies Succeed or Fail: Lessons from Western and Japanese History. F

Examines the emergence of capitalism and the world's first industrial revolution in Britain, continental Europe industrialization, Soviet economic growth and collapse, and the Japanese economic miracle. Asks about the historical sources of long-run economic development, stagnation, and decline. Draws lessons for current debates over free market versus more interventionist policies, economic reform in the former Communist nations, and economic rivalry between the U.S. and Japan. Prerequisite(s): courses 1 and 2. Related course work in history also helpful. *B. Elbaum*

128. Poverty and Public Policy. F

Studies the causes, consequences, and governmental response to urban poverty in the U.S. Topics include how public policy, the macroeconomy, race, gender, discrimination, marriage, fertility, child support, and crime affect and are affected by urban poverty. Emphasizes class discussion and research. (Also offered as Legal Studies 128. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of Entry Level Writing & Composition requirement; courses 100A or 100M; and course 113. Enrollment restricted to economics, business management economics, global economics, legal studies, or economics combined majors. Enrollment limited to 35. (General Education Code(s): W, E.) *The Staff*

130. Money and Banking. S

The institutional structure of central banking and of bank and nonbank financial intermediation in the U.S.; theoretical and empirical investigations of the role of monetary policy in macroeconomic stabilization and economic growth. Prerequisite(s): courses 100B or 100N, and 113. *The Staff*

131. International Financial Markets. S

International financial management analyzes the key financial markets and instruments that facilitate trade and investment activity on a global scale. Inquiry spans two areas: (1) economic determinants of prices in international financial markets; and (2) decisions facing private individuals and enterprises, with topics including capital financing, investment, and risk management. Prerequisite(s):

courses 100A or 100M, and 100B or 100N. *The Staff*

133. Security Markets and Financial Institutions. F,W

An examination of all major financial markets: equities, bonds, options, forwards, and futures. Uses modern financial theory, including asset pricing models such as CAPM and APT. Prerequisite(s): courses 100A or 100M, and 113. *The Staff*

135. Corporate Finance. W

An analysis of financial policies of business enterprises. Topics include cash flow analysis, stock and bond valuation, asset pricing models, capital budgeting, financial market institutions, and financial planning. Prerequisite(s): courses 10A, 100A or 100M, and 113. *The Staff*

136. Business Strategy. F

The strategic management process, techniques for analyzing single-business and diversified companies, implementing strategy, organization, business planning, financial strategy, competitive analysis, entrepreneurial skills. Prerequisite(s): courses 10A and either 100A or 100M. Concurrent enrollment in course 136L is not required. *The Staff*

137. Performing Arts in the Public and Private Economy. *

Analysis of the performing arts: a commodity satisfying a rich and varied source of satisfaction, an occupation for thousands of talented and creative individuals, and an activity whose funding (public versus private) is the source of significant controversy. Economics 1 is strongly recommended as a preparation. Students cannot receive credit for this course and course 80G. *D. Kaun*

138. The Economics and Management of Technology and Innovation. W

Examines the analytics of issues in technology and innovation, including cooperation in research and development (R&D), standardization and compatibility, patents and intellectual property rights, and strategic management, using economic models and firm case studies. Prerequisite(s): course 100A or 100M, or permission of instructor. *The Staff*

139A. The Economics of Electronic Commerce. S

An analysis of the broad spectrum of issues affecting commercial uses of the Internet and the next-generation information infrastructure. Uses economics to examine market structure, pricing quality, intellectual property rights, security, electronic payments and currencies, and public policy implications. Prerequisite(s): course 100A or 100M, or permission of instructor. *N. Singh*

139B. E-Commerce Strategy. *

Introduction and review of economic principles for e-commerce. Overview of trends in e-commerce. Online retailing of physical products; digital products; financial services; housing and related markets. Online business-to-business transactions. Internet infrastructure industry. Government regulation of e-commerce and business strategy responses. Prerequisite(s): course 139A. *N. Singh*

140. International Trade. F,S

The theory of international production and trade. The effects of tariffs and quantitative trade restrictions; the nature of economic integration; multinational firms; effects of trade and protection on economic stability and welfare. Prerequisite(s): course 100A or 100M. *The Staff*

141. International Finance. W

Topics include national accounting, balance of payments theories, parity conditions in international finance, exchange rate determination models, forward-looking financial instruments, international monetary systems,

country interdependence and exchange rate regimes, international monetary integration, and Eurocurrency market. Prerequisite(s): course 100B or 100N. *The Staff*

142. Advanced Topics in International Economics. S

Selected issues in contemporary international economics: theory, empirical evidence, and public policy. Seminar emphasizing discussion and individual research. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, courses 100A or 100M, and 100B or 100N, and 140 or 141. (General Education Code(s): W.) *The Staff*

143. Policy Issues in the International Economy. F

Covers selected issues concerning the international economy. Topics include: U.S. competitiveness; U.S. trade policy; immigration; trade and the environment; developing countries; foreign investment; foreign exchange markets; and international economic institutions. Prerequisite(s): courses 1, 2, and 100A or 100M. *The Staff*

148. Latin American Economies. F

This course is designed to familiarize students with the economic and business environment in Latin America. Prerequisite(s): courses 1 and 2. *The Staff*

149. The Economies of East and Southeast Asia. W

Examines the pattern of international trade, investment, and industrial structure in Asia. Examines competing explanations of rapid growth of Japan, Korea, and Taiwan; presents an overview of economic developments in China, Hong Kong, and Taiwan. Concludes with an analysis of high technology trade and multinationals in Asia in 2000 and beyond. Prerequisite(s): courses 1 and 2. *The Staff*

150. Public Finance. F

Economics of taxation, including incidence, equity issues, efficiency, and supply side effects. Close attention to taxes in the U.S. system and tax-reform issues. Students cannot receive credit for this course and course 250. Prerequisite(s): course 100A or 100M, and course 100B or 100N. *The Staff*

156. Health Care and Medical Economics. *

Health economics theory and review of studies of the health industry, including current topics. Focuses on the structure of the U.S. health care system, including analysis of health policy issues. Relationship to models of perfect competition and efforts at reform. Prerequisite(s): courses 100A or 100M and 113. *C. Dobkin*

159. The Economics of Organizations. S

Uses an economic approach to shed light on questions such as why and how organizations are formed, and what consequences they may have on the adoption of different types of organizations for economic performance. Also emphasizes differences between the "internal markets" within organizations and market transactions. Prerequisite(s): course 11B or Applied Mathematics and Statistics 11B or Mathematics 22, and course 100A or 100M. *R. Gil*

160A. Industrial Organization. W

The structure and conduct of American industry with strong emphasis on the role of government, regulation, anti-trust, etc. The evolution of present-day industrial structure. The problems of overall concentration of industry and of monopoly power of firms. Pricing, output decisions, profits, and waste. Approaches include case study, theory, and statistics. (Also offered as Legal Studies 160A. Students cannot receive credit for both courses.)

Prerequisite(s): course 100A or 100M. *The Staff*

160B. Government and Industry. *

The influence of government regulation on industry and the allocation of resources is rigorously examined using theory and statistics. Areas of regulation include transportation and power, pollution and congestion, rent control, and liability insurance regulation. Both optimal and actual regulation are examined from the point of view of effectiveness, efficiency, social welfare, and re-distribution. Prerequisite(s): course 100A or 100M. *The Staff*

161A. Marketing. W

The evolution of markets and marketing; market structure; marketing cost and efficiency; public and private regulation; the development of marketing programs including decisions involving products, price, promotional distribution. (Formerly course 161.) Prerequisite(s): course 100A or 100M. *The Staff*

161B. Marketing Research. S

Prepares students to conduct market research and use it in solving real management problems. Students work with a company to solve marketing-based problems. Students conduct research, process data, and make a presentation to the company's management. Course work involves marketing, statistics, and communications; material is both qualitative and quantitative. Prerequisite(s): courses 113 and 161A. *The Staff*

164. Economics and the Telecommunications Industry. F

Covers the economics of the telecommunications industry including telephone, cellular telephone, and data communications. Particular emphasis on the Internet, satellite, paging, cable television, radio and television broadcasting. Examines the industry structure and implications of moving from a regulated environment to competition. Topics examined from a competitive strategic standpoint as well as public policy perspective. Prerequisite(s): courses 100A or 100M, and 113. *The Staff*

165. Economics as an Experimental Science. F

The design, execution, and analysis of laboratory experiments in economics. Students study experimental methodology, critically survey the published literature, and design an experiment. Literature includes lab studies of investigations in auctions, markets, social choice theory, and game theory. Prerequisite(s): course 100A or 100M, and course 113. Enrollment limited to 40. (General Education Code(s): W.) *D. Friedman*

166A. Game Theory and Applications I. *

Introduces modern game theory, including applications in social science, biology, and engineering. Topics include extensive form, strategic form, mixed strategies, incomplete information, repeated games, evolutionary games, and simulation techniques. (Also offered as Computer Science 166A. Students cannot receive credit for both courses.) Prerequisite(s): Applied Math and Statistics 5 or 7 or Economics 113; and Economics 11B, Applied Math and Statistics 11B, or Mathematics 11B or 19B. Enrollment restricted to juniors and seniors. Enrollment limited to 100. *The Staff; B. Sinervo, D. Friedman*

166B. Game Theory and Applications II. *

Explores research frontiers in game theory, emphasizing applications in social science, biology, and engineering. Each interdisciplinary team develops a topic, and presents it to the class in oral and written reports and demonstrations. Students must have shown a strong performance in course 166A or equivalent. Students cannot receive credit for this course and Economics 272, Computer Science 272, or Biology: Ecology and

Evolutionary 274. (Also offered as Computer Science 166B. Students cannot receive credit for both courses.) Prerequisite(s): course 166A, Computer Science 166A, or Biology: Ecology and Evolutionary 166A; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. Enrollment limited to 40. (General Education Code(s): W.) *The Staff; B. Sinervo, D. Friedman*

169. Economic Analysis of the Law. S

The application of the theories and methods of neoclassical economics to the central institutions of the legal system, including the common law doctrines of negligence, contract, and property; bankruptcy and corporate law; and civil, criminal, and administrative procedure. (Also offered as Legal Studies 169. Students cannot receive credit for both courses.) Prerequisite(s): course 100A or 100M or permission of instructor. *D. Wittman*

170. Environmental Economics. F

Economic analysis of environmental issues. Environmental pollution and deterioration as social costs. Economic policy and institutions for environmental control. Influences of technology, economic growth, and population growth on environmental quality. Prerequisite(s): courses 100A or 100M, and 113. *The Staff*

171. Natural Resource Economics. W

The application of economic analysis to the use of renewable and nonrenewable natural resources. Efficiency and distributional aspects of natural resource scarcity. Measurement of the benefits and costs. Optimal extraction or use policies. Common property and externalities. Government policies. Prerequisite(s): course 100A or 100M. *The Staff*

175. Energy Economics. W

Applications of micro, welfare, and international economic theory and methodology to the energy field. Questions considered include optimal allocation of natural resources; pricing and investment; regulations and taxes; import and export control; redistributive policies. Prerequisite(s): course 100A or 100M. *The Staff*

180. Labor Economics. S

A study of the changing nature and composition of the U.S. labor force. Topics include the demand for and supply of labor; wage determination; the role and impact of unions in the labor market; racial, ethnic, and gender differences in job and income opportunities and the role of discrimination in explaining these differences; and the theory of human capital, all considered from the traditional neoclassical as well as institutional and radical perspectives. Prerequisite(s): course 100A or 100M. Course 113 is strongly recommended as preparation. *The Staff*

183. Women in the Economy. *

Study of gender roles in economic life, past and present. Topics include occupational structure, human capital acquisition, income distribution, poverty, and wage differentials. The role of government in addressing economic gender differentials is examined. (Also offered as Legal Studies 183. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; courses 1, 2, and 100A or 100M; course 113 strongly recommended. (General Education Code(s): W.) *The Staff*

184. Labor Wars in Theory and Film. W

This seminar focuses on the impact of trade unions and labor-market discrimination on the U.S. work force. The neo-classical, institutional, and radical/Marxist approaches to these questions are employed in the analy-

sis. Films, both fictional and documentary, are utilized as primary source material. Prerequisite(s): permission of instructor based on quality of work in economics; courses 100A or 100M, 100B or 100N, and 113; satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 20. (General Education Code(s): W.) *D. Kaun*

186. Mathematical Methods for Economic Analysis. *

Presents mathematical methods commonly used in graduate-level economic analysis: basic matrix algebra, real analysis, functions, continuity concepts, differentiation, Taylor expansions, and implicit function theorem and optimization. Prerequisite(s): interview only: admitted to M.S. or Pathway Programs. *The Staff*

188. Management in the Global Economy. S

An overview of how firms do business in the global economy. Focus is on the firm, but also explores the impact of corporate decision-making on national welfare. Emphasizes how national economic policies and international institutions influence firm strategy and industrial structure. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 2 and 100A or 100M; course 100B or 100N strongly recommended as preparation. (General Education Code(s): W.) *The Staff*

189. Political Economy of Capitalism. W

An assessment of modern day capitalism from the three major economics paradigms-liberal, conservative, radical. Theories of Smith, Marx, and Keynes are explored in contemporary writing, with focus on the U.S. from WW II to present. Students cannot receive credit for this course and course 80A. Prerequisite(s): courses 1 and 2; courses 100A or 100M, and 100B or 100N are recommended as preparation. *D. Kaun*

190. Senior Proseminar. *

Courses focus on problems of interest to advanced students of economics. They offer a flexible framework, so those interested in specific issues can read, present papers, and develop their ideas. *The Staff*

191. Economics Teaching Practicum. F,W,S

Each student serves as facilitator for small discussion group in connection with core economics courses. Facilitators complete course readings and meet with instructor as a group to discuss the teaching process. May *not* be counted toward upper-division major requirements. May be repeated for credit. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar, course 42, under faculty supervision. May *not* be counted toward the upper-division major requirements. Students submit petition to sponsoring agency. *The Staff*

193. Field Study. F,W,S

Provides for department-sponsored individual field study in the vicinity of the campus under the direct supervision of a faculty sponsor (in contrast to course 198 where faculty supervision is by correspondence). May *not* be counted toward the upper-division major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S

Provides for department-sponsored individual field study in the vicinity of the campus under the direct supervision of a faculty sponsor. May *not* be counted toward the upper-division major requirements. Students spend 8-10 hours per week at job site. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Advanced Topics in Management. *

Honors course providing detailed analysis of specialized topics in management. Possible topics include: venture capital, the financial services industry, e-business, behavioral finance, advanced consumer behavior, entrepreneurship, high-tech marketing, risk management, and option value approaches to business strategy. Students cannot receive credit for this course and course 194F. Prerequisite(s): courses 100A or 100M, 100B or 100N, and 113. Enrollment by permission of instructor, and review of performance in economics courses. Enrollment restricted to senior and junior business management economics majors. (Formerly *Advanced Topics in Business Management Economics*.) Enrollment limited to 30. *The Staff*

194F. Advanced Topics in Management (2 credits). *

Detailed analysis of specialized topics in management. Possible topics include: venture capital, the financial services industry, e-business, behavioral finance, advanced consumer behavior, entrepreneurship, high-tech marketing, risk management, and option value approaches to business strategy. Students cannot receive credit for this course and course 194F. Prerequisite(s): courses 100A or 100M, 100B or 100N, and 113. Enrollment by permission of instructor, and review of performance in economics courses. Enrollment restricted to senior and junior business management economics majors. Enrollment limited to 30. *The Staff*

195. Senior Thesis. F,W,S

A supervised research project. If the project is of unusual scope, the course may be repeated for credit. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, students submit petition to sponsoring agency. (General Education Code(s): W.) *The Staff*

198. Independent Field Study. F,W,S

Provides for department-sponsored individual study program off campus for which faculty supervision is not in-person, but by correspondence. May *not* be counted toward the upper-division major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Provides for department-sponsored individual study program off campus for which faculty supervision is not in person, but by correspondence. May *not* be counted toward the upper-division major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

May be repeated for credit, but may be counted only once toward the upper-division major requirements. Undergraduates may not take graduate courses for credit as 199. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Specialized study with individual faculty. May not be applied toward the major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Microeconomic Analysis. F

Survey of partial equilibrium analysis, market distortions, consumer choice and production and trade

theory, perfect and imperfect competition, price discrimination, and intertemporal choice theory. *The Staff*

201. Applications in Microeconomics. S

Applies concepts and tools developed in course 200 to problems encountered in private- and public-sector output and labor markets. The focus is empirical; topics include analysis of labor supply and labor demand and the role of government labor market policies, analysis of pricing policies and regulation, estimation of the returns to schooling, estimation of demand and cost functions, and the role of unions in the economy. Course 200 is strongly recommended as preparation. *The Staff*

202. Macroeconomic Analysis. W

Aggregate economic analysis: determinants of aggregate expenditures and output, the roles of monetary and fiscal policy, recent developments in macro theory; macro policy issues. *The Staff*

204A. Advanced Microeconomic Theory. F

Economic theory of individual and market behavior, including constrained optimization, duality, theory of the consumer, theory of the producer, dynamic optimization, behavior under uncertainty, intertemporal choice, asymmetric information, game theory, partial and general equilibrium, pure and applied welfare economics, public goods and externalities. Illustrative examples emphasize international applications. Courses must be taken in sequence. *The Staff*

204B. Advanced Microeconomic Theory. W

Economic theory of individual and market behavior, including constrained optimization, duality, theory of the consumer, theory of the producer, dynamic optimization, behavior under uncertainty, intertemporal choice, asymmetric information, game theory, partial and general equilibrium, pure and applied welfare economics, public goods and externalities. Illustrative examples emphasize international applications. Courses must be taken in sequence. Prerequisite(s): course 204A. *The Staff*

204C. Advanced Microeconomic Theory. S

Economic theory of individual and market behavior, including constrained optimization, duality, theory of the consumer, theory of the producer, dynamic optimization, behavior under uncertainty, intertemporal choice, asymmetric information, game theory, partial and general equilibrium, pure and applied welfare economics, public goods and externalities. Illustrative examples emphasize international applications. Courses must be taken in sequence. Prerequisite(s): course 204B. *The Staff*

205A. Advanced Macroeconomic Theory. F

Modern macroeconomic theory: determination of national income; employment, inflation, and exchange rates; theories of growth and business cycle fluctuations; international transmission of inflation and other disturbances; recent developments in the analysis of macroeconomic policy; modern theoretical and empirical analysis of aggregate relationships. Courses must be taken in sequence. *The Staff*

205B. Advanced Macroeconomic Theory. W

Modern macroeconomic theory: determination of national income; employment, inflation, and exchange rates; theories of growth and business cycle fluctuations; international transmission of inflation and other disturbances; recent developments in the analysis of macroeconomic policy; modern theoretical and empirical analysis of aggregate relationships. Courses must be taken in sequence. Prerequisite(s): course 205A. *The Staff*

205C. Advanced Macroeconomic Theory. S

Modern macroeconomic theory: determination of national income; employment, inflation, and exchange rates; theories of growth and business cycle fluctuations; international transmission of inflation and other disturbances; recent developments in the analysis of macroeconomic policy; modern theoretical and empirical analysis of aggregate relationships. Courses must be taken in sequence. Prerequisite(s): course 205B. *The Staff*

209A. Accounting I. F

Principles, control, and theory of accounting for assets; accounting as an information system; measurement and determination of income. M.S. level projects required. Students cannot receive credit for this course and course 111A. Enrollment restricted to graduate students. *R. Shepherd*

209B. Accounting II. W

Principles, control, and theory of accounting for liabilities and equities; preparation and analysis of cash flow statements and earnings per share computation. M.S. level projects required. Students cannot receive credit for this course and course 111B. *R. Shepherd*

210A. Mathematical Methods for Economic Analysis. F

Mathematical methods commonly used in economic analysis are discussed. Covers basic matrix algebra, real analysis, functions, continuity concepts, differentiation, Taylor expansion, implicit function theorem, and optimization. Prerequisite(s): qualifications as determined by instructor; inquire at department office. *The Staff*

210B. Mathematical Methods for Economic Analysis. F

A course in introductory mathematical economics which covers standard optimization problems, difference and differential equations, optimal control theory, decisions under uncertainty, game theory, and stochastic calculus. Course 210A or equivalent is strongly recommended as preparation. *The Staff*

211A. Advanced Econometrics. F

Advanced econometric methods are introduced. Topics include the standard regression analysis, simultaneous equation estimation, nonlinear models, qualitative response models, panel data analysis, and univariate and multivariate time series analysis. *The Staff*

211B. Advanced Econometrics. W

Advanced econometric methods are introduced. Topics include the standard regression analysis, simultaneous equation estimation, nonlinear models, qualitative response models, panel data analysis, and univariate and multivariate time series analysis. Course 211A is strongly recommended as preparation for course 211B. *The Staff*

211C. Topics in Empirical Research. S

A topic course in econometrics designed for graduate students interested in quantitative analysis. Selected topics, including standard and recently developed econometric techniques, are critically and thoroughly discussed. In addition to methodology, focuses on exploring the research potential and applications of advanced econometric techniques. Courses 211A and 211B are strongly recommended as preparation. *The Staff*

212. Empirical Project in Econometrics (2 credits). F,W,S

Empirical project or paper in econometrics to demonstrate student's ability to conduct applied econometric analysis. Ph.D. requirement to be completed by beginning of stu-

dent's third year of study. Prerequisite(s): courses 211A and 211B. May be repeated for credit. *The Staff*

216. Applied Econometric Analysis I. F

The use of statistical techniques for the testing of economic hypotheses and the estimation of parameters, with emphasis on regression analysis. Includes methods of dealing with serial correlation, errors in variables, multicollinearity, and heteroscedasticity. Experience with common statistical packages. *The Staff*

217. Applied Econometric Analysis II. W

Focuses on the application of advanced econometric and time series techniques to economic issues. Computer assignments and empirical applications are used to discuss and illustrate the practical aspects of simultaneous equation systems, nonlinear models, qualitative response models, time series model specification, unit root test, and cointegration analysis. Course 216 is strongly recommended as preparation. *The Staff*

220A. Development Economics: Theory and Cases. F

Surveys traditional development economics and the neo-classical resurgence in development theory. Topics include sources of growth, income distribution, population and human capital development, savings, fiscal and monetary mobilization and allocation, foreign investment and aid, and macroeconomic policies. Case study focus in the second quarter. Courses 204A and 205A are strongly recommended as preparation. *The Staff*

220B. Development Economics: Theory and Cases. W

Surveys traditional development economics and the neo-classical resurgence in development theory. Topics include sources of growth, income distribution, population and human capital development, savings, fiscal and monetary mobilization and allocation, foreign investment and aid, and macroeconomic policies. Case study focus in the second quarter. Courses 204A and 205A are strongly recommended as preparation. *The Staff*

221A. Advanced Monetary Economics I. W

Covers major issues in monetary economics, focusing on the core theoretical models employed in monetary economics. Topics include: money in general equilibrium; money-in-the-utility function approaches; cash-in-advance models; search-based models; welfare costs of inflation; optimal inflation tax; informational frictions in monetary economies; financial and credit frictions; nominal price and wage frictions; time-dependent and state-dependent models of price adjustment; and money in new Keynesian models. Prerequisite(s): course 205 A-B-C, or by permission of instructor. Enrollment restricted to graduate students. *F. Ravenna, C. Walsh*

221B. Advanced Monetary Economics II. S

Covers major issues in monetary economics, focusing on the core lessons for design and implementation of monetary policies. Topics include: welfare-based policy objectives; optimal policy under discretion; optimal commitment policies; model dynamic stochastic general equilibrium (DSGE) for policy analysis; open economy models for monetary policy analysis; learning; model uncertainty and policy design; empirical evidence on the channels of monetary policy transmission; monetary policy operating procedures; zero nominal interest-rate bound; international transmission of monetary policy; policy and asset prices. Prerequisite(s): course 205 A-B-C, or by permission of instructor. Enrollment restricted to graduate students. *F. Ravenna, C. Walsh*

233. Finance I. S

Applications of economic analysis in private finance. Topics include risky choice and intertemporal choice theory, asset pricing models, efficient market hypotheses, market institutions, and derivative securities. Course 200 is strongly recommended as preparation. *The Staff*

234. Financial Institutions and Markets. S

This course examines the evolving microstructure of financial markets, instruments, and institutions. Topics include the role of banks and other financial intermediaries and the trading practices for domestic and international financial instruments, including equity, debts, futures, and options. Prerequisite(s): course 233. *The Staff*

235. Corporate Finance. W

Application of modern financial theory to corporate decision making. Topics covered include capital budgeting and the firm's investment decision, capital structure, dividend policies, and the implications of corporate governance for enterprise financial goals. Prerequisite(s): course 233. *The Staff*

236. Financial Engineering. F

This course surveys the financial risks faced by corporations, banks, and other financial institutions that arise from changes in interest rates, foreign exchange rates, commodity prices, and stock prices. It examines the characteristics, payoffs, and pricing of financial derivatives and other instruments for managing risk, including options, forwards, futures, swaps, structured notes, and asset-backed securities. Several cases will be used to illustrate how actual firms solve financial risk management problems. Prerequisite(s): course 233. *The Staff*

239. Current Topics in Finance. *

Topics in finance selected by the instructor. Prerequisite(s): course 233. *The Staff*

240A. Advanced International Trade Theory I. F

The theory of international trade and commercial policy. Both traditional analyses and recent developments are covered. Topics include both normative and positive theoretical analyses, as well as empirical testing of theory. Enrollment restricted to graduate students. Courses 204A-B-C are strongly recommended as preparation. *The Staff*

240B. Advanced International Trade Theory II. W

This is the second quarter of a two-quarter sequence. It deals with most major current advanced research topics in trade. It is both theoretical and empirical and is designed to acquaint students with recent research in the field. Research topics include models of political economy of trade policies; trade and labor markets; regionalism and multilateralism; trade and environment; theories, determinants, and implications of foreign direct investments; economic geography. Prerequisite(s): course 240A. *The Staff*

240C. Advanced International Trade Theory III. S

Covers the empirical aspects of international trade issues. Topics include the testing and estimation of various trade models such as the Ricardian model, Heckscher-Ohlin-Vanek model, intra-industry trade models, trade models associated with multinational corporations, models of trade and intellectual property rights, the impact of trade on income inequality, and trade between developed and developing economies. Prerequisite(s): course 240B. Enrollment restricted to graduate students. *The Staff*

241A. Advanced International Finance I. F

Financial aspects of aggregate capital and trade flows and

income determination in open economies. Specific topics include financial risk in the international setting, international borrowing and lending, money and exchange rate regimes, income determination and macroeconomic policy, current issues in international monetary reform. *The Staff*

241B. Advanced International Finance II. W

An examination of the formulation and implementation of international economic policy from both theoretical and empirical perspectives. Topics include case studies in fiscal, monetary, exchange rate, tariff, and other regulatory policies. *The Staff*

241C. Advanced International Finance III. S

Focuses on empirical applications in international finance. Topics include structural and reduced form models of exchange rates, interest parity conditions, purchasing power parity, capital controls, capital flows to emerging markets, and government intervention in foreign exchange markets. Courses 202 and 203 or 205A-B-C strongly recommended as preparation. *The Staff*

243. History of the International Economy. S

Studies the evolution and functioning of the international economy from the days of the gold standard to the present. Particular attention is paid to the interwar period with its problems of structural transformations and their relation to the Great Depression and its immediate aftermath, the rise and fall of the Bretton Woods system, the experience of floating exchange rate regimes, the rise of the "new industrial countries," and the problems of international indebtedness. Courses 204A and 205A are strongly recommended as preparation. *The Staff*

249A. International Trade and Development Policy I. W

Focuses on a range of real-life issues in international trade and development. Topics include North American Free Trade Agreement (NAFTA), the semiconductor industry, the Boeing-Airbus aircraft trade problems, the World Trade Organization (WTO) and developing countries, U.S./Japan trade, trade and the environment, and U.S./China trade. Enrollment restricted to graduate students. *The Staff*

249B. International Trade and Development Policy II. *

Emphasizes government policies to promote growth. Topics include the "Washington Consensus," the East Asian "model," and recent policy changes in East Asia, Latin America, Eastern Europe, and the former Soviet Union. Prerequisite(s): course 249A. Enrollment restricted to graduate students. *The Staff*

250. Advanced Public Finance. F

Theory of the role of public sector expenditures and taxes in market economies. Analyzes efficiency and equity arguments for government intervention. Topics include the role of public debt and deficits in economies, international effects of tax and spending policies, and economic theories of public sector decision making. Courses 204A and 205A are strongly recommended as preparation. Students cannot receive credit for this course and course 150. *The Staff*

259A. Cost-Benefit Analysis. *

Applications of economic analysis in public finance, largely from the revenue side: taxation. The issues considered include the effects of taxation on consumer welfare, consumption, labor, capital, production, growth. Course 200 is strongly recommended as preparation. Students cannot receive credit for this course and course 153. *The Staff*

259B. Public Policy Analysis. *

Applications of welfare and microeconomic theory and methodology to the public expenditure question: cost-benefit. Effects of the taxes discussed in course 259A and sophisticated tools used in the face of these and other distortions with regard to measurement of benefits, costs, and the discount rate. Course 200 strongly recommended as preparation. *The Staff*

270. Advanced Topics in Applied Microeconomics. *

Advanced topics and current research in microeconomic theory, including game theory and general equilibrium analysis. Courses 204A-B and 205A are strongly recommended as preparation. (Formerly *Advanced Topics in Microeconomic Theory*.) *The Staff*

271. Advanced Topics in Macroeconomic Theory. *

Advanced topics and current research in macroeconomic theory, including DSGE models, empirical issues, and optimal policy analysis. Prerequisite(s): courses 204A-B-C, 205A-B-C, and 211A-B-C are strongly recommended as preparation. *The Staff*

272. Evolutionary Game Theory. *

Reviews static equilibrium concepts, games of incomplete information, and the traditional theory of dynamic games in discrete time. Develops recent evolutionary game models, including replicator and best reply dynamics, and applications to economics, computer science, and biology. Also offered as Computer Science 272 and Biology: Ecology and Evolutionary 274. Students cannot receive credit for this course Computer Science 272, and Biology: Ecology and Evolutionary 274. Prerequisite(s): upper-division math courses in probability theory are strongly recommended. Cannot receive credit for this course and Economics 166B, Computer Science 166B, or Biology: Ecology and Evolutionary 176B. (Also offered as Computer Science 272. Students cannot receive credit for both courses.) *The Staff*

273. Advanced Applied Microeconomics. *

Covers topics in applied microeconomics, including labor economics, public economics, and demography. Discusses advanced econometric techniques and theory commonly used in applied microeconomics and microeconomic theory. Students make extensive use of statistical packages and large data sets to complete course assignments. Upper-division econometric and microeconomics courses strongly recommended. *R. Fairlie*

274. Workshop in Macroeconomics and Monetary Economics (3 credits). *

For Ph.D. students in economics who are at the early stages of their research careers as well as for those who are engaged in dissertation work in macroeconomics and monetary economics. Topics vary from quarter to quarter depending on the interests of participants. Prerequisite(s): courses 205A, 205B, and 205C, or by consent of instructor. Enrollment restricted to graduate students. May be repeated for credit. *F. Ravenna, C. Walsh*

290. Topics in International Economics. *

Covers several advanced topics in the history of international economics, international trade, and international finance. Topics include imperfect competition and trade, strategic trade policies, increasing returns, and the pattern of trade, economic geography, exchange rate target zones, and balance of payment crises. Topics vary from year to year. Courses 204A-B-C and 205A-B-C are strongly recommended as preparation. *The Staff*

291. Workshop in Applied Economics. S

Experience in applied projects, report writing and

presentation, drawing on previous course work. *The Staff*

293. Field Study. F,W,S

Students will undertake analytical projects in public or private institutions. The material covered must be different from that of the thesis topic. *The Staff*

294A. Applied Economics Laboratory (2 credits). F

Practical experience in managing computerized data sets and running statistical packages. Covers SAS, RATS, TSP, Bridge Equity System, LIMDEP, GAUSS, and MAPLE programs; and internet, IFS, OECD, and SPIRS EconLit databases. May be repeated for credit. *The Staff*

294B. Applied Economics Seminar (2 credits). *

Weekly seminar designed to present students with current working applications in various fields of applied economics and finance. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

295A. Directed Reading. F

Reading in research area of student interest, with faculty supervision through weekly discussion. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

295B. Directed Reading. W

Reading in research area of student interest, with faculty supervision through weekly discussion. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

295C. Directed Reading. S

Reading in research area of student interest, with faculty supervision through weekly discussion. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

296A. Third Year Ph.D. Seminar. F

Student presentations of literature and/or original research in areas of student research interest. Student discussion of presentations under faculty supervision. Prerequisite(s): courses 204C, 205C, 211B, 240A, 240B, 241A, and 241B are required preparation. *The Staff*

296B. Third Year Ph.D. Seminar. W

Student presentations of literature and/or original research in areas of student research interest. Student discussion of presentations under faculty supervision. Prerequisite(s): courses 204C, 205C, 211B, 240A, 240B, 241A, and 241B are required preparation. *The Staff*

296C. Third Year Ph.D. Seminar. S

Student presentations of literature and/or original research in areas of student research interest. Student discussion of presentations under faculty supervision. Prerequisite(s): courses 204C, 205C, 211B, 240A, 240B, 241A, and 241B are required preparation. *The Staff*

297. Independent Study. F,W,S

Independent study and research under faculty supervision. Students submit petition to sponsoring agency. *The Staff*

298. Dissertation Research. F,W,S

Research toward Ph.D. dissertation under faculty supervision. Prerequisite(s): advancement to candidacy and students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

May be taken once to meet course requirements for the

master's degree. Students submit petition to sponsoring agency. *The Staff*

Education

217 Social Sciences I Building
Advising: (831) 459-2589
<http://education.ucsc.edu>
education@ucsc.edu

Faculty and Professional Interests

Professor

MARGARET (GRETA) A. GIBSON, Emerita

JUNE A. GORDON

Urban comparative education; sociology of education; schooling and society in Japan, China, the U.K., and the U.S.A.; marginalized youth and economic conditions

JUDIT MOSCHKOVICH

Mathematics cognition and learning; student conceptions of linear functions; discourse in mathematics and science classrooms; everyday mathematical practices; and bilingual mathematics learners

RODNEY OGAWA

Educational leadership, educational reform, and the impact of social institutions on the structure of school organization

ART PEARL, Emeritus

DAVID SWANGER, Emeritus

TRISH STODDART

Teacher education, science education, educational reform

ROLAND G. THARP, Emeritus

C. GORDON WELLS

Language and literacy development, analysis of discourse in learning and teaching, inquiry-oriented curriculum; socio-cultural theory and education, collaborative action research

Associate Professor

DORIS ASH

Informal science learning, teacher professional development, science discourse in and out of the classroom

RON GLASS

Moral and political philosophy and education, ideology and education, race and education, urban school reform

BRAD OLSEN

Teacher development (with emphasis on knowledge and identity), English education, and sociolinguistics

LUCINDA PEASE-ALVAREZ

Language and literacy development, language-minority education, bilingualism, informal learning

JUDITH SCOTT

Literacy and language learning; academic language; reading, writing, vocabulary development; teachers' professional development through collaboration and inquiry

KIP TÉLLEZ

Preparation of teachers for linguistic and cultural diversity, second language learning, studies of the school curriculum, educational assessment

Assistant Professor

LORA BARTLETT

Educational policy and school reform, schools as workplaces for teachers, the conditions of teachers' commitment

GEORGE BUNCH

Language and education in linguistically diverse settings, preparation of teachers for linguistic diversity, language policy, and bilingualism

CYNTHIA CRUZ

Street ethnography; community-based learning and pedagogies; decolonial feminist pedagogies; Chicana studies and epistemologies; U.S. Third World Feminisms; cultural studies and education

EDUARDO MOSQUEDA

Mathematics education of English learners; large-scale dataset quantitative analysis; urban education issues

JEROME SHAW

Scientific inquiry, specifically examining the science education experiences of English language learners and their teachers; includes examining ways in which assessments in English measure content knowledge versus language proficiency



Professor

CATHERINE R. COOPER (Psychology)

Cultural perspectives on child and adolescent development; linkages among families, peers, schools, and work; issues of diversity, ethnicity, and gender in identity; research, practice, and policy in university outreach programs; linking qualitative and quantitative research

BRUCE N. COOPERSTEIN (Mathematics)

Algebra, algebraic number theory

BARBARA ROGOFF (Psychology)

Human development in sociocultural activity; informal and formal arrangements for learning; adult/child and peer communication in families and schools in diverse cultural communities; learning through observation; cognitive development, especially problem solving, planning, and attention

Senior Lecturer

DONALD L. ROTHMAN (Writing)

Literacy education and democracy; UC/K-12 partnerships; writing, persuasion, and nonviolence; writing pedagogy; connections between beauty and justice

Program Description

The purpose of the Education Department's instructional programs is to prepare all students, undergraduates and graduates, to engage in the analysis and integration of educational theory, research, and practice for an increasingly diverse society. The department's primary intellectual and practical focus is on fostering equitable and effective schooling for all students. In working toward this goal, the department seeks to understand the profound issues involved in transforming public education so that it better meets the needs of students from diverse language, ethnic, racial, and class backgrounds. We are a small department with the large agenda of developing educational leaders and pursuing educational research that will affect the future of teaching and learning both inside and outside of schools. Our commitment lies in three essential and interrelated domains: 1) school, families, and communities; 2) teacher education and development; and 3) mathematics and science. Undergirding them all is a focus on the socio-cultural context in which learning and teaching takes place and an understanding of the power of language and literacy in both formal and informal educational settings.

The Education Department has two growing doctor

of philosophy (Ph.D.) and doctor of education (Ed.D.) programs that attract students who have exemplary preparation as well as experience working in educational settings; a model teacher-education program; and two vibrant minor tracks that serve more than 300 undergraduates each year.

Minors in Education

The UCSC undergraduate courses in education engage students in the study of the history of educational thought and philosophy, the politics and economics of education, learning theory and pedagogy, and issues of cultural and linguistic diversity in education.

Because an academic major in education is not permitted in the state of California, UCSC offers two minors in education for those students who are considering a career in teaching and also for those who hold a general interest in educational studies. Please note that the minors in education do not provide a California Teaching Credential. Additionally, the UCSC teaching credential program is a graduate program and coursework taken in the minor cannot be substituted for credential requirements.

General Minor in Education

The general minor in education consists of six courses totaling 30 credits: 60, 180, and four upper-division education courses (please refer to the Education Department's web site for a list of approved upper-division courses for the education minor, <http://education.ucsc.edu>).

To declare a minor, students must file a Proposed Plan and Declaration of Major/Minor form at the Education Department. Students pursuing a minor in education should meet with the Education Department's academic adviser as early as possible. The adviser will assist students in filing the Proposed Study Plan and the Declaration of a Major/Minor form.

For specific instructions about how to declare a minor in education, please refer to the Education Department's web site <http://education.ucsc.edu>.

Science, Technology, Engineering, and Mathematics (STEM) Education Minor

The STEM minor specifically serves students in STEM majors who are considering careers in secondary mathematics or science teaching. The STEM minor in education consists of eight courses, totaling 32 credits and including 90-100 hours of classroom field placements: EDUC 50, EDUC 60, EDUC 100, EDUC 185B or 185C, EDUC 185L, one education course addressing cultural and linguistic diversity (e.g., EDUC 128, 135, 141, 164, 170, 177, or 181), and two education upper-division electives. Students pursuing the STEM education minor should meet with the Cal Teach staff as early as possible. Entry into EDUC 50 is by interview only, and interested students must submit an application to the Cal Teach program (see <http://calteach.ucsc.edu> or e-mail calteach@ucsc.edu).

Graduate Programs

Master of Arts in Education and California Teacher Credential Program

Please note that students are not admitted into the program for a stand-alone master of arts (M.A.) in education or a stand-alone credential.

Because program requirements are authorized by statutes and regulated by a state entity, the California Commission on Teacher Credentialing, program requirements must be responsive to new legislation

and regulatory policies. Admission requirements and programs of study referred to are subject to change to comply with regulatory mandates.

The master of arts in education and California teacher credential program prepares prospective teachers to work with California's culturally and linguistically diverse student population. Students in this program earn a master's degree and are eligible to apply for a Preliminary California Credential upon completing a five-quarter program comprised of two summers and one academic year. Graduates of the program are prepared to teach English language learners enrolled in K–12 public schools. The program also offers the Bilingual, Crosscultural, Language, and Academic Development (BCLAD) emphasis. The UCSC BCLAD emphasis authorizes primary language instruction or dual language immersion instruction in a K–12 setting. The UCSC BCLAD language of emphasis is Spanish.

Students who complete the program are eligible to apply for a California Preliminary Multiple Subjects Teaching Credential or a California Preliminary Single Subject Teaching Credential. The Multiple Subjects Teaching Credential authorizes the holder to teach in a K–12, self-contained public school classroom, where all subjects are taught by the same teacher. The Single Subject Teaching Credential authorizes the holder to teach in his/her credential subject area in a K-12 departmentalized classroom setting within a public school system.

The UCSC, single-subject, teacher-credential program offers the following subject areas: mathematics, English, social science, and science. Programs of study are subject to change.

Prerequisite Admission Requirements

All candidates must have preparation in the following areas:

A course, or equivalent experience, that addresses cultural and linguistic diversity. The following UCSC undergraduate education courses are examples of courses that meet this requirement: 128, *Immigrants and Education*; 141, *Bilingualism and Schooling*; 164, *Urban Education*; 181, *Race, Class, and Culture in Education*; and 92C *Introduction to Issues in Diversity and Education*. Other courses offered outside the Education Department may be acceptable. However, outside coursework cannot be preapproved by the department.

A documented field experience with children or youth in an educational setting. Experiences such as directed observation, substitute teaching, school tutoring, work in after-school programs, camp counseling, instructional aide, or the equivalent are acceptable experiences. When applying to the program, please describe your field experience in the designated area of the application titled, PERSONAL STATEMENT.

Application Selection Criteria

Admission to the program is competitive. Candidates for admission are selected, in part, on the following criteria:

Academic Record

College coursework is evaluated with attention to content and grades or narrative evaluations. The appropriateness of courses taken for the credential sought is also taken into consideration. For the multiple subjects credential, students should have an extensive breadth of courses in the core subject areas taught in elementary school—math, science, social science, and English. For

the single subject credential, students should have an extensive body of coursework in the content area.

Statement of Purpose, Writing Sample, Letters of Recommendation, Personal Statement, and Résumé Information provided in these documents is used in the selection of candidates. All documents must be submitted by the application deadline.

The statement of purpose should discuss the following:

- an explanation of why you want to become a teacher;
- how your experience has contributed to your motivation and potential to be an educational leader;
- a description of your experiences related to youth, cultural and linguistic diversity, and community involvement.
- *Writing sample*: a sample of your writing (no more than 10 pages). A research-based paper is preferred, for example, a paper written on an educational topic or a paper written in your content area. Alternatively, applicants may choose to write a brief piece specifically for this application.
- *Letters of recommendation*: three letters of recommendation are required. At least one letter should be written by university faculty who can address the applicant's academic merit, and at least one letter written from someone in the field who has observed the applicant's work with children or youth. It is recommended that these letters address your qualifications in the following areas:
 - a) academic performance
 - b) field work with youth
 - c) experience in culturally and linguistically diverse settings and with student populations who have traditionally been underserved in schools and classrooms.
- *Personal history*: write a statement (approximately two to five pages) explaining how your personal history has influenced your decision to apply to this graduate program.
- *Résumé*: a résumé that includes an employment history; any relevant volunteer or community work, especially in schools and/or with children; and experiences in multicultural and multilingual settings. Include information on languages (other than English) in which you have competence.
- *BCLAD Essay (BCLAD applicants only)*: candidates must submit an essay in Spanish as described in the online application.

Admission Requirements

Testing

All required examinations must be met by the stated deadlines.

All admitted applicants must verify completion of the California Basic Educational Skills Test (CBEST) requirement and submit a passing-status verification by June 1 in order to enroll in the program.

Additional information can be found at the CSET Registration web site, <http://www.cset.nesinc.com/> (*state requirement and subject to change*). It is recommended that passing verification be submitted with the application.

Subject-Matter Competence

California state law mandates that all teachers provide evidence of their subject-matter knowledge (*state requirement and subject to change*).

Admitted Multiple Subject applicants must submit verification of having passed the California Subject Examinations for Teachers (CSET): Multiple Subjects Subtests by June 1 prior to enrollment in the program. However, it is highly recommended that documentation of passing CSET scores be submitted with the application. Multiple Subject applicants must pass each section of the CSET; no coursework or "waiver" program can substitute for passing CSET scores.

Deadline to complete this requirement: June 1 of each year prior to enrollment into the program. However, applicants are encouraged to complete this requirement prior to applying to the program.

Additional information can be found at the CSET Registration web site, <http://www.cset.nesinc.com/>.

Single Subject

The California Subject Examinations for Teachers (CSET), or verification of an approved subject matter program from the applicant's undergraduate institution is required. Admitted applicants must submit verification of having passed the CSET examination for their subject (e.g., mathematics), or confirmation of 100 percent completion of an approved subject matter program.

Deadline to complete this requirement: June 1 of each year prior to enrollment into the program. However, it is highly recommended that documentation of subject matter competence be submitted with the application. Additional information can be found at the CSET Registration web site, <http://www.cset.nesinc.com/>.

Certificate of Clearance

In accordance with Education Code Section 44320(b), each credential candidate for an initial credential, prior to admission to any credential program, must obtain a Certificate of Clearance.

A Certificate of Clearance is a document that indicates that the individual has completed the fingerprint and character and identification process and has been cleared by the California Commission on Teacher Credentialing to begin student teaching.

To comply with this regulation the UCSC Education Department must have on file a copy of the Certificate of Clearance before allowing a person to begin public school fieldwork or student teaching.

If you hold or have applied for a credential from the California Commission on Teacher Credentialing (such as an emergency substitute teaching permit) you are not required to apply for another Certificate of Clearance. Please submit a photo copy of your prior credential for your application to the program by mail to: Education Dept., UC Santa Cruz, 1156 High St., Santa Cruz, CA, 95064.

Applicants who do not hold a valid California credential or have not previously applied for a Certificate of Clearance through the Commission on Teacher Credentialing must apply for the Certificate of Clearance.

Further information regarding this requirement, including Live Scan form LS-41, is also available within the UCSC Graduate School Online Application available October 1 each year (<http://graddiv.usc.edu/prospective/>). Please send an e-mail to the Education Department, edma@usc.edu, for further instructions regarding your Certificate of Clearance Application.

Deadline for completing this requirement: January 15 of each year.

Program and State of California Requirements (Not Required for Initial Admission in the Program)

These requirements may be met prior to or while enrolled in the program, but they must be met to be eligible for a California teaching credential.

BCLAD Candidates

The CSET Languages Other Than English (LOTE) (Spanish) Subtest III (CSET test code 147). It is recommended that passing test scores be submitted with the application. Individuals may still apply to the program without having passed the CSET LOTE. However, all admitted BCLAD applicants must submit passing verification for the examination prior to being issued a credential. (CSET Registration: <http://www.cset.nesinc.com>).

U.S. Constitution Requirement

A course on the U.S. Constitution (or completion of an examination offered by the Education Department to enrolled students) is required. UCSC-approved courses that meet this requirement are Politics 20, *American Politics*; Politics 111, *Constitutional Law*; Politics 120A, *Congress, President, and the Court in American Politics*; and History 25A, *United States History to 1877*.

Reading Instruction Competence Assessment (RICA)

Multiple Subjects candidates are required—prior to completion of the program and in order to be recommended for a preliminary credential—to pass the RICA exam. The RICA measures the knowledge, skills, and abilities essential to offer effective reading instruction to K–12 students. Candidates should not take this examination prior to completing course 220.

CPR

A certified cardiopulmonary resuscitation (CPR) course (infant, child, and adult) must be completed and valid upon application for the credential.

Student Teaching

The successful development of teaching skills in the classrooms is the culmination of a teacher education program. Therefore, candidates must demonstrate, by the end of their program, teaching competence in the classroom. Credentialed public school teachers are responsible for the nurturing of children and youth. Therefore, teaching credential candidates must consistently display conduct befitting the profession. To this end, the candidate must be able to cope with the demands and responsibilities of teaching as outlined below:

- Meet university and program requirements and deadlines (including school expectations during field experiences).
- Plan ahead to anticipate needs and potential student teaching problems.
- Be able to adapt to institutional and/or professional expectations and policies.
- Relate appropriately to children, parents, and school staff.
- Demonstrate sensitivity to the social, cultural, economic context of the school environment.
- Adhere to school expectations for dress, appearance, and personal hygiene.

Candidates whose professional behavior does not meet these minimal standards may be recommended for

dismissal from the program.

Beginning student teaching, which begins during the Summer Bridge between the university summer and fall quarters, constitutes the first classroom observation experience for students in the program. Student teachers are in their classroom placements from 10–14 hours a week depending on the school site schedule. To enroll in this course, students must have a Certificate of Clearance issued and on file with the California Commission on Teacher Credentialing.

Intermediate and advanced student teaching is a two-quarter experience (winter/spring) in which student teachers are placed with cooperating teachers in local schools. Students are in the classroom placements 14 or more hours a week in winter quarter leading toward full time in the classroom by spring quarter. They gradually assume responsibility for preparation, instruction, and evaluation of the class during this two-quarter period. Supervisors of teacher education give ongoing and frequent support to students in their classroom placements and in seminars at UCSC. Multiple Subjects candidates obtain classroom experience in both primary and intermediate grades. Single Subjects candidates obtain classroom experience in middle school/junior high and high school.

Admission to course 201 and 201A, *Intermediate Student Teaching*, and courses 202A–B–C, *Advanced Student Teaching*, is based on an assessment of academic performance, experience, leadership, and initiative shown in public school placements and required courses taken earlier in the program.

Capstone Requirements

Students will complete a capstone portfolio, which includes a teaching performance assessment and reflective papers. Prompts for these assignments may vary from year to year as they reflect the most current California state credentialing requirements.

Multiple Subject Course Requirements

- 200 *Applied Classroom Analysis and Methods: Beginning Student Teaching*
- 201 *Intermediate Student Teaching*
- 202ABC *Advanced Student Teaching*
- 203 *Methods of English Language Development*
- 205 *Teaching, Learning, and Schooling*
- 207 *Social Foundations of Education*
- 208 *Portfolio Development*
- 209 *Introduction to Technology in Schools*
- 210 *Creating Supportive, Healthy Environments for Student Learning*
- 211 *Teaching Special Populations*
- 212ABC (BCLAD students only) *Bilingualism and Bilingualism*
- 217 *Topics in Elementary Education: Physical Education*
- 218 *Topics in Elementary Education: Visual Arts*
- 219 *Topics in Elementary Education: Performing Arts*
- 220 *Reading and Language Arts for Elementary Classrooms*
- 221 *Science Learning and Teaching in Elementary Classrooms*
- 222 *Mathematics Learning and Teaching in Elementary Classrooms*

Single Subject Course Requirements

- 200 *Applied Classroom Analysis and Methods: Beginning Student Teaching*

- 201 *Intermediate Student Teaching*
- 201A *Intermediate Student Teaching: Single Subject*
- 202ABC *Advanced Student Teaching*
- 204 *Methods of English Language Development*
- 206 *Teaching, Learning, and Schooling*
- 207 *Social Foundations of Education*
- 208 *Portfolio Development*
- 209 *Introduction to Technology in Schools*
- 210 *Creating Supportive, Healthy Environments for Student Learning*
- 211 *Teaching Special Populations*
- 212ABC (BCLAD students only) *Bilingualism and Bilingualism*
- 225 *Reading Across the Curriculum in Middle School and Secondary*
 - Single Subject Credential students enroll in the two methods courses related to their subject area:
- 223 *Writing Across the Curriculum for Secondary*
- 226 *English Teaching: Theory and Curriculum*
- 227 *English Teaching for Secondary Classrooms*
- 228 *Math Education: Research and Practice*
- 229 *Teaching Mathematics in the Secondary Classroom*
- 230 *Science Education: Research and Practice*
- 231 *Teaching Science in the Secondary Classroom*
- 232 *Social Science: Theory and Curriculum*
- 233 *Social Science Teaching for Secondary Classrooms*

For Further Information

Phone the Education Department credential analyst at (831) 459-2200, send e-mail to edma@ucsc.edu, or view the department's home page on the web at <http://education.ucsc.edu> where potential applicants can obtain full details about the programs.

Ed.D in Collaborative Leadership

Overview

The goal of the Ed.D. program is to prepare educational professionals to enact research-based leadership in the transformation of schools and other educational institutions serving racially, culturally, and linguistically diverse communities in California's Central Coast and Bay Area region. Ed.D. students' dissertations apply cutting-edge theory and research in action-research reform efforts. Research projects will often be situated within the student's professional work site. Graduates of the Ed.D. program will be qualified for leadership positions in schools and school districts, as well as for the instruction of professional courses in universities and colleges. Graduates may also choose to work for independent or governmental policy centers.

Admission Requirements

- M.A. or equivalent with a background in research methodology
- 3.0 grade point average (GPA) or above
- Official Graduate Record Examination (GRE) scores <http://www.gre.org/>—taken within the last five years
- Documentation of second language and/or multicultural focus
- Statement of purpose
- Personal history
- A research project proposal

- Official transcripts from all undergraduate and graduate work
- Application essay, which includes:
 - Experience in and/or commitment to underserved schools and communities
 - Research area of interest
- Three current recommendation letters specifying potential for collaborative leadership and scholarly productivity.
- Application fee

Prior to completing your application, we highly recommend a personal interview with at least one of our faculty members. Please contact an Education Department faculty member whose research interest is similar to your own (please visit the Education Department web site at <http://education.ucsc.edu>)

Course Requirements and Sequencing

Courses required in year one:

- EDUC 235, *Introduction to Educational Inquiry*
- EDUC 236, *Quantitative Methods in Educational Research*
- EDUC 237, *Qualitative Research Methods*
- EDUC 262, *Social and Cultural Context of Education Core Seminar*
- EDUC 263, *Foundations of Educational Reform*
- EDUC 268, *Schools, Communities, and Families*
- EDUC 269ABC, *First-Year Doctoral Proseminar*
- Summer research and coursework optional, though encouraged

Courses required in year two

- EDUC 266, *Program Evaluation and Action Research in Educational Reform*
- EDUC 271, *Theoretical Perspectives on Learning and Using Literacy*, or EDUC 273, *Language Acquisition, Bilingualism, and Education*
- EDUC 277ABC, *Second/Third-Year Professional Development Seminar Families*
- Summer research and coursework optional, though encouraged

Courses required in year three

- EDUC 277ABC, *Second/Third-Year Professional Development Seminar*
- EDUC 279ABC, *Dissertation Supervision*
- EDUC 299, *Directed Research* (each quarter)
- Qualifying examination (conclusion of spring quarter)

Courses required in year four

- Graduation

Ph.D. in Education

Overview

The goal of the Ph.D. in education is to support graduate students in becoming creative scholars who engage in research focused on the educational needs of students from linguistic and cultural groups that have historically not fared well in our nation's public schools. To achieve this goal, this program provides students with grounding in the varieties of interdisciplinary theorizing, research methods, and applications needed to advance the study of learning and teaching for diverse

student populations. The courses and research experiences are closely related to practice in K-12 classrooms. Students in this interdisciplinary program apply tools and perspectives from education, anthropology, linguistics, philosophy, psychology, sociology, cognitive science, and cultural historical activity theory. The program integrates theory and practice to examine learning and teaching within the multiple contexts of classroom, school, family, and community. Graduates of this program will be qualified to teach and to conduct the kinds of educational research demanded by tenure-track positions in research and regional universities. Graduates may also work in non-university based institutions that focus on teacher professional development, curriculum development, and related areas of educational research and development.

Together with his or her faculty academic adviser, each student develops an integrated program of study that includes advanced coursework, seminars, and electives within the five program concentrations: language, literacy and culture; teachers and teacher development; mathematics and science education; learning and teaching; and social and cultural contexts of education. Students learn through an apprenticeship model in which they develop expertise through active participation in research. Courses may be taken in other departments, when appropriate.

Ph.D. Admissions Guidelines

The minimum grade-point average (GPA) established by the University of California for admission to graduate school is 3.0. In general, the Ph.D. in education program looks for potential excellence in graduate students, whether this manifests itself in a high grade-point average, strong letters of recommendation, or a high Graduate Record Examination (GRE) scores, or a strong statement of purpose. Applicants will be evaluated on their individual merits and also with regard to how well their proposed doctoral research can be supported by the existing resources of the program.

Admission Requirements

- Bachelor's degree, or its equivalent, from an accepted university prior to the quarter for which admission is sought
- 3.0 GPA or above
- Official GRE scores <http://www.gre.org/> taken within the last five years
- Experience working with culturally and linguistically diverse communities
- Statement of purpose
- Personal history
- A writing sample, preferably in education or a related field. The sample can be a term paper, a field report, a research proposal, or an essay written especially for the application
- Official transcripts from all colleges/universities attended after high school
- Three current recommendation letters specifying potential for scholarly productivity
- Current resume
- Application fee
- International applicants must take the Test of English as a Foreign Language (TOEFL). A minimum score of 550 on the TOEFL (paper) or 220 on the TOEFL (computer) is required for admission. The TOEFL examination may be waived for international students who have

taken and successfully passed a freshman composition course at an accredited university in the United States.

Prior to completing your application, we highly recommend a personal interview with at least one of our faculty members. Please contact an education faculty member whose research interest is similar to your own (please visit the Education Department web site at <http://education.ucsc.edu>)

Preferred Prerequisites for Mathematics and Science Education Concentration

A bachelor of science (B.S.) or a bachelor of arts (B.A.) degree in a mathematical or natural science discipline (mathematics, applied mathematics and statistics, biology, chemistry, computer science, physics, etc.) or equivalent upper-division coursework.

Program Requirements

During the first two years of study, all students are expected to enroll in a set of required courses, including core seminars, methodology courses, the first- and second-year professional development seminars, and a research apprenticeship. The student and his/her adviser will also design a course of study within one or more of the department's concentrations. The overall number courses and seminars taken varies depending on the student's preparation, interests, and plans, which are determined in consultation with relevant faculty and the department chair. The program encourages interdisciplinary study.

To achieve Ph.D. candidacy, students are expected to pass an annual review of their written work, maintain satisfactory academic progress, complete all required courses, attend department colloquia, complete a second-year research project, complete a TAship or teaching internship in education, pass a qualifying examination (QE), and meet the specific requirements of the Division of Graduate Studies.

The QE is intended to assess a student's depth and breadth of knowledge in his or her areas of concentrations and his/her competence to do extended dissertation-level research and analysis. Normally taken during the third year of enrollment, the QE consists of both written and oral components. For the written portion, the student prepares three papers, two of which are position papers on a theoretical topic; the third is a dissertation prospectus. The student presents and defends his/her work to at the oral examination.

A dissertation based on original research is required. After the dissertation has been completed and submitted, students must defend the dissertation in an oral exam.

Course Requirements and Sequencing

The following courses are required. Incoming students should consult with their faculty adviser to determine the most appropriate order in which to fulfill course requirements in the student's proposed concentration(s). All required courses must be completed prior to advancement to candidacy.

| Core Courses (30 credits) | | |
|--|--|--------------------------------------|
| Course Number and Name | Type | When Taken |
| EDUC 261, <i>Thinking, Learning and Teaching</i> (1) | Core (can be counted as learning and teaching concentration) | Before Advancement to Candidacy (AC) |
| EDUC 262, <i>Social and Cultural Contexts of Education</i> | Core (can be counted as social and cultural contexts of education concentration) | Before Advancement to Candidacy (AC) |

| Core Courses (30 credits) | | |
|---|---|--------------------------------------|
| Course Number and Name | Type | When Taken |
| EDUC 235, <i>Introduction to Educational Inquiry</i> | Methods | Year 1 |
| EDUC 236, <i>Introduction to Quantitative Methods in Educational Research</i> | Methods | Before Advancement to Candidacy (AC) |
| EDUC 237, <i>Introduction to Quantitative Methods in Educational Research</i> | Methods | Before Advancement to Candidacy (AC) |
| Advanced methods course. (Course in a different department might count as an advanced methods course, at adviser's discretion.) | Advanced methods course (can be counted toward a concentration course, if applicable) | Before Advancement to Candidacy (AC) |

| Professional Development Courses (22 credits) | | |
|--|---|--|
| Course Number and Name | Type | When Taken |
| EDUC 269ABC, <i>Pro-Seminar</i> First year professional development seminar; 2 credits/quarter | Pro-seminar | Year 1 |
| EDUC 293A or EDUC 293B, <i>Research Apprenticeship</i> (minimum of 5 credits) | Research apprenticeship | Recommended in Year 1, but required before Advancement to Candidacy (AC) |
| EDUC 270ABC, <i>Professional Development</i> seminars; 2 credits/quarter | Pro-seminar | Year 2 |
| EDUC 294, <i>Second-Year Research Project</i> (minimum 5 credits) | Research apprenticeship (second-year project) | Year 2 |

| Concentration Courses (30 credits) | | |
|--|------------------------|--------------------------------------|
| Course Number and Name | Type | When Taken |
| EDUC Concentration course (2) (minimum of four in any one concentration) | Concentration | Before Advancement to Candidacy (AC) |
| EDUC Concentration course (minimum of four in any one concentration) | Concentration | Before Advancement to Candidacy (AC) |
| EDUC Concentration course (minimum of four in any one concentration) | Concentration | Before Advancement to Candidacy (AC) |
| EDUC Concentration course (minimum of four in any one concentration) | Concentration | Before Advancement to Candidacy (AC) |
| EDUC/Other Elective/Concentration course (3,4) | Elective/Concentration | Before Advancement to Candidacy (AC) |
| EDUC/Other Elective/Concentration course | Elective/Concentration | Before Advancement to Candidacy (AC) |

1. A student may count EDUC 261 or 262 toward a relevant four concentration-course requirement but must still take six courses (i.e., concentration courses) beyond the core courses.
2. Concentration courses will be crosslisted when appropriate. Students may claim up to two (or, in rare cases, three) concentrations. Students may petition DPC for an independent study to count as a concentration course, but this is expected only in cases where sufficient course offerings for the student do not exist. Four concentration courses alone will not demonstrate expertise in a concentration, however, in conjunction with independent readings, research work, qualifying examination papers, and other experiences, a concentration designation (or two) will be defended and

awarded during the qualifying examination.

3. These two additional elective/concentration courses can count as concentration courses, or can be advanced methods courses, or courses from other departments/divisions. This is left up to adviser's discretion.
4. Students are encouraged to take courses beyond the minimum required, and, therefore, teaching faculty (and second-year project readers) are encouraged not to overload the students. It is expected that students will take *Pro-Seminar* plus three courses each academic quarter until advancement to candidacy

Requirements for the M.A. Degree

Although applications for a master's degree are not accepted, students in the Ph.D. program may obtain a M.A. degree after successfully completing a minimum of three quarters residency, 60 course credits including courses 235, 237, 269ABC, 270ABC, 293A or 293B, 294, and a second-year research project. Students seeking an M.A. degree must adhere to the guidelines set out by the Graduate Division for filing for a degree.

Designated Emphasis in Education

The Designated Emphasis in Education enables doctoral students in other departments to pursue interests in education and obtain formal certification of a "minor" level of competence in the field of education. The requirements for obtaining a Designated Emphasis in Education are the following:

1. Have a designated graduate adviser from among the faculty in education. This adviser will be in addition to the graduate adviser from the student's home department. The education adviser must serve on the student's qualifying examination committee and, as appropriate, may also serve on the student's dissertation committee.
2. Complete at least two (2) of the following three core courses in education:
 - EDUC 261, *Thinking, Learning, and Teaching*
 - EDUC 262, *Social and Cultural Context of Education*
 - EDUC 263, *Foundations of Educational Reform*
3. Complete additional courses as needed to total five graduate courses in education, no more than one of which may be a directed readings course (*Independent Studies*). Courses must be approved by the student's graduate adviser in education. Courses in other departments focused on education may be approved by petition to the Education Department's Doctoral Programs Committee.
4. Prepare a significant piece of writing in some area of education. This writing may take the form of a substantial position paper (seminar paper, QE paper, dissertation chapter, master's thesis) grounded in the literature of educational research, as determined by the graduate adviser in education.

Education is an institutional field in which scholars from a wide variety of disciplines—including sociology, psychology, politics, economics, mathematics and science—have scholarly interests. A Designated Emphasis in Education enables graduate students from other departments to ground their work in theory and

research on important issues in education.

The Education Department's core courses, EDUC 261 and 262, are offered every year; and EDUC 263 is offered biennially. The department typically offers six doctoral courses during each year across five concentrations: language, literacy, and culture; teachers and teacher development; mathematics and science education; learning and teaching, and social and cultural contexts of education. The Education Department annually admits 7-10 Ph.D. students, leaving adequate room for doctoral students from other departments to take courses in education.

Other Requirements

Students are required to attend the Education Department's colloquium series during their first and second years in the program.

The education Ph.D. program emphasizes teaching experience, and all students are required to complete one TAship or teaching internship in education prior to advancement to candidacy.

Students are required to complete a second-year project paper by the first day of fall quarter in year three.

Financial Support

Financial support for students includes a variety of fellowships, research assistantships, and teaching assistantships in the Education Department. Students may participate in research projects under the auspices of several interdisciplinary research centers, including the Center for Justice, Tolerance, and Community (CJTC), Chicano/Latino Research Center (CLRC), the Vocabulary Innovations in Education (VINE) project, The Teachers With Computers: Ward Annotations for Vocabulary Education (tecWAVE) project, Effective Science Teaching for English Language Learners (ESTELL) project, The Center for Collaborative Research for an Equitable California (CREC), and the Center for Educational Research in the Interest of Underserved Students (ERIUS).

Lower-Division Courses

40. Identity and Schooling.*

Examines history and philosophy of U.S. public education system and its impact on identity formation. Introduces basic frameworks for understanding school and society. Enrollment restricted to first-year, incoming Bridge/EOP students. Enrollment limited to 125. (General Education Code(s): IS.) *R. Glass*

50A. CAL Teach 1: Science and Mathematics (2 credits).

Introductory seminar exploring secondary students, teaching, and schools in the context of science and/or mathematics instruction. Concurrent participation in a secondary school internship required. Course material supports and enhances students' placement experiences. Prerequisite(s): Acceptance into CAL Teach and concurrent participation in a secondary school internship in a science or math classroom. Enrollment limited to 25. *The Staff*

50B. CAL Teach 1: Mathematics (2 credits). F,W

Introductory seminar exploring secondary students, teaching, and schools in the context of mathematics instruction. Concurrent participation in a secondary school internship required. Course material supports and enhances students' placement experiences. Prerequisite(s): Acceptance into CAL Teach and concurrent participation in a secondary school internship in a math classroom. Enrollment limited to 25. *The Staff*

50C. CAL Teach 1: Science (2 credits). F,W

Introductory seminar exploring secondary students, teaching, and schools in the context of science instruction. Concurrent participation in a secondary school internship required. Course material supports and enhances students' placement experiences. Prerequisite(s): Acceptance into CAL Teach and concurrent participation in a secondary school internship in a science classroom. Enrollment limited to 25. *The Staff*

60. Introduction to Education: Learning, Schooling, and Society. F,W,S

Explores the foundations of learning and teaching, the social and political forces within schools and school systems in the U.S., and the educational policies and practices in culturally and linguistically diverse communities. (General Education Code(s): IS, E.) *L. Bartlett, D. Ash*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***100A. Cal Teach 2: Science and Mathematics (2 credits).**

Examines students, schools, and science and/or mathematics instruction with emphasis on developing an instructional project aligned with state-mandated content standards. Concurrent participation in a secondary school internship required. Course content supports and enhances students' internship experience. (Formerly course 75A.) (General Education Code(s): W satisfied by taking this course and course 185L.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 50A, 50B, or 50C; and acceptance into the Cal Teach program. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 25. *The Staff*

100B. Cal Teach 2: Mathematics (2 credits). F,S

Examines students, schools, and mathematics instruction with emphasis on developing an instructional project aligned with state-mandated content standards. Concurrent participation in a secondary school internship required. Course content supports and enhances students' internship experience. (Formerly course 75B.) (General Education Code(s): W satisfied by taking this course and course 185L.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 50A, 50B, or 50C; and acceptance into the Cal Teach program. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 25. *The Staff*

100C. Cal Teach 2: Science (2 credits). F,S

Examines students, schools, and science instruction with emphasis on developing an instructional project aligned with state-mandated content standards. Student must concurrently participate in a K-12 school internship. Concurrent participation in a secondary school internship required. Course content supports and enhances students' internship experience. (Formerly course 75C.) (General Education Code(s): W satisfied by taking this course and course 185L.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 50A, 50B, or 50C; and acceptance into the Cal Teach program. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 25. *The Staff*

102. Education, Media, and Society.*

Focusing on ways the media (both news and the entertainment industry) portrays schools, teachers, and students to the public, investigates the way society views education, the way education is presented in the media, and the way education is influenced by society. Enrollment restricted

to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): IM.) *B. Olsen*

104. Ethical Issues and Teaching.

Emphasizes a philosophical exploration of the moral complexities of teaching. Students read theoretical investigations of these complexities, and examine case studies that pose difficult moral questions and illuminate the dilemmas of everyday life in classrooms. Course is grounded in a dialogical approach to learning. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. *R. Glass*

115. K-12 Student Assessment.*

Provides an overview of educational testing. Appropriate use and interpretation of standardized, classroom achievement and special needs assessments are examined. Issues on fair testing of diverse populations of students are discussed within each topic area. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. *The Staff*

120. The Arts in Schools: Aesthetic Education Theory and Practice.*

Explores the historical legacy of the arts within education; considers aesthetic education as an inter-arts philosophical and practical endeavor; studies alternatives to the current situation of the arts in education; develops theory, curricula and methods necessary to teach the arts. Addresses both elementary and secondary teaching in the arts. Meets third-course requirements. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): IM.) *B. Olsen*

125. Multicultural Children's Literature for Elementary Classrooms. W,S

Offers opportunities for undergraduate and graduate students to learn about fundamental aspects of children's literature, increase their knowledge of range and quality of children's literature, enhance their understanding of multicultural children's literature, and develop ways to integrate children's literature into elementary- and middle-school curriculum areas. (Formerly *Introduction to Teaching Children's Literature in Grades K-8*.) Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. *J. Scott*

128. Immigrants and Education. S

Research and theory on the education of immigrant students. Major topics include the Americanization movement and America's changing demography, identity maintenance and change, home-school relations, and educators' roles in meeting the needs of culturally and linguistically diverse student populations. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): ER, E.) *M. Gibson*

135. Gender and Education. W

Addresses the changing but continuing patterns of unequal expectations, opportunities, and treatment throughout the educational system for all students, female and male, who do not match a standard model of gender performance. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. *C. Cruz*

141. Bilingualism and Schooling.*

Introduces participants to issues related to the schooling of students who speak languages other than or in addition to English. Uses a multidisciplinary perspective to understand the circumstances these students face in schools and considers approaches and policies that best meet their needs. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): E.) *The Staff*

160. Issues in Educational Reform. W

Explores a variety of perspectives on key educational policy issues including desegregation, bilingual education, affirmative action, charter schools, national and state curriculum standards, student assessment and the assessment and certification of teachers. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. *L. Bartlett*

164. Urban Education.*

Focuses on urban schooling through critical readings, fieldwork, group projects, and extensive writing. Students explore how socialization, marginalization, and assimilation impede or support academic success, how class intersects with "race", and how "culture" affects one's orientation to education. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. Satisfies American History and Institutions Requirement. (General Education Code(s): W, E.) *The Staff*

170. East Asian Schooling and Immigration. F

Focuses on an historical and contemporary study of education in Japan, China, Korea, Hong Kong, and Taiwan, and the adaptation to schooling in the U.S. of immigrant families from those cultures. Topics include the effects on schooling of language acquisition, religion and cultural practices, family patterns, socioeconomic status, career aspirations, and parental expectations. (Formerly *Schools and Asian Cultures*.) Prerequisite(s): Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): CC.) *J. Gordon*

171. South and Southeast Asian Schooling and Immigration. S

Historical and contemporary study of education in India, Vietnam, Cambodia, Laos, and the Philippines, and the adaptation to schooling in the U.S. of immigrant families. Topics include: effects of language acquisition; religion and cultural practices; family patterns; socioeconomic status; career aspirations; and parental expectations. Prerequisite(s): Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): CC.) *J. Gordon*

173. Seminar in Critical Pedagogy. F

Philosophical and pedagogical exploration of relationships among oppression, power, society, education, and change. Examines how history, power, economics, and discrimination shape societal perspectives and schooling practices, and considers ways to transform education. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. May be repeated for credit. *R. Glass*

177. Teaching Culturally and Linguistically Diverse Students Math and Science. W

Examines equity issues in the learning and teaching of math and science in culturally and linguistically diverse school settings. Draws on multicultural, bilingual, and math/science education perspectives. Intended for undergraduate majors considering a K-12 teaching career. Satisfies an elective requirement for the minor in education program. Prior completion of course 180 is advised. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 25. (General Education Code(s): ER.) *E. Mosqueda*

180. Introduction to Teaching. F,W

Designed to encourage students to think about teaching in new ways. Assumptions about teaching and schooling are examined as well as considering what it takes to teach so that children learn and understand. Not a course

in how to teach, but an opportunity to reconsider what teaching should try to accomplish and what kinds of learning teachers should foster. Practicum in the schools of 30 hours per quarter required. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 120. *The Staff*

181. Race, Class, and Culture in Education. F

Examines the schooling experience and educational attainment of racial/ethnic minority students in the U.S. Focuses primarily on domestic minorities. Addresses issues of variability between and within minority groups and the role of cultural, structural, and psychological factors in the educational attainment of these students. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. (General Education Code(s): ER, E.) *C. Cruz*

182. American Teacher. *

Examines multiple and competing images of "teachers" and, more specifically, notions of the "good teacher"; also explores social, cultural, historical, and policy context of teachers' work in the U.S. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 50. *L. Bartlett*

185B. Introduction to Teaching Mathematics. W

Provides an introduction to principles and practices for teaching mathematics in secondary classrooms; examines theoretical and practical approaches to teaching mathematics; provides an introduction to national and state standards and an overview of mathematics curricula and current issues in mathematics teaching. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 30. *J. Moschkovich*

185C. Introduction to Teaching Science. W

An introduction to the principles and practices for teaching science in secondary classrooms. Course examines theoretical and practical approaches to teaching science, provides an introduction to national and state standards and an overview of science curricula and current issues in science teaching. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 40. *D. Ash*

185L. Introduction to Teaching: Cal Teach 3 (3 credits). W

Supplements theoretical and practical introduction to the teaching of science or mathematics with subject-pedagogical approaches. Concurrent participation in an advanced Cal Teach internship provides context to apply theory and practical techniques. (Formerly course 180A.) (General Education Code(s): W satisfied by taking this course and one of the following: courses 100A, 100B, and 100C.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 50A, 50B, or 50C; previous or concurrent enrollment in courses 100A, 100B, or 100C; 185B or 185C. Enrollment restricted to juniors and seniors or education minors. Enrollment limited to 30. *The Staff*

187. Cognition and Instruction. *

Addresses the question, "How do people learn?" by examining theories of learning and research on cognition, learning, and instruction. Enrollment restricted to juniors, seniors, or education minors. Enrollment limited to 60. *C. Wells*

194. Group Projects. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Projects (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Beginning Student Teaching. F

A required course that introduces students to the diverse cultural and linguistic settings of today's classrooms. Classroom practices, instructional strategies, and analysis are emphasized. First course in the student teaching placement series. Placements are used to examine and apply teaching methods while developing classroom management skills. Class meetings include discussion and demonstration of teaching methods. (Formerly *Applied Classroom Analysis and Methods: Beginning Student Teaching*.) Enrollment restricted to M.A./credential students. *The Staff*

201. Intermediate Student Teaching. W

Designed to provide students enrolled in the UCSC teacher education program a coherent, integrated, pre-professional experience in public school classrooms. Students assume part-time student teaching responsibilities totalling 14–16 hours per week under the direct supervision of an exemplary classroom teacher. Weekly seminars and ongoing supervision by department staff are required. Prerequisite(s): course 200. Enrollment restricted to M.A./credential students. *The Staff*

201A. Intermediate Student Teaching: Single Subject. W

Provides advanced pre-professional experience for single subject teaching candidates who progressively assume full-time responsibility for public school student teaching beginning in winter quarter. Taken concurrently with course 201. Weekly supervision and seminars with teacher supervisors are required. Prerequisite(s): course 200. Enrollment restricted to M.A./credential students. *The Staff*

202A. Advanced Student Teaching. S

Designed for students who have extensive field and course experience in education, and who wish to qualify for the single-subject or multiple-subject teaching credential by undertaking a quarter of full-time, supervised student teaching. Prerequisite(s): course 201. Enrollment restricted to M.A./credential students. *The Staff*

202B. Advanced Student Teaching. S

Designed for students who have extensive field and course experience in education, and who wish to qualify for the single-subject or multiple-subject teaching credential by undertaking a quarter of full-time, supervised student teaching. Prerequisite(s): course 201. Enrollment restricted to M.A./credential students. *The Staff*

202C. Advanced Student Teaching. S

Designed for students who have extensive field and course experience in education, and who wish to qualify for the single-subject or multiple-subject teaching credential by undertaking a quarter of full-time, supervised student teaching. Prerequisite(s): course 201. Enrollment restricted to M.A./credential students. *The Staff*

203. Methods of English Language Development: Multiple Subject Credential. W

This course will help future educators develop a practical theory for teaching English in the elementary and secondary schools to students who speak other languages. Topics include current trends in the field, language assessment, and the design of instructional units. Enrollment restricted to M.A./credential students. *L. Chamberland, K. Téllez*

204. Methods of English Language Development: Single Subject. F

Course helps future educators develop a practical theory for teaching English in the elementary and secondary schools to students who speak other languages. Topics include current trends in the field, language assessment, and the design of instructional units. Enrollment restricted to M.A./credential students. *The Staff*

205. Teaching, Learning, and Schooling in a Diverse Society: Multiple Subject. *

Required for master's students in education. Three basic units comprise the subject matter: teaching/learning, with such topics as development, learning, pedagogy, and socialization theories; second, schooling, as the context of teaching/learning both in its existent structures and its reform movements; third, the sociocultural context in which educational institutions exist, topics such as cultural and historical forces, political and economic condition, family, and community structures. Enrollment restricted to M.A./credential students. *C. Wells*

206. Teaching, Learning, and Schooling: Single Subject. *

Required for master's students in education. Three basic units comprise the subject matter: teaching/learning, with such topics as development, learning, pedagogy, and socialization theories; schooling, as the context of teaching/learning both in its existent structures and its reform movements; and the sociocultural context in which educational institutions exist, including topics such as cultural and historical forces, political and economic conditions, family, and community structures. Enrollment restricted to M.A./credential students. Enrollment limited to 30. *P. Stoddart*

207. Social Foundations of Education. *

A sustained inquiry into the social, political, economic, and historical foundations of schools with an emphasis on community attitudes toward education. Student narratives of engagement and resistance will provide a basis for insights and interventions useful to educators. Enrollment restricted to M.A./credential students. *S. Flinspach*

208. Portfolio Development (2 credits). *

Provides student and faculty adviser with time to confer over the completion of the required portfolio. Enrollment restricted to M.A./credential students. *The Staff*

209. Introduction to Technology in Schools (2 credits). *

This course is required for prospective teachers. It provides an overview of the use of technology in the K–12 classroom. Topics covered include using the Internet and the web, building a web page, and using resources for educators on the web. Students will review software applications in a particular content area, use technology to develop lesson plans, and create integrated, thematic curricula in which technology is utilized to promote higher-order thinking, creativity, and problem-solving. Enrollment restricted to M.A./credential students. *The Staff*

210. Health, Safety, and Community (2 credits). *
Addresses the preparation of teachers for creating a supportive, healthy environment for student learning. Covers

topics related to physical, emotional, and social health. Enrollment restricted to M.A./credential students. *The Staff*

211. Topics in Elementary Education: Teaching Special Populations (2 credits). F

Addresses the preparation of teachers for meeting needs of special populations within the general education setting. Covers basic knowledge, skills, and strategies. Enrollment restricted to M.A./credential students. *The Staff*

212A. Bilingualism and Biliteracy: History, Politics, Theory, and Practice (2 credits). F

Taught in Spanish. Prepares future bilingual teachers to be knowledgeable about history, politics, theory, and practices related to bilingual instructional programs. Topics: second-language acquisition, bilingual-program models, equity pedagogy. Enrollment restricted to M.A./credential students. *The Staff*

212B. Bilingualism and Biliteracy: Language, Literacy and Content Instruction (2 credits). W

Taught in Spanish. Prepares future bilingual teachers to teach language, literacy, and the content areas in ways that address the needs of culturally and linguistically diverse students. Topics: literacy in two languages; academic language; assessment. Enrollment restricted to M.A./credential students. *The Staff*

212C. Bilingualism and Biliteracy: Community and School Partnerships (2 credits). S

Taught in Spanish. Provides opportunities for future bilingual teachers to develop culturally relevant practices that build collaboration between the school, students' families, and community. Topics: Latino culture and history, school-parent communication. Enrollment restricted to M.A./credential students. *The Staff*

217. Topics in Elementary Education: Physical Education (2 credits). *

Examines pedagogical understanding in teaching physical education. Introduces candidates to theoretical and research basis in physical education and content standards and frameworks. Also investigates and presents instructional practices. Enrollment restricted to M.A./credential students. *The Staff*

218. Topics in Elementary Education: Visual Arts (2 credits). *

Examines pedagogical understanding in teaching visual arts. Introduces candidates to theoretical and research basis for teaching visual arts and content standards and frameworks. Also investigates and presents instructional practices. Enrollment restricted to M.A./credential students. *The Staff*

219. Topics in Elementary Education: Performing Arts (2 credits). *

Examines pedagogical understanding in teaching performing arts. Introduces candidates to theoretical and research basis for teaching performing arts and content standards and frameworks. Also investigates and presents instructional practices. Enrollment restricted to M.A./credential students. *The Staff*

220. Reading and Language Arts for Elementary Classrooms. F

This course provides both a theoretical and practical foundation for literacy instruction, emphasizing reading and language arts instruction in grades K–8. Interactive instruction and field experience will be used to examine curricula, methods, materials, and literacy evaluation. Enrollment restricted to M.A./credential students. (F) *L. Pease-Alvarez*

221. Science Learning and Teaching in Elementary Classrooms. W

Examines constructivist and sociocultural approaches to the learning and teaching of science in elementary classrooms, including beliefs about the nature of science and theories of how children learn science. Provides a critical overview of curricula, instructional theories, and multiple approaches to teaching the "big ideas" in elementary science. Students are billed a materials fee. Enrollment restricted to M.A./credential students. *J. Shaw*

222. Mathematics Learning and Teaching in Elementary Classrooms. F

This course is required for the multiple subject credential. Examines constructivist and sociocultural approaches to the learning and teaching of mathematics in elementary classrooms, including the nature of mathematics and theories of how children learn mathematics. Provides an introduction to mathematics teaching standards and a critical overview of curricula, instructional theories, and multiple approaches to teaching the "big ideas" in elementary mathematics. Enrollment restricted to M.A./credential students. *The Staff*

223. Writing Across the Curriculum in Middle and Secondary Classrooms (2 credits). *

Reviews issues of literacy and writing in secondary content areas. Students write in several genre and prepare lesson plans for teaching writing within the discourse of their respective curricular area. Concurrent enrollment in course 225 is required; enrollment restricted to M.A./credential students. *The Staff*

224. Learning and Teaching Writing in Elementary Classrooms (2 credits). *

Explores the practical application of teaching and learning writing in elementary school classrooms, and considers the theoretical ideas that underpin these current practices. Guest teachers speak about their own inquiries, challenges, and successes in teaching writing. Enrollment restricted to M.A./credential students. *The Staff*

225. Reading Across the Curriculum in Middle School and Secondary. *

Provides a theoretical and practical foundation for teaching reading within content area instruction in middle school and secondary classrooms. Field experiences and interactive instruction will facilitate learning about strategies, curricula, methods, materials, and observation. Intended for students pursuing a single subject credential. Enrollment restricted to M.A./credential students. *The Staff*

226. English Teaching: Theory and Curriculum. F

Required for the single subject English credential student. Examines sociocultural approaches to the learning and teaching of English in secondary classrooms, including theories of how children learn English language, literature, and composition. Enrollment restricted to M.A./credential students. *The Staff*

227. English Teaching for Secondary Classrooms. W

Prepares English single subject credential candidates for student teaching in winter and spring. Course focuses on developing curricula and strategies in the content area. Through classroom placements, students observe and apply techniques to develop curriculum units used in student teaching. Enrollment restricted to M.A./credential students. *L. Baker*

228. Math Education: Research and Practice. F

Examines research on the learning and teaching of mathematics. Topics include the nature of mathematics cognition and learning, how children learn mathematics,

mathematical discourse, and perspectives on addressing diversity in mathematics classrooms. Course is required for M.A./credential students in secondary (single subject) mathematics and of Ph.D. students in mathematics education. Enrollment restricted to M.A./credential students. *J. Moschkovich*

229. Teaching Mathematics in the Secondary Classroom. W

Examines constructivist and sociocultural approaches to teaching mathematics in the secondary classroom. Course will provide an introduction to mathematics teaching standards and a critical overview of curricula, instructional theories, and multiple approaches to teaching the "big ideas" in secondary mathematics. Required for mathematics secondary credential. Prerequisite(s): course 228. Enrollment restricted to M.A./credential students. *A. England*

230. Science Education: Research and Practice. F

Examines theoretical approaches to the learning and teaching of science including the nature of scientific knowledge, theories of how children learn science, approaches to scientific discourse, and perspectives on addressing diversity in science classrooms. Course is required for single subjects science credential. Enrollment restricted to M.A./credential students. *D. Ash*

231. Teaching Science in the Secondary Classroom. W

Examines constructivist and sociocultural approaches to teaching science in secondary classrooms. Course will provide a critical overview of curricula, instructional theories, and multiple approaches to teaching the "big ideas" in science. Students are billed a materials fee. Enrollment restricted to M.A./credential students. *The Staff*

232. Social Science: Theory and Curriculum. F

Required for the single subject social science credential student. Tracks both the implicit and explicit connections between theory and practice, illustrating that theory suggests best practice while practice informs theory-formation and testing. Enrollment restricted to M.A./credential students. *The Staff*

233. Social Science Teaching for Secondary Classrooms. W

Prepares social science single subject credential candidates for student teaching in winter and spring. Course focuses on developing curricula and strategies in the content area. Through classroom placements, students observe and apply techniques to develop curriculum units that are used in student teaching. Enrollment restricted to M.A./credential students. *E. Dyer*

235. Introduction to Educational Inquiry. F

Addresses foundational knowledge needed to understand and conduct educational inquiry and research. Topics include epistemology in the human sciences, philosophical foundations of modern research strategies, and general classes of research investigations in education. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Ogawa*

236. Quantitative Methods in Educational Research. W

Promotes intermediate-level knowledge of quantitative research methods in educational settings. Students learn the foundations of quantitative data theory, general logic behind statistical inference, and specific methods of data analysis in educational contexts. Prerequisite(s): course 235. Enrollment restricted to graduate students. Enrollment limited to 15. *E. Mosqueda*

237. Qualitative Research Methods. S

Graduate level introduction to qualitative methods, with

special attention to ethnographic research on schooling. Moves from overview of different methods, through examination of selected studies, to discussion of issues in research design, data collection, analysis, and writing. Enrollment restricted to graduate students; priority is given to graduate students in education. Enrollment limited to 12. *L. Bartlett*

250. Teacher Thinking, Teacher Knowledge, and Teacher Identity. S

This doctoral seminar explores recent research on teacher thinking, teacher knowledge, and teacher identity to examine interrelationships among teachers' perspectives, preparation experience, biographies, work contexts, career shapes, professional practices, and effects on student achievement. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Olsen*

251. Analysis of Activity and Interaction in Educational Settings. F

Analyzes topics, which vary systematically from year to year, including analysis of classroom interaction, video recording and transcription, coding and analysis of discourse data, and software programs for qualitative analysis. Prerequisite(s): course 237. Enrollment restricted to graduate students. Enrollment limited to 12. May be repeated for credit. (W) *C. Wells*, (S) *B. Olsen*

252. Hermeneutics of Education.

Investigates philosophical hermeneutics to deeply interrogate education. Addresses such questions as: What is hermeneutics? How is education an hermeneutic enterprise? How does knowing hermeneutics deepen the ability to engage in education research? Enrollment restricted to graduate students. Enrollment limited to 12. *B. Olsen*

253. Research Design in Mathematics and Science Education. *

Examines multiple approaches to designing research studies in mathematics and science education. Introduces multiple types of research designs and principles used by education researchers examining mathematics/science learning and teaching. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Moschkovich*

254. Critical and Alternative Paradigms in Education Research. *

Examines theoretical foundations of critical and alternative research paradigms commonly used in education, including critical ethnography, participatory research, counter-storytelling, and social-design experiments. Examines critiques of qualitative/quantitative research from feminist and critical theory; surveys how such critiques have informed the development of new paradigms in education research; and explores the benefits and limits of selected alternative paradigms. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

255. Intermediate Quantitative Methods. S

Focuses on the applied statistical modeling and analysis of educational data (large-scale data sets), not on the mathematical foundations of science. Students learn to address quantitative research questions using general linear model (GLM) statistical methods. GLM includes regression analysis, analysis of variance (ANOVA), and analysis of covariance (ANCOVA). Students learn statistics by doing statistics. Prerequisite(s): introductory statistics course (course 236 or equivalent). Enrollment restricted to graduate students. Enrollment limited to 15. *E. Mosqueda*

256. Advanced Qualitative Analysis in Education Research.

Emphasizes the analysis of qualitative data in education research and introduces interpretive analytical approaches for its use with empirical data, the use of coding soft-

ware for ethnographic analysis, and video recording and transcription. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *C. Cruz*

261. Thinking, Learning, and Teaching. F

Examines multiple theoretical perspectives on thinking, learning, and teaching; the development of the whole person in a variety of cultural contexts; the roles thinking, learning, and teaching play in that development; and how researchers' and educators' conceptions shape instruction. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Moschkovich*

262. Social and Cultural Context of Education. W

Application of anthropological and sociological theories to study of education. Examines social, cultural, and linguistic context of schooling with particular attention to role of race, class, culture, power, and language in influencing schooling outcomes. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Gibson*

263. Foundations of Educational Reform.

Provides students with multiple analytic perspectives from which to examine important educational issues by analyzing political, historical, and philosophical origins of educational reform in the U.S. and internationally. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Ogawa*

264. Research on Teacher Development and Teacher Education. *

Addresses personal and professional development of teachers. Explores models of teacher education with specific attention to methods and processes by which teachers can be better prepared to work with culturally and linguistically diverse students. Enrollment restricted to graduate students. Enrollment limited to 15. *K. Tellez*

266. Program Evaluation and Action Research in Educational Reform. F

Overview of the purpose of and practice in program evaluations in a variety of contexts with a specific focus on educational settings. Students learn the techniques of program evaluation; the historical and theoretical context of program evaluations, including its relation to experimental research; and how action research can be used in conducting field-based evaluations. Students should be familiar with basic quantitative and qualitative methodologies. Enrollment restricted to graduate students. Enrollment limited to 15. *K. Tellez*

268. Schools, Communities, and Families. F

Examines the nexus of schools, communities, and families, and, in particular, how collaboration across institutional boundaries can facilitate school and community reform. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Glass*

269A. First-Year Doctoral Proseminar (2 credits). F

This three-quarter seminar supports professional development for first-year doctoral students. Students develop essential skills for success as scholars, discuss issues in educational research and practice, and are introduced to research by Education Department faculty. Enrollment restricted to education graduate students. Enrollment limited to 15. *B. Olsen*

269B. First-Year Doctoral Proseminar (2 credits). W

This three-quarter seminar supports professional development for first-year doctoral students. Students develop essential skills for success as scholars, discuss issues in educational research and practice, and are introduced to

research by Education Department faculty. Enrollment restricted to education graduate students. Enrollment limited to 15. *B. Olsen*

269C. First-Year Doctoral Proseminar (2 credits). S

This three-quarter seminar supports professional development for first-year doctoral students. Students develop essential skills for success as scholars, discuss issues in educational research and practice, and are introduced to research by Education Department faculty. Enrollment restricted to education graduate students. Enrollment limited to 15. *B. Olsen*

270A. Second-Year Professional Development Seminar (2 credits). F

Three-quarter seminar supports professional development for second-year doctoral students. Activities include preparation of research and conference proposals, presentation of second-year project findings, and attendance at department colloquia. Enrollment restricted to second-year Ph.D. students. Enrollment limited to 12. *B. Olsen*

270B. Second-Year Professional Development Seminar (2 credits). W

Three-quarter seminar supports professional development for second-year doctoral students. Activities include preparation of research and conference proposals, presentation of second-year project findings, and attendance at department colloquia. Enrollment restricted to second-year Ph.D. students. Enrollment limited to 12. *B. Olsen*

270C. Second-Year Professional Development Seminar (2 credits). S

Three-quarter seminar supports professional development for second-year doctoral students. Activities include preparation of research and conference proposals, presentation of second-year project findings, and attendance at department colloquia. Enrollment restricted to second-year Ph.D. students. Enrollment limited to 12. *B. Olsen*

271. Theoretical Perspectives on Learning and Using Literacy. S

Examines theoretical perspectives, educational issues, and scholarship related to use and development of literacy among diverse populations, particularly those who have not fared well in U.S. schools. Enrollment restricted to graduate students. Enrollment limited to 12. *L. Pease-Alvarez*

272. Sociolinguistics in Education. *

Investigates discipline of sociolinguistics and explores actual ways in which sociolinguistics has become a useful lens for better understanding teaching, learning, and schooling. Conduct own sociolinguistic analyses of data collected for culminating project. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Olsen*

273. Language Acquisition, Bilingualism, and Education. *

Foundations of first- and second-language acquisition and bilingualism with emphasis on implications for education in linguistically diverse settings. Topics include linguistic, cognitive, sociolinguistic, and sociocultural approaches to development of languages and the nature of individual and societal bilingualism. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Bunch*

274. Language and Power in Education. *

Examines relationships between sociopolitical struggles and language/language practices. Students study ways in which Marxism, critical theory, and post structuralism have represented links between language and power, and investigate contemporary studies of language and power in education. Enrollment restricted to graduate students.

Enrollment limited to 15. *B. Olsen*

276. Theory and Practice of Writing.*

Explores first and second language-writing theory, research, and practice, especially relating to language minority students and others considered academically under-prepared. Focuses on educational settings from pre-school settings including families and communities. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Bunch, L. Pease-Alvarez*

277A. Second-year Doctoral Proseminar (2 credits). F

This three-quarter seminar supports professional development for second-year doctoral students as they prepare their qualifying materials and begin dissertation work. Prerequisite(s): courses 269 A-B-C. Enrollment restricted to graduate students. Enrollment limited to 20. *B. Olsen*

277B. Second-year Doctoral Proseminar (2 credits). W

This three-quarter seminar supports professional development for second-year doctoral students as they prepare their qualifying materials and begin dissertation work. Prerequisite(s): courses 269 A-B-C. Enrollment restricted to graduate students. Enrollment limited to 20. *B. Olsen*

277C. Second-year Doctoral Proseminar (2 credits). S

This three-quarter seminar supports professional development for second-year doctoral students as they prepare their qualifying materials and begin dissertation work. Prerequisite(s): courses 269 A-B-C. Enrollment restricted to graduate students. Enrollment limited to 20. *B. Olsen*

278. Critical Exploration of Reading Theory and Practice.*

Doctoral seminar that examines historical and current research on reading processes and instructional practices. Intensive study of factors affecting the development of proficient, engaged, and reflective readers who can acquire new knowledge from text. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Scott*

280. Academic Language.*

Considers and critiques conceptualizations of the language used for academic pursuits, from the early years of schooling to higher education. Focuses on implications for research and practice related to the education of students in linguistically diverse schools and societies. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Bunch, J. Scott*

281. Conceptual Change in Science and Mathematics.

Examines approaches in cognitive science, mathematics education, and science education to documenting student conceptions in science and mathematics, defining conceptual change, and describing relationship between conceptual change and learning with understanding. Enrollment restricted to graduate students. Enrollment limited to 12. *J. Moschkovich*

282. Informal Learning in Sciences and Mathematics.*

Explores research on learning outside of school in multiple settings such as museums, after-school clubs, aquariums, workplaces, and homes. Readings draw from multiple fields and disciplines, including cognitive psychology, cognitive anthropology, cognitive science, education, museum education and evaluation, science, and mathematics education. Examine theoretical approaches to describing and understanding how people learn science and mathematics outside of school, empirical studies documenting learning in multiple non-school settings, and diversity

issues in out-of-school settings. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Ash*

283. Equity and Social Justice in Mathematics and Science Education.*

Examines the theory, research, policy and practice of social justice and equity in mathematics and science education in local, national, and international contexts. Emphasizes the promotion of equity and critical mathematics and science literacy in schools and communities. Enrollment restricted to graduate students. *J. Shaw*

284. Gender in Mathematics and Science Education.*

Explores basic aspects of gender in the fields of mathematics and science education. Discusses historical trends, current dilemmas, and how science and mathematics block or enable access for women. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Ash*

286. Special Topics in Math and Science Education. W

Focuses on particular issues of theoretical importance to research in mathematics and science education. Topics vary from year to year. Particular issues in cognition, learning, teaching, curriculum, and assessment in mathematics and science education may be covered. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *J. Moschkovich, D. Ash, J. Shaw*

287. Issues in Educational Assessment.*

Familiarizes students with the basic concepts of educational assessment and explores issues related to the design and implementation of educational assessment as well as the application of educational assessment in educational research. Enrollment restricted to graduate students. Enrollment limited to 12. *J. Shaw*

288. Ethnographies of Education.*

Offers opportunity to critique a range of book-length ethnographic studies of education focusing on relationship between culture, learning, and schooling in the U.S. with comparative studies from other countries. Enrollment restricted to graduate students. Enrollment limited to 12. *M. Gibson*

289. School Organization. W

Applies multiple perspectives drawn from organizational theory, highlighting important aspects of organization of schools, including their operational environment, instructional organization, and professional and bureaucratic dimensions. Enrollment restricted to graduate students. Enrollment limited to 12. *R. Ogawa*

290. CHAT and Educational Practice and Research.*

Introduction to cultural-historical activity theory (CHAT) based on work of Vygotsky, Bakhtin, and contemporary developments of their ideas. Explores the utility of CHAT as a framework for thinking about educational practice and research. Enrollment restricted to graduate students. Enrollment limited to 15. *C. Wells*

291. Comparative and International Education.

Examines educational access and advancement in several nations affected by globalization, national policies, and localized identity and opportunity structures. Attention to language and cultural expectations relevant to research in international contexts and how this knowledge provides reflection on the American condition. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Gordon*

292. Ideology and Education.*

Philosophical study of the theory of ideology from Marx

to the present and how ideologies (racism, sexism, classism, linguisticism, abilityism) become embodied, reproduced, resisted, and transformed (and particularly the role of education therein). Enrollment restricted to graduate students. Enrollment limited to 22. *R. Glass*

293A. Research Apprenticeship (2 credits). F,W,S

Research apprenticeship under guidance of faculty member during first or second year of doctoral studies. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

293B. Research Apprenticeship. F,W,S

Research apprenticeship under guidance of faculty member during first or second year of doctoral studies. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

294. Second-Year Research Project. F,W,S

Doctoral students work with faculty advisors to plan, carry out, and write up small independent research project during second year of graduate studies. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

295. Critical Theories of Education.*

Investigates critical theories in education. Situates the themes against and within critical theory and philosophical foundations of Paulo Freire's theory of liberation education. Elaborates these themes within the discourses on critical race theory and education, and feminism and education. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Glass*

296. Educational Policy and the Context of Teachers' Work. F

Focuses on both the conceptual and methodological developments in the study of policy and on the research relation to the policy context of teachers' work. Enrollment restricted to graduate students. Enrollment limited to 12. *L. Bartlett*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297F. Independent Study (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Electrical Engineering

See Engineering, page 263.

Engineering: School of Engineering

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ARTHUR RAMIREZ, Dean

PROFESSOR CHARLES E. MCDOWELL, Associate
Dean of Undergraduate Affairs

PROFESSOR HERBERT LEE, Associate Dean for
Graduate Studies and Research

Baskin School of Engineering

The Baskin School of Engineering has a high-technology focus incorporating programs and curricula that educate students to meet the changing demands of society and a high-technology global marketplace. The school offers a stimulating academic environment that provides a foundation for professional growth as well as a lifetime of learning. The Baskin School's programs and courses prepare students for the human aspects, as well as the technical challenges, of careers in engineering, computer science, and bioinformatics. The Baskin School of Engineering includes the Department of Applied Mathematics and Statistics, the Department of Biomolecular Engineering, the Department of Computer Engineering, the Department of Computer Science, and the Department of Electrical Engineering. The Department of Technology and Information Management is awaiting approval.

Graduate Study

The Baskin School of Engineering offers 12 graduate programs designed to prepare students for advanced study and research in major areas of biomolecular, computer, and electrical engineering, as well as computer science and statistics and stochastic modeling:

- Biomolecular engineering and bioinformatics master of science (M.S.) and doctor of philosophy (Ph.D.)
- Computer engineering M.S. and Ph.D.
- Computer science M.S. and Ph.D.
- Electrical engineering M.S. and Ph.D.
- Statistics and Applied Mathematics M.S. and Ph.D.
- Technology and Information Management M.S. and Ph.D.

These programs are described in subsequent sections. The aim of these programs is to develop professionals who can address the complex scientific and technological problems of today and tomorrow.

Undergraduate Study

The School of Engineering offers 10 undergraduate degree programs in the following majors.

- Bioengineering bachelor of science (B.S.)
- Bioinformatics B.S. or combined B.S./Graduate
- Computer engineering B.S. or combined B.S./M.S.
- Computer science bachelor of arts (B.A.) and B.S.
- Computer science: computer game design B.S.
- Electrical engineering B.S.

Information systems management B.S.

Bioengineering. The bioengineering program prepares graduates for a rewarding career at the interfaces between engineering, medicine and biology. UCSC bioengineering graduates will have a thorough grounding in the principles and practices of bioengineering and the scientific and mathematical principles upon which they are built; they will be prepared for further education (both formal and informal) and for productive employment in industry. The program includes a broad range of courses in the sciences, engineering, ethics, and other topics, and is co-sponsored by the Departments of Biomolecular Engineering, Computer Engineering, Electrical Engineering, and Molecular, Cell and Developmental Biology.

Bioinformatics. The bioinformatics curriculum combines mathematics, the physical sciences, computer science, and engineering to explore and understand biological data from high-throughput experiments, such as genome sequencing and gene expression chips. The immense growth of biological information stored in computerized databases has led to a critical need for people who can understand the languages, tools, and techniques of mathematics, science, and engineering. The undergraduate bioinformatics degree program prepares students for graduate school or a career in the fast-paced pharmaceutical or biotechnology industries.

Computer Engineering. The computer engineering curriculum focuses on making digital systems that work. It overlaps with computer science on one end (software systems) and with electrical engineering on the other (digital hardware). The emphasis of our program is on design rather than analysis—on making things work, rather than on explaining the abstract theory of computation or electronics. The program's emphasis on problem solving provides both excellent training for future engineers and a strong foundation for graduate study. The computer engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). The combined B.S./M.S. program provides an opportunity for outstanding undergraduates to begin advanced study and earn both degrees in five years.

Computer Science. The computer science curriculum has options that include topics in hardware and software, giving students a solid grounding in both theoretical and practical aspects of computer technology and computer usage. Students become proficient in many areas, with a good academic foundation for various careers in the software industry, as well as preparation for graduate school.

Computer Science: Computer Game Design. The computer game design curriculum is a four-year interdisciplinary program that focuses on the technical, dramatic, and artistic elements of computer games. The program provides a rigorous education in computer science, in concert with a broad introduction to those aspects of art, music, narrative, digital media, and computer engineering most relevant to games. An intensive year-long game design studio sequence permits students to create substantial video games as part of a multi-student team. Students receive proficiency in many aspects of computer science, a good academic foundation for careers in the computer game industry or information technology industry, or for the pursuit of graduate studies in computer science, or computer game design.

Electrical Engineering. The electrical engineering curriculum provides a balance of engineering science and

design and allows students to specialize in both the traditional topics and the latest subjects in electrical engineering. Students may concentrate their electives in the areas of electronics and optics, communications, or signals and systems. The major is designed to attract motivated students who, upon graduation, will be sought by employers in the high-tech industry. The electrical engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Information Systems Management. The information systems management (ISM) curriculum is multidisciplinary and focuses on the fusion of information systems, technology, and business management for two purposes: the use of information systems to solve business problems and the management of technology, which includes new product development and enterprise management. Students must learn the mathematics, science, and technical fundamentals of computer science and engineering as well as understand the environment in which information technology (IT) solutions will be applied—through economics, business, and management of technology courses. It is a rigorous, challenging major for those students wanting to pursue careers in information systems management and the management of technology.

Undergraduate Minors

Undergraduate students may choose from the following eight minor options:

Applied Mathematics. The applied mathematics minor is available to students who wish to develop 1) proficiency in modeling real-life problems using mathematics and 2) knowledge of standard, practical analytical and numerical methods for the solution of these models. This minor could be combined with a major in any of the physical, biological, mathematical, or engineering sciences as preparation for a graduate degree in that field or in applied mathematics.

Bioinformatics. The bioinformatics minor is intended primarily for bioinformatics tool users who are majoring in a biological or chemical specialty. The bioinformatics minor is also appropriate for computer science or computer engineering majors who are considering graduate work in bioinformatics.

Computer Engineering. The computer engineering minor provides a solid foundation in digital hardware, electronics, and computer software, as well as the prerequisite material in mathematics and physics. The minor is well-suited to students who wish to take part in the design of computer and embedded systems in any discipline.

Computer Science. The computer science minor is available for students whose primary interest is in another area, and are interested in the applications of computer science in other areas of study, from art and music to business and science.

Computer Technology. The computer technology minor is intended for students outside the School of Engineering interested in exploring computer software and hardware. It is particularly recommended for students interests in the use of computer technology in another discipline or in K-12 teaching.

Electrical Engineering. The electrical engineering minor provides a solid foundation in the core areas of electronic circuits and signals and systems, as well as the prerequisite material in mathematics and physics. Concentration of upper-division electives in either of

the major tracks constitutes substantial and focused work in the discipline of electrical engineering. This minor is particularly suitable for students with majors in applied physics or any School of Engineering major.

Information Systems and Technology Management.

The information systems management (ISM) program provides a minor in information systems and technology management (ISTM) to provide undergraduates in the School of Engineering as well in other programs and divisions in the university, such as economics and business management economics, the physical and biological sciences, and arts, the opportunity to expand the breadth of their knowledge and training to include the management of information systems and the management of technology.

Statistics. The statistics minor is available for students who wish to gain a quantitative understanding of how to a) measure uncertainty and b) make good decisions on the basis of incomplete or imperfect information and apply these skills to their interests in another field. This minor could also be combined with a major in mathematics as preparation for a graduate degree in statistics or biostatistics.

Undergraduate Advising Office

The Baskin School of Engineering undergraduate advising office offers general advising for prospective and declared undergraduates majoring in School of Engineering programs. The office handles major declarations, transfer credits, course substitutions, articulations, and degree certifications. Undergraduate students obtain and submit all paperwork requiring departmental approval to the undergraduate advising office. Students may obtain additional information and assistance on the School of Engineering web site: <http://ua.soe.ucsc.edu>.

Admission to School of Engineering Majors

High School Preparation for Engineering Students

It is recommended that high school students intending to apply to a School of Engineering major have completed four years of mathematics (through advanced algebra and trigonometry) and three years of science in high school. Comparable college mathematics and science courses completed at other institutions also serve to properly prepare students for these majors.

College Board Advanced Placement Credit

Prospective students are encouraged to take the College Board Advanced Placement (AP) Examinations in computer science, mathematics, economics, chemistry, or biology, because an acceptable score on these examinations may satisfy both university and major degree requirements. Students must provide official examination scores to the UCSC Office of Admissions to be granted credit toward course prerequisites or degree requirements as follows:

Biology: a score of 5 on the AP Biology examination can be substituted for Biology 20A, *Cell and Molecular Biology*, and Biology 20B, *Development and Physiology*.

Chemistry: a score of 5 on the AP Chemistry examination fulfills the prerequisite for enrollment in Chemistry 1B/M.

Computer Science: a score of 3 on Exam A satisfies Computer Science 5J, *Introduction to Programming in Java*; a score of 4 or 5 on Exam A satisfies Computer Science 12A, *Introduction*

to Programming, and the associated laboratory, Computer Science 12L; a score of 4 or 5 on Exam AB satisfies both Computer Science 12A, *Introduction to Programming*, and Computer Science 12B, *Introduction to Data Structures*, and the associated laboratories, Computer Science 12L, and Computer Science 12M. A score of 5 on the IBH Computer Science examination satisfies Computer Science 12A, *Introduction to Programming*, and the associated laboratory, Computer Science 12L; a score of 6 or 7 on the IBH Computer Science examination satisfies Computer Science 12A, *Introduction to Programming*, and Computer Science 12B, *Introduction to Data Structures*, and the associated laboratories, Computer Science 12L, and Computer Science 12M.

Economics: a score of 4 or 5 on the Microeconomics examination satisfies Economics 1, *Introductory Microeconomics*; a score of 4 or 5 on the Macroeconomics examination satisfies Economics 2, *Introductory Macroeconomics*.

Mathematics: a score of 4 or 5 on the Calculus AB examination satisfies Mathematics 19A, *Calculus for Science, Engineering, and Mathematics*; a score of 4 or 5 on the Calculus BC examination satisfies both Mathematics 19A-B.

Students may check with the Office of Admissions for details about other AP examinations that also satisfy university requirements.

Admission as First-Year Students

Students interested in declaring a School of Engineering major are encouraged to do so during their first year at UCSC. Some students may be admitted directly into their School of Engineering major of choice at the time they are admitted to UCSC.

First-year applicants to UCSC may apply for direct acceptance to a School of Engineering major by indicating the major as their first or second choice on the application. Applicants will be granted direct acceptance based on their high school grade point average, courses completed in mathematics and sciences, scores on standardized tests, and/or their personal statement.

To take advantage of direct acceptance, first-year students must complete the declaration of major process in their first term at UCSC or forfeit their direct acceptance status.

Students not directly admitted may still apply during their first year and their acceptance into their selected major will be based upon their School of Engineering grade point average (GPA—described below), their high school grade point average, courses completed in mathematics and sciences, and scores on standardized tests.

Post First-Year Current Students Acceptance to Majors

Any student admitted to UCSC as a lower-division student that has completed three or more quarters at UCSC can apply to declare a School of Engineering major upon completion (with a grade of C or better) of all the foundation courses for that major. Specific information about requirements and the School of Engineering major declaration process can be found at <http://ua.soe.ucsc.edu>.

School of Engineering GPA Calculation

The School of Engineering GPA is calculated on grades received for all School of Engineering and Division of

Physical and Biological Sciences courses. Students are strongly advised not to request Pass/No Pass grading in any School of Engineering or Division of Physical and Biological Sciences courses since a grade of P is treated as a C for calculating the School of Engineering GPA regardless of the content of the evaluation. No Pass grades are treated as an F. Although the campus GPA excludes the first 15 credits of repeated courses from the GPA calculation, all attempts are included in the School of Engineering GPA calculation. The School of Engineering GPA is used in determining acceptance into School of Engineering majors and the School of Engineering disqualification process described later in this section.

Junior Transfer Acceptance to Majors

The School of Engineering strongly encourages applications from transfer students. Due to the prerequisite structure for upper-division courses, prospective transfer students should have completed as many of the lower-division requirements for the respective majors as possible to complete the degree within a reasonable time. Students must plan carefully because many courses must be taken sequentially.

Transfer students should **not** follow the Intersegmental General Education Transfer Curriculum (IGETC) because it will not provide transfer students with enough mathematics and engineering courses to allow them to complete School of Engineering programs at UCSC in two years.

Students who apply as transfer students with junior status (90 quarter credits or more of transfer credit) who wish to earn a degree from the School of Engineering must indicate a School of Engineering major as their first choice on their UC application. (Students may also indicate an alternative School of Engineering major as their second choice.)

Junior transfers who do not list a School of Engineering major on their application to UCSC will not be considered for admission to such majors after the first day of their first quarter on campus.

Acceptance into the major is based on the student's academic college record and preparation for the major. Applicants are encouraged to take and excel in as many courses that are equivalent to the department's foundation courses as possible. For many School of Engineering majors, completion of a year of calculus (accepted as equivalent to Mathematics 19A-B), linear algebra, differential equations, a year of calculus-based physics courses (accepted as equivalent to Physics 5A, 5B, 5C), and two programming courses (accepted as equivalent to Computer Science 12A, Computer Science 12B, or Computer Engineering 12/L or Computer Engineering 13/L) are strongly recommended. An applicant will be approved, conditionally approved, or declined. Only students who have completed most or all of the foundation courses will be approved or conditionally approved for acceptance into the major.

Students who are approved for acceptance and who have course credit for all the foundation courses for their major must declare the major in their first term of enrollment at UCSC. The status of students who are approved for acceptance but who, upon review of their transcripts, are found not to have course credit for all the foundation courses for their major will be changed to conditionally approved.

Students who are conditionally approved must complete the remaining required foundation courses for their major in their first term at UCSC and declare the major at the beginning of the following term at UCSC. Conditionally approved students will be evaluated based

upon their performance in the foundation courses attempted during their first term at UCSC. Students who are conditionally approved for the major should be prepared to declare an alternative major outside of the School of Engineering in case they are unsuccessful in their attempt to complete their remaining foundation courses.

Course Substitutions

The School of Engineering undergraduate advising office may require that a Petition for Course Substitution be approved before credit for a course completed at another institution can be applied to any School of Engineering major requirement. The undergraduate advising staff can help determine if this petition process is necessary based on transcript information provided to them by the student. This petition is in addition to and separate from the transfer credit awarded by the university. Petition forms are available at the undergraduate advising office. Each petition must be accompanied by a course description, syllabus, and verification of the number of credits earned with a grade of C or better. To guarantee equivalency, departments may sometimes require a grade of B or better. It is very helpful if students can provide further evidence of course content, such as examples of programming assignments, homework, or examinations.

Appeal Process

Appeal of negative decisions concerning School of Engineering admission will be evaluated by the academic program to which the student applied. Appeal letters must be submitted in writing to the undergraduate advising office within the time frame given in the letter of denial. Late appeals will not be considered. Letters of appeal should describe any extenuating circumstances that might affect the faculty's evaluation of the record. Students whose petitions are denied may still be admitted to UCSC, but they may not reapply for acceptance to the engineering major(s) for which they were originally considered.

Letter Grade Policy

The School of Engineering strongly advises students to request letter grades in all foundation courses for all engineering concentrations. Many majors in the School of Engineering have additional restrictions on the use of the Pass/No Pass option. Foundation courses should not be taken Pass/No Pass because doing so may lower students' School of Engineering GPA and affect their admission into School of Engineering majors. Major grade requirements are as follows:

Bioengineering major: All courses required for the major must be taken for a letter grade. Two lower-division exceptions are allowed.

Bioinformatics major: Same as campus requirements, but foundation courses should not be taken Pass/No Pass, since doing so may lower the declaration GPA needed for admission to the major.

Computer engineering major: All courses required for the major must be taken for a letter grade. Two lower-division exceptions are allowed.

Computer engineering minor: Same as campus requirements.

Computer science major and minor: All courses required for the major and minor must be taken for letter grades. Two lower-division exceptions are allowed.

Computer game design major and minor: All courses required for the major and minor must

be taken for letter grades. Two lower-division exceptions are allowed.

Electrical engineering major: All courses required for the major must be taken for letter grades. Two lower-division exceptions are allowed.

Information systems management major: All courses required for the major must be taken for letter grades. Two lower-division exceptions are allowed (not to include Information Systems Management 50 or 58).

Statistics minor: same as campus requirements.

Note: for admission into any School of Engineering major, a grade of Pass is treated as a C, which may adversely affect your admission to the major.

Disqualification Policy

GPA Requirement

Your cumulative School of Engineering GPA is calculated from all School of Engineering and Physical and Biological Sciences courses attempted. Your term School of Engineering GPA is calculated from all School of Engineering and Physical and Biological Sciences courses you have taken in the previous quarter as a UCSC student.

If both your cumulative and term School of Engineering GPAs are 2.0 or greater, you are in good departmental standing. If either your cumulative or term GPAs are less than 2.0, you are on departmental probation. If you are on departmental probation and your cumulative School of Engineering GPA is below 2.0 at the beginning of the next quarter, you are subject to disqualification from the major. If your term School of Engineering GPA falls below 1.5 in any term, you are also subject to disqualification from the major. All students that are subject to disqualification are reviewed by their departmental faculty to determine whether to require the student to choose a different major or to be on departmental probation.

Ethics Requirement

Graduates of the Baskin School of Engineering are expected to become professionals with the highest ethical standards. Knowledge and practice of professional ethics is a requirement for the degree. Examples of professional society codes of ethics are available at www.ieee.org/about/whatis/code.html and www.acm.org/serving/se/code.htm. Students of the Baskin School of Engineering are also expected to adhere to high ethical standards while pursuing their undergraduate studies.

Students found guilty of a single incident of academic dishonesty may, at the discretion of the department, be disqualified from the major. In addition, students may be subject to other possible university sanctions. A second incident of academic dishonesty will result in automatic disqualification from the major.

Additional Notes on Disqualification

Please note the Repeating Courses policy in the School of Engineering section of this catalog. Two failed attempts in a class will endanger your opportunity to continue in a School of Engineering major.

Bioinformatics, Computer Engineering, and Computer Science have additional disqualification criteria. Please see those sections of this catalog for details.

Repeating Courses

No School of Engineering course may be attempted more than twice without prior approval from the chair of the department offering the course. A class in which a W is given is counted as an attempt.

Courses Taken Elsewhere After Enrollment

It is the intent of the faculty of the Baskin School of Engineering that all degree requirements be completed at UCSC or prior to first enrollment at UCSC. Course substitutions, such as taking a course at another UC campus, in the Education Abroad Program (EAP), or at a community college, require approval prior to taking the class. Applications and procedures for pre-approval are obtained from and given to the School of Engineering undergraduate advising office.

California Community College articulation agreements do not apply to enrolled students. Students must get pre-approval before taking a class at a community college.

When a student declares their major, minor, or proposed major in a School of Engineering program, the decision as to whether a course taken elsewhere is accepted for this School of Engineering major or minor is made by the major department at that point. (**Note:** There is no guarantee that a course will be applicable toward a School of Engineering major, minor, or proposed major even if the student has completed more advanced courses in that department.)

School-Wide Information and Policies

Computing Facilities

The Baskin School of Engineering houses research facilities and teaching laboratories in the Baskin Engineering Building for courses in programming, software design, circuits, electronics, graphics, digital design, and computer and system architecture. Emphasis in these laboratories is on state-of-the-art equipment, including personal computers, engineering workstations, a 1000-processor Linux cluster, logic analyzers, microprocessor development systems, a wireless network for mobile computers, and network support at 100MB/sec.

All Unix computers and workstations and most personal computers on campus are networked together, allowing students to access the School of Engineering and the Information Technology Services (ITS) facilities from any computer account on campus. For a more complete description of the computing facilities on campus, see <http://its.ucsc.edu>.

Prerequisites

Because of the sequential nature of the School of Engineering curricula, most courses have prerequisites, which are listed in the course descriptions. Students should carefully review these descriptions in the catalog and the quarterly *Schedule of Classes*. Students must have passed all prerequisites of a course for which they are enrolling. Pre-enrolled students who then fail a prerequisite are no longer eligible to be enrolled in the course and will be dropped.

For example, to enroll in Computer Science 101, a prerequisite to many upper-division courses, the prerequisite courses that must be completed or in progress are Computer Science 12B, Computer Engineering 16, Mathematics 19B, and one of the following: Mathematics 21, 22, 23A, 24, or Applied Mathematics and Statistics 10.

Students who have transferable course work from another institution that appears to satisfy a UCSC course prerequisite should promptly consult with the School of Engineering's staff advisers. Students will be asked to present records from the other institution to document the course equivalency. Until such evidence has been verified by the department, students attempting to enroll in a course using a prerequisite course that was not completed at UCSC will be informed that

they have not satisfied the course prerequisite. (See the Course Substitutions section under Admission to School of Engineering Majors.)

Permission Numbers

Students not meeting the regular prerequisite requirements for courses sponsored by the Baskin School of Engineering may petition the course instructor to receive a permission number to enroll. The instructor may ask a student to demonstrate the ability and/or potential to succeed in the course or may request additional information to formulate a decision. If no instructor has been assigned to the course, please contact the undergraduate advising office for direction.

Materials Fee

Students should be aware that some laboratory courses require each student to purchase miscellaneous parts or a material kit for completion of the laboratory work. Some laboratory courses may include consumable (one-time use) parts and materials that are distributed to the entire class. Some laboratory kits include parts that the student will assemble into a project and keep. Please refer to the Baskin Engineering Laboratory Support web page for specific course material fee amounts: www.soe.ucsc.edu/administration/labs/.

Miscellaneous Fees

Miscellaneous breakage or loss of equipment fees are assessed to address the cost of damaged laboratory equipment and loss of laboratory materials due to abuse or negligence. This fee is only charged if a student breaks or loses laboratory equipment or materials and is not a mandatory fee charged to all students taking the course. Please refer to the Baskin Engineering Laboratory Support web page for more information: www.soe.ucsc.edu/administration/labs/.

Lower-Division Courses

50. Engineering Mechanics. W

An introduction to statics and engineering graphics, and their applications. Topics include equilibrium of two-dimensional and three-dimensional systems, work and potential energy, virtual work, orthographic projections and descriptive geometry, engineering drawing, computer graphics and modeling, and empirical equations. Prerequisite(s): Physics 5A/L or 6A/L, and concurrent enrollment in course 50L. *K. Groppi*

50L. Engineering Mechanics Laboratory (1 credit). W

Laboratory sequence illustrating topics covered in course 50. One two-hour laboratory session per week. Students are billed a materials fee. Prerequisite(s): Physics 5A/L or 6A/L, and concurrent enrollment in course 50. *K. Groppi*

Applied Mathematics and Statistics

Baskin School of Engineering
(831) 459-2158
<http://www.soe.ucsc.edu>

Faculty and Professional Interests

Professor

NICHOLAS BRUMMELL

Fluid dynamics; magnetohydrodynamics; numerical simulations of geophysical and astrophysical dynamics, especially solar interior physics; supercomputing

DAVID DRAPER

Bayesian statistics, hierarchical modeling, Bayesian nonparametric methods, model specification and model uncertainty, quality assessment, risk assessment, statistical applications in the environmental, medical, and social sciences

HERBERT LEE

Bayesian statistics, computational statistics, spatial statistics, inverse problems, model selection and model averaging, nonparametric regression, neural networks, classification and clustering

MARC MANGEL

Distinguished Professor of Applied Mathematics and Statistics
Program Director, Technology and Information Management
Mathematical modeling of biological phenomena, especially quantitative issues in fishery management; mathematical and computational aspects of aging and disease; impact of technology on biological systems

BRUNO SANSÓ

Bayesian spatio-temporal modeling, environmental and geostatistical applications, modeling of extreme values, statistical assessment of climate variability

HONGYUN WANG

Theoretical biophysics, mathematical modeling of single molecule systems, molecular motors and molecular bonds, statistical physics, numerical analysis, partial differential equations, computer animation, data systems, fast algorithms

Associate Professor

PASCALE GARAUD

Astrophysical and geophysical fluid dynamics, magnetohydrodynamics; analytical and numerical solutions of partial differential equations related to these phenomena

ATHANASIOS KOTTAS

Bayesian nonparametrics, analysis of computer model experiments, mixture models, modeling and inference for point processes, quantile regression, survival analysis, applications in ecology and engineering

RAQUEL PRADO

Bayesian non-stationary time series modeling, multivariate time series, biomedical signal processing and statistical genetics

Assistant Professor

QI GONG

Computational methods for real-time control systems, trajectory optimization and motion planning, nonlinear filtering and observer design, robust and adaptive control of nonlinear systems, industry applications of control theory

DEJAN MILUTINOVIC

Stochastic dynamical systems and statistical signal processing, multi-agent systems/robotics, systems biology/immune system, optimal control, hybrid and discrete event systems

ABEL RODRÍGUEZ

Bayesian nonparametrics, Bayesian time series and spatial models, public health, financial econometrics, structural proteomics

Associate Adjunct Professor

ROBIN MORRIS

Bayesian analysis of scientific data, with applications in Earth remote sensing, particle and astroparticle physics, signal processing and engineering

TIMOUR RADKO

Physical oceanography and geophysical fluid dynamics. Particular subjects include the dynamics of mesoscale jets and vortices, general circulation of the ocean, double diffusive convection, and wave motion.

Assistant Adjunct Professor

ERIC ANDERSON

Statistical methods in fisheries management and ecology, parentage inference, inference of species hybrids, genetic stock identification

Lecturer

YONATAN KATZNELSON

Number theory

BRUNO MENDES

Parameter and model uncertainty in geophysics and groundwater contamination modeling, Bayesian statistics, parallel computation



WILLIAM DUNBAR (Computer Engineering)

Theory and application of feedback control, single-molecule biophysics, nanopore sensors, dynamics and control of biomolecules

GABRIEL ELKAIM (Computer Engineering)

Embedded systems; robust software architectures for real-time reactive systems; sensor fusion; guidance, navigation, and control (GNC) system identification; robust and advanced control schemes; feedback control systems; robotics; unmanned autonomous vehicles (UAVs); and cooperative control

ANDREW T. FISHER (Earth Sciences)

Hydrogeology, crustal studies, coupled flows, modeling

GARY A. GLATZMAIER (Earth Sciences)

Computer simulation of geodynamics and planetary dynamics

DAVID HAUSSLER (Biomolecular Engineering;

Distinguished Professor of Biomolecular Engineering; Investigator, Howard Hughes Medical Institute; Director, Center for Biomolecular Science and Engineering; Scientific Co-Director, California Institute for Quantitative Biosciences [QB3])

Molecular evolution, neurodevelopment, genomics, bioinformatics, computational molecular biology, statistical models, machine learning, neural networks

DAVID P. HELMBOLD (Computer Science)

Machine learning, computational learning theory, analysis of algorithms

ROBERTO MANDUCHI (Computer Engineering)

Computer vision and sensor processing, with application to assistive technology for the visually impaired

RICHARD MONTGOMERY (Mathematics)

Celestial mechanics, differential geometry, gauge theory, mechanics (quantum and classical), and control theory

KATIA OBRACZKA (Computer Engineering)

Computer networks, distributed systems, operating systems, Internet information systems, mobile computing, wireless networks

HAMID SADJADPOUR (Computer Engineering)
Wireless communication systems, network information theory and scaling laws, performance analysis of wireless ad hoc and sensor networks, routing and MAC protocol design for wireless networks

MANFRED WARMUTH (Computer Science)
Online learning, machine learning, statistical decision theory, game theory, analysis of algorithms

PETER YOUNG (Physics)
Condensed matter theory, statistical mechanics

YI ZHANG (Information Systems Management)
Information retrieval, knowledge management, natural language processing, machine learning

Program Description

Applied mathematics and statistics are disciplines devoted to the use of mathematical methods and reasoning to solve real-world problems of a scientific or decision-making nature in a wide variety of subjects, principally (but not exclusively) in engineering, medicine, the physical and biological sciences, and the social sciences. Applied mathematical modeling often involves the use of systems of (partial) differential equations to describe and predict the behavior of complex real-world systems that unfold dynamically in time. Statistics, construed broadly, is the study of uncertainty: how to measure it (using ideas and methods in probability theory), and what to do about it (using concepts from statistical inference and decision theory).

The Applied Mathematics and Statistics Department at UCSC offers master's and doctoral programs in Statistics and Applied Mathematics, or Applied Mathematics and Statistics, depending on chosen emphasis. The goal of these programs is to help students develop into independent scholars who are prepared for productive careers in research, teaching, and industry. The department also offers a designated emphasis in statistics, a minor in statistics, and a minor in applied mathematics.

Additional information on these programs can be found on the department's web pages at www.soe.ucsc.edu.

Undergraduate Programs

Requirements for an Undergraduate Minor in Statistics

The statistics minor is available for students who wish to gain a quantitative understanding of how to (a) measure uncertainty and (b) make good decisions on the basis of incomplete or imperfect information, and to apply these skills to their interests in another field. This minor could also be combined with a major in mathematics as preparation for a graduate degree in statistics or biostatistics.

Students are required to take a two-quarter basic calculus sequence:

Basic calculus sequence:

- Applied Mathematics and Statistics 11A-B or Economics 11A-B or Mathematics 11A-B or Mathematics 19A-B or Mathematics 20A-B
- Plus one course from each of the following nine categories:
 - Statistical Concepts: Applied Mathematics and Statistics 5 or 7/L
 - Computer Programming: Bioinformatics 60/L or Computer Science 12A/L or 5C or 5J or 5P or Computer Engineering 13/L

- *Mathematical Methods for Engineers I* or Linear Algebra: Applied Mathematics and Statistics 10 or Mathematics 21 (also recommended that students take *Basic Mathematical Methods for Engineers II* or *Mathematical Methods for Engineers II* or Ordinary Differential Equations: Applied Mathematics and Statistics 20A or Applied Mathematics and Statistics 20 or Mathematics 24)
- Multivariate Calculus: Mathematics 22 or 23A
- Probability: Applied Mathematics and Statistics 131 or Computer Engineering 107
- Statistical Inference: Applied Mathematics and Statistics 132
- Computational Methods: Applied Mathematics and Statistics 147
- Bayesian Statistics: Applied Mathematics and Statistics 206
- Statistical Elective: Applied Mathematics and Statistics 198, or Applied Mathematics and Statistics 205A, or Biomolecular Engineering 205, or Computer Engineering 108, or Economics 114, or Electrical Engineering 151, or Mathematics 114, or Psychology 181, or Sociology 103A

Students planning graduate work in statistics are recommended to choose Mathematics 23A and Applied Mathematics and Statistics 205A, and also to take Mathematics 23B and Mathematics 105A-B.

Requirements for an Undergraduate Minor in Applied Mathematics

The applied mathematics minor is available for students who wish to develop (1) proficiency in modeling real-life problems using mathematics and (2) knowledge of standard, practical analytical and numerical methods for the solution of these models. This minor could be combined with a major in any of the physical, biological, mathematical, or engineering sciences as preparation for a graduate degree in that field or in applied mathematics.

Students are required to take the four-quarter calculus sequence:

- Calculus Sequence: Mathematics 19A-B or Mathematics 20A-B, and Mathematics 23A-B
- Plus one of the following sequences:
 - Applied Mathematics and Statistics 10 and 20
 - Mathematics 21 and 24
 - Physics 116A and 116B
- (**Note:** Students who complete Mathematics 21 and 24 or Physics 116A and 116B, are strongly recommended to complete the MATLAB self-paced tutorial at: <http://matlab-training.soe.ucsc.edu/>)
- Plus one course from each of the following categories:
 - Probability Theory: Applied Mathematics and Statistics 131 or Computer Engineering 107
 - Dynamical Systems: Applied Mathematics and Statistics 114 or Applied Mathematics and Statistics 214
 - Introduction to Numerical methods: Applied Mathematics and Statistics 147, Physics 115, or Earth Sciences 119
 - Partial Differential Equations: Applied Mathematics and Statistics 212A, Physics

116C, or Mathematics 107

- Plus one applied-mathematics elective from the following list:
 - Applied Mathematics and Statistics 107/217, 115/215, 132, 198, 212B, 213, 216, 231, 290B

Students may also propose other electives which use applied mathematical methods, subject to approval by the department.

Graduate Programs (M.S., Ph.D.)

Requirements for a Graduate Degree in Statistics and Applied Mathematics

This track is for students emphasizing statistics. All students must complete the core courses described below.

Master's Program

Required core Applied Mathematics and Statistics courses:

- 200 *Research and Teaching in Applied Mathematics and Statistics*
- 205A *Mathematical Statistics*, or 205B, *Statistical Inference*
- 206 *Bayesian Statistics*
- 207 *Intermediate Bayesian Modeling*
- 211 *Applied Mathematical Methods I*
- 256 *Linear Statistical Models*
- 280B *Seminar in Statistics and Stochastic Modeling*

In addition to these 30 credits, master of science (M.S.) students must complete two additional 5-credit courses from the approved list, for a total requirement of 40 credits.

Ph.D. Program

Required core Applied Mathematics and Statistics courses:

- 200 *Research and Teaching in Applied Mathematics and Statistics*
- 205B *Statistical Inference*
- 206 *Bayesian Statistics*
- 207 *Intermediate Bayesian Modeling*
- 211 *Applied Mathematical Methods I*
- 256 *Linear Statistical Models*
- 280B *Seminar in Statistics and Stochastic Modeling*

In addition to these 30 credits, doctor of philosophy (Ph.D.) students must complete four additional 5-credit courses from the approved list, for a total requirement of 50 credits.

Requirements for a Graduate Degree in Applied Mathematics and Statistics

This track is for students emphasizing Applied Mathematics. All students must complete the core courses described below.

Required core Applied Mathematics and Statistics courses:

- 200 *Research and Teaching in Applied Mathematics and Statistics*
- 205A *Mathematical Statistics*, or 205B, *Statistical Inference*
- 211 *Foundations of Applied Mathematics for Science and Engineering*
- 212A *Applied Mathematical Methods I*
- 212B *Applied Mathematical Methods II*
- 213 *Numerical Solutions Differential Equations*

214 *Applied Dynamical Systems*280B *Seminar in Statistics and Stochastic Modeling*

In addition to these 35 credits, Ph.D. students must complete four additional 5-credit courses from the approved list, for a total requirement of 55 credits.

For both emphasis tracks, M.S. students will be allowed to substitute up to two courses with their required research project in which they conduct a research program in one or two of the quarters of their second year. The project will consist of solving a problem or problems from the selected area of application and will be presented to the sponsoring faculty member as a written document.

Ph.D. students will be required to serve as teaching assistants for at least two quarters during their graduate study. Certain exceptions may be permitted for those with extensive prior teaching experience, for those who are not allowed to be employed due to visa regulations, or for other reasons approved by the graduate director.

Qualifying Examinations

At the end of the first year, all students will take a pre-qualifying examination covering the five or six (non-seminar) core courses. This examination will have two parts: an in-class written examination, followed by a take-home project involving data analysis. Students who do not pass this examination will be allowed to retake it before the start of the following fall quarter; if they fail the second examination they will be dismissed from the program.

Ph.D. students must complete the oral proposal defense, through which they advance to candidacy, by the end of the spring quarter of their third year. The proposal defense is a public seminar as part of an oral qualifying examination given by the qualifying committee.

Thesis and/or Dissertation Requirements

A capstone project is required for the M.S. degree and a dissertation for the Ph.D. degree.

For the M.S. degree, students will conduct a capstone research project in their second year (up to three quarters). Students must submit a proposal to the potential faculty sponsor by the start of the fourth academic quarter. If the proposal is accepted, the faculty member will become the sponsor and will supervise the research and writing of the project. The project will involve the solution of a problem or problems from the selected area of application. When the project is completed and written, it will be submitted to and must be accepted by a committee of two individuals, consisting of the faculty adviser and one additional reader. Additional readers will be chosen appropriately from within the Applied Mathematics and Statistics Department or outside of it. Either the adviser or the additional reader must be from within the Applied Mathematics and Statistics Department.

A dissertation is required for the Ph.D. degree. Ph.D. students must select a faculty research adviser by the end of the second year. A written dissertation proposal will be submitted to the adviser, and filed with the graduate secretary. A qualifying examination committee will be formed, consisting of the adviser and three additional members, approved by the Chair of the Graduate Program and the Dean of the Graduate Division. The student will submit the written dissertation proposal to all members of the committee and the graduate secretary no less than one month in advance of the qualifying examination. The dissertation proposal will be formally presented in a public oral qualifying examination with the committee, followed by a private examination. Students will advance to candidacy after

they have completed all course requirements (including removal of all incompletes), passed the qualifying examination, and paid the filing fee. Under normal progress, a student will advance to candidacy by the end of the spring quarter of her/his third year. A student who has not advanced to candidacy by the start of the fourth year will be subject to academic probation. Upon advancement to candidacy, a dissertation reading committee will be formed, consisting of the dissertation supervisor and at least two additional readers appointed by the Graduate Program chair upon recommendation of the dissertation supervisor. At least one of these additional readers must be in the Applied Mathematics and Statistics Department. The committee is subject to the approval of the Graduate Division.

The dissertation will consist of a minimum of three chapters composed of material suitable for submission and publication in major professional journals in statistics and stochastic modeling. The completed dissertation will be submitted to the reading committee at least one month before the dissertation defense, which consists of a public presentation of the research followed by a private examination by the reading committee. Successful completion of the dissertation defense is the final requirement for the Ph.D. degree.

Relationship of Masters and Doctoral Programs

The M.S. and Ph.D. programs are freestanding and independent, so that students can be admitted to either. Students completing the M.S. program may proceed into the Ph.D. program, and students in the Ph.D. program can receive a M.S. degree upon completion of M.S. requirements, including the capstone research project. Each Ph.D. student will be required to have knowledge of statistics and applied mathematics equivalent to that required for the M.S. degree. In addition, Ph.D. candidates will be required to complete coursework beyond the M.S. level.

Transfer Credit

Up to three School of Engineering courses fulfilling the degree requirements of either the M.S. or Ph.D. degrees may be taken before beginning the graduate program through the concurrent enrollment program. Ph.D. students who have previously earned a master's degree in a related field at another institution may substitute courses from their previous university with approval of the adviser and the graduate committee. Courses from other institutions may not be applied to the M.S. degree course requirements.

Petitions should be submitted along with the transcript from the other institution or UCSC Extension. For courses taken at other institutions, copies of the syllabi, exams, and other course work should accompany the petition. Such petitions are not considered until the completion of at least one quarter at UCSC. At most, a total of three courses may be transferred from concurrent enrollment and other institutions.

Review of Progress

Each year, the faculty reviews the progress of every student. Students not making adequate progress toward completion of degree requirements are subject to dismissal from the program (see the *Graduate Handbook* for the policy on satisfactory academic progress). For specific guidelines on the annual student reviews, please refer to <http://www.soe.ucsc.edu/programs/ssm/graduate/index.html>.

Requirements for a designated emphasis to an external degree program

Students from another degree program who meet the following requirements can have the designated emphasis of "statistics" annotated to their degree title. For example, a Ph.D. student in electrical engineering who meets the requirements would get a certification that read "Ph.D. Electrical Engineering (Statistics)." This certification is supplied for those students who effectively do a statistics M.S. on their way to a Ph.D. in another program. To qualify for this, the degree granting department must sign an agreement with the AMS department regarding designated emphases. The course requirements are:

Required core Applied Mathematics and Statistics courses:

205A *Mathematical Statistics*, or 205B, *Statistical Inference*

206 *Bayesian Statistics*

207 *Intermediate Bayesian Modeling*

256 *Linear Statistical Models*

and one other course from a list of approved courses in AMS (currently 211, 221, 223, 241, 245, 261, 274 although others will be added in the future)

Lower-Division Courses

2. Pre-Statistics. F

Reviews and introduces mathematical methods useful in the elementary study of statistics, including logic, real numbers, inequalities, linear and quadratic equations, functions, graphs, exponential and logarithmic functions, and summation notation. Prerequisite(s): Mathematics 2 or placement exam score of 20 or higher. (General Education Code(s): MF, Q.) *B. Mendes, The Staff*

3. Precalculus for Science and Engineering. W

Includes inequalities, linear and quadratic equations, functions (linear, quadratic, rational, power, exponential, logarithms, trigonometric), and analytic geometry, with application to science and engineering. Students cannot receive credit for both this course and Mathematics 2A and 2B, or Mathematics 3. Mathematics 3 can substitute for course 3. Prerequisite(s): score of 20 or higher on Mathematics Placement Exam or Mathematics 2. (General Education Code(s): MF, Q.) *The Staff, P. Garaud, B. Mendes*

5. Statistics. F,W,S

Introduction to statistical methods/reasoning, including descriptive methods, data-gathering (experimental design and sample surveys), probability, interval estimation, significance tests, one- and two-sample problems, categorical data analysis, correlation and regression. Emphasis on applications to the natural and social sciences. Students cannot receive credit for this course if they have already received credit for course 7. (General Education Code(s): SR, IN, Q.) *The Staff, H. Lee, R. Morris, B. Sansó, A. Rodriguez, A. Kottas*

7. Statistical Methods for the Biological, Environmental, and Health Sciences. F,W,S

Case-study-based introduction to statistical methods as practiced in the biological, environmental, and health sciences. Descriptive methods, experimental design, probability, interval estimation, hypothesis testing, one- and two-sample problems, power and sample size calculations, simple correlation and simple linear regression, one-way analysis of variance, categorical data analysis. (Formerly *Statistical Methods for the Biological and Environmental Sciences*.) Prerequisite(s): score of 31 or higher on math-

ematics placement exam, course 2 or 3 or 11A or 15A or Mathematics 3 or 11A or 19A. Concurrent enrollment in course 7L is required. (General Education Code(s): SR, IN, Q.) *H. Lee, A. Rodriguez, D. Draper, R. Prado*

7L. Statistical Methods for the Biological, Environmental, and Health Sciences Laboratory (2 credits). F,W,S

Computer-based laboratory course in which students gain hands-on experience in analysis of data sets arising from statistical problem-solving in the biological, environmental, and health sciences. Descriptive methods, interval estimation, hypothesis testing, one-and two-sample problems, correlation and regression, one-way analysis of variance, categorical data analysis. (Formerly *Statistical Methods for the Biological and Environmental Sciences Laboratory*.) Prerequisite(s): score of 31 or higher on mathematics placement exam, course 2 or 3 or 11A or 15A or Mathematics 3 or 11A or 19A. Concurrent enrollment in course 7 is required. *H. Lee, D. Draper, R. Prado*

10. Mathematical Methods for Engineers I. F,S

Applications-oriented course on complex numbers and linear algebra integrating Matlab as a computational support tool. Introduction to complex algebra. Vectors, bases and transformations, matrix algebra, solutions of linear systems, inverses and determinants, eigenvalues and eigenvectors, and geometric transformations. Students cannot receive credit for this course and for courses 10A or 27L or Mathematics 21. (Formerly course 27, *Mathematical Methods for Engineers*.) Prerequisite(s): Score of 40 or higher on mathematics placement exam, or course 3, or Mathematics 3. (General Education Code(s): MF, Q.) *The Staff, H. Wang, Q. Gong, J. Katznelson, N. Brummell, B. Mendes*

10A. Basic Mathematical Methods for Engineers I (3 credits). F,S

Applications-oriented course on complex numbers and linear algebra integrating Matlab as a computational support tool. Introduction to complex algebra. Vectors, bases and transformations, matrix algebra, solutions of linear systems, inverses and determinants. Students cannot receive credit for this course and courses 10 or 27L or Mathematics 21. Prerequisite(s): Score of 40 or higher on mathematics placement exam, or course 3, or Mathematics 3. *The Staff, H. Wang, Q. Gong, J. Katznelson, N. Brummell, B. Mendes*

10B. Mathematical Methods for Engineers IB (2 credits). F,S

Can only be taken by students who need a transition from course 10A to course 10. Students cannot receive credit for this course and for course 10 or Mathematics 21 or courses 27 and 27L. Prerequisite(s): course 10A. Enrollment by permission of instructor only. *The Staff*

11A. Mathematical Methods for Economists I. F,W,S

Introduction to mathematical tools and reasoning, with applications to economics. Topics are drawn from differential calculus in one variable and include limits, continuity, differentiation, elasticity, Taylor polynomials, and optimization. (Also offered as Economics 11A. Students cannot receive credit for both courses.) Students who have already taken Mathematics 11A and 19A should not take this course. Prerequisite(s): score of 31 or higher on Math Placement Exam. Students who do not place into precalculus should enroll in Mathematics 2. (General Education Code(s): IN, Q.) *J. Katznelson, D. Milutinovic, M. Mangel*

11B. Mathematical Methods for Economists II. F,W,S

Mathematical tools and reasoning, with applications to

economics. Topics are drawn from multivariable differential calculus and single variable integral calculus, and include partial derivatives, linear and quadratic approximation, optimization with and without constraints, Lagrange multipliers, definite and indefinite integrals, and elementary differential equations. (Also offered as Economics 11B. Students cannot receive credit for both courses.) Prerequisite(s): course 11A, Economics 11A, Mathematics 11A, or Mathematics 19A. (General Education Code(s): MF, IN, Q.) *J. Katznelson*

15A. Case-Study Calculus I. W

Case-study-based, first-quarter introduction to single-variable calculus, with computing labs/discussion sections featuring contemporary symbolic, numerical, and graphical computing tools. Case studies drawn from biology, environmental sciences, health sciences, and psychology. Includes functions, mathematical modeling, limits, continuity, tangents, velocity, derivatives, the chain rule, implicit differentiation, higher derivatives, exponential and logarithmic functions and their derivatives, differentiating inverse functions, the mean value theorem, concavity, inflection points, function optimization, and curve-sketching. Students cannot receive credit for this course and course 11A or Economics 11A or Mathematics 11A or 19A. Prerequisite(s): course 3 or Mathematics 3 or score of 40 or higher on precalculus placement exam or by permission of instructor. (General Education Code(s): MF, IN, Q.) *B. Mendes, The Staff*

15B. Case-Study Calculus II. S

Case-study based, second-quarter introduction to single-variable calculus, with computing labs/discussion sections featuring symbolic numerical, and graphical computing tools. Case studies are drawn from biology, environmental science, health science, and psychology. Includes indefinite and definite integrals of functions of a single variable; the fundamental theorem of calculus; integration by parts and other techniques for evaluating integrals; infinite series; Taylor series, polynomial approximations. Students cannot receive credit for this course and course 11B or Economics 11B or Mathematics 11B or 19B. Prerequisite(s): course 15A or 11A or Economics 11A or Mathematics 11A or 19A. (General Education Code(s): MF, IN, Q.) *The Staff, D. Milutinovic, B. Mendes*

20. Mathematical Methods for Engineers II. W

Applications-oriented class on ordinary differential equations (ODEs) and systems of ODEs using Matlab as a computational support tool. Covers linear ODEs and systems of linear ODEs; nonlinear ODEs using substitution and Laplace transforms; phase-plane analysis; introduction to numerical methods. Students cannot receive credit for this course and for courses 20A or 27L or Mathematics 24. Prerequisite(s): Mathematics 19B, and course 10 or 10A or Mathematics 21. (General Education Code(s): MF, Q.) *Gong, J. Katznelson*

20A. Basic Mathematical Methods for Engineers II (3 credits). W

Applications-oriented class on ordinary differential equations (ODEs) and systems of ODEs integrating Matlab as a computational support tool. Covers linear ODEs and systems of linear ODEs; nonlinear ODEs using substitution and Laplace transforms. Students cannot receive credit for this course and for courses 20 or 27L or Mathematics 24. Prerequisite(s): Mathematics 19B, and course 10 or 10A or Mathematics 21. *Q. Gong, J. Katznelson*

20B. Mathematical Methods for Engineers IIB (2 credits). W

Can only be taken by students who need a transition from course 20A to course 20. Students cannot receive credit for this course and for course 20 or Mathematics 24 or

course 27 and 27L. Prerequisite(s): course 20A. Enrollment by permission of instructor only. *The Staff*

27L. Matlab for Engineers Laboratory (2 credits). *

Introduction to Matlab and elementary programming. Covers visualization of functions and data; linear algebra and numerical solutions of differential equations using the supplied Matlab routines. Previous knowledge of linear algebra and differential equation is expected. (Formerly *Mathematical Methods for Engineers Laboratory*) Prerequisite(s): Mathematics 21 and 24, or permission of instructor. Enrollment limited to 40. *The Staff*

80A. Gambling and Gaming. S

Games of chance and strategy motivated early developments in probability, statistics, and decision theory. Course uses popular games to introduce students to these concepts, which underpin recent scientific developments in economics, genetics, ecology, and physics. (General Education Code(s): SR, T7-Natural Sciences or Social Sciences, Q.) *A. Rodriguez, H. Lee*

Upper-Division Courses

100. Mathematical Methods for Engineers III. *

Applications-oriented course on complex analysis and partial differential equations using Maple as symbolic math software support. In addition, introduces Fourier analysis, special functions, and asymptotic methods. Students cannot receive credit for this course and Physics 116B or Physics 116C. Prerequisite(s): course 20, or by permission of instructor. Enrollment limited to 25. *The Staff*

107. Introduction to Fluid Dynamics. W

Covers fundamental topics in fluid dynamics: Euler and Lagrange descriptions of continuum dynamics; conservation laws for inviscid and viscous flows; potential flows; exact solutions of the Navier-Stokes equation; boundary layer theory; gravity waves. Students cannot receive credit for this course and Applied Mathematics and Statistics 217. (Also offered as Physics 107. Students cannot receive credit for both courses.) Prerequisite(s): Mathematics 107 or Physics 116C or Earth and Planetary Sciences 111. *N. Brummell*

114. Introduction to Dynamical Systems. W

Introduces continuous and discrete dynamical systems. Topics include: fixed points; stability; limit cycles; bifurcations; transition to and characterization of chaos; fractals. Examples are drawn from sciences and engineering. Students cannot receive credit for this course and course 214. (Formerly course 146.) Prerequisite(s): course 27 or 20, or Mathematics 21 and Mathematics 24, or Physics 116B. Enrollment restricted to sophomores, juniors and seniors. (General Education Code(s): MF.) *D. Milutinovic, P. Garaud*

115. Stochastic Modeling in Biology. *

Application of differential equations, probability, and stochastic processes to problems in cell, organismal, and population biology. Topics include life-history theory, behavioral ecology, and population biology. Students may not receive credit for this course and course 215. Prerequisite(s): course 131, a university-level course in biology, and operational knowledge of a programming language; or consent of instructor. *M. Mangel*

118. Estimation and Introduction to Control of Stochastic Processes. F

Provides practical knowledge of Kalman filtering and introduces control theory for stochastic processes. Selected topics include: state-space modeling; discrete- and continuous-time Kalman filter; smoothing; and applications in feedback control. Students learn through hands-on

experience. Students cannot receive credit for this course and course 218. Enrollment by permission of instructor. (General Education Code(s): SR.) *D. Milutinovic*

131. Introduction to Probability Theory. S

Introduction to probability theory and its applications. Combinatorial analysis, axioms of probability and independence, random variables (discrete and continuous), joint probability distributions, properties of expectation, Central Limit Theorem, Law of Large Numbers, Markov chains. Students cannot receive credit for this course and Computer Engineering 107. Prerequisite(s): course 11B or Economics 11B or Mathematics 11B or 19B. (General Education Code(s): SR, Q.) *R. Prado, M. Mangel, B. Sansó, A. Kottas*

132. Statistical Inference. F

Introduction to statistical inference at a calculus-based level: maximum likelihood estimation, sufficient statistics, distributions of estimators, confidence intervals, hypothesis testing, and Bayesian inference. Prerequisite(s): course 131 or Computer Engineering 107. (General Education Code(s): SR.) *A. Rodriguez, A. Kottas*

147. Computational Methods and Applications. W

Applications of computational methods to solving mathematical problems using Matlab. Topics include solution of nonlinear equations, linear systems, differential equations, sparse matrix solver, and eigenvalue problems. Prerequisite(s): course 27 or 10 or 10A, or Mathematics 21. Knowledge of differential equations is recommended (course 20 or 20A, or Mathematics 24). (General Education Code(s): MF.) *H. Wang*

156. Linear Regression. *

Covers simple linear regression, multiple regression, and analysis of variance models. Students learn to use the software package R to perform the analysis, and to construct a clear technical report on their analysis, readable by either scientists or nontechnical audiences. (Formerly *Linear Statistical Models*.) Prerequisite(s): course 132 and satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 30. (General Education Code(s): W.) *H. Lee*

198. Independent Study or Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Study or Research (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Research and Teaching in AMS (3 credits). F

Basic teaching techniques for teaching assistants, including responsibilities and rights; resource materials; computer skills; leading discussions or lab sessions; presentation techniques; maintaining class records; and grading. Examines research and professional training, including use of library; technical writing; giving talks in seminars and conferences; and ethical issues in science and engineering. Enrollment restricted to graduate students. *The Staff*

202. Linear Models in SAS. S

Case study-based course teaches statistical linear modeling using the SAS software package. Teaches generalized linear models; linear regression; analysis of variance/covariance; analysis of data with random effects and repeated measures. Prerequisite(s): course 156 or 256, or permission of instructor. Enrollment restricted to graduate students. *B. Mendes*

205A. Mathematical Statistics. F

Graduate introduction to topics in probability and statistical inference. Probabilities, random variables, common families of distributions; expectation and higher moments; multivariate distributions, marginals and conditionals; point estimation, methods and properties; interval estimation, methods and properties; and hypothesis testing, methods and properties. (Formerly course 205.) Prerequisite(s): Strongly recommended: course 131. Previous experience with univariate and multivariate calculus, and experience with elementary probability also recommended. Enrollment restricted to graduate students. *A. Rodriguez, B. Sansó*

205B. Statistical Inference. *

Statistical inference from a frequentist point of view. Properties of random samples; convergence concepts applied to point estimators; principles of statistical inference; obtaining and evaluating point estimators with particular attention to maximum likelihood estimates and their properties; obtaining and evaluating interval estimators; and hypothesis testing methods and their properties. Prerequisite(s): course 131 or equivalent. Enrollment restricted to graduate students. *B. Sansó*

206. Bayesian Statistics. W

Introduction to Bayesian statistical methods for inference and prediction; exchangeability; prior, likelihood, posterior, and predictive distributions; coherence and calibration; conjugate analysis; Markov Chain Monte Carlo methods for simulation-based computation; hierarchical modeling; Bayesian model diagnostics, model selection, and sensitivity analysis. Prerequisite(s): graduate standing, or course 132, or permission of instructor. Enrollment restricted to juniors, seniors, and graduate students. *D. Draper, H. Lee*

207. Intermediate Bayesian Statistical Modeling. S

Hierarchical modeling, linear models (regression and analysis of variance) from the Bayesian point of view, intermediate Markov chain Monte Carlo methods, generalized linear models, multivariate models, mixture models, hidden Markov models. Prerequisite(s): course 206, and graduate standing or permission of instructor. *R. Prado, D. Draper, B. Sansó*

211. Foundations of Applied Mathematics. F

Accelerated class reviewing fundamental applied mathematical methods for all sciences. Topics include: multivariate calculus, linear algebra, Fourier series and integral transform methods, complex analysis, and ordinary differential equations. Enrollment restricted to graduate students. *N. Brummell*

212A. Applied Mathematical Methods I. W

Focuses on the analytical and numerical methods for solving differential equations. Topics include well-posed problems, Fourier transform, separation of variables, Green's functions, Huygen's principle, calculus of variation, numerical discretization, local truncation error, global error, error estimation, numerical stability, multigrid method. (Formerly course 211.) Enrollment restricted to graduate students. Undergraduates are encouraged to take this class with permission of instructor. *H. Wang, N. Brummell, P. Garaud*

212B. Applied Mathematical Methods II. S

Covers perturbation methods: asymptotic series, stationary phase and expansion of integrals, matched asymptotic expansions, multiple scales and the WKB method, Padé approximants and improvements of series. (Formerly course 212.) Prerequisite(s): course 212A. *H. Wang, N. Brummell, P. Garaud*

213. Numerical Solutions of Differential Equations. S

Focuses on numerical solutions of differential equations. Topics include Runge-Kutta methods; error estimation and error control; consistency, stability, and convergence; conjugate gradient method; multigrid method; CFL condition; and high-resolution methods for conservation laws. Enrollment restricted to graduate students or permission of instructor. *H. Wang, Q. Gong, N. Brummell, P. Garaud*

214. Applied Dynamical Systems. W

Introduces continuous and discrete dynamical systems. Topics include: fixed points; stability; limit cycles; bifurcations; transition to and characterization of chaos; and fractals. Examples drawn from sciences and engineering; founding papers of the subject are studied. Students cannot receive credit for this course and course 114. Enrollment restricted to graduate students. Enrollment of undergraduates by permission of instructor. Enrollment limited to 15. *H. Wang, D. Milutinovic, P. Garaud, M. Mangel*

215. Stochastic Modeling in Biology. *

Application of differential equations and probability and stochastic processes to problems in cell, organismal, and population biology. Topics include: life-history theory, behavioral ecology, and population biology. Students may not receive credit for this course and course 115. Enrollment restricted to graduate students or permission of instructor. *M. Mangel*

216. Stochastic Differential Equations. *

Introduction to stochastic differential equations and diffusion processes with applications to biology, biomolecular engineering, and chemical kinetics. Topics include Brownian motion and white noise, gambler's ruin, backward and forward equations, and the theory of boundary conditions. Enrollment restricted to graduate students or consent of instructor. *H. Wang*

217. Introduction to Fluid Dynamics. W

Covers fundamental topics in fluid dynamics at the graduate level: Euler and Lagrange descriptions of continuum dynamics; conservation laws for inviscid and viscous flows; potential flows; exact solutions of the Navier-Stokes equation; boundary layer theory; gravity waves. Students cannot receive credit for this course and course 107. Enrollment restricted to graduate students. *N. Brummell*

218. Estimation and Introduction to Control of Stochastic Processes. F

Provides practical knowledge of Kalman filtering and introduces control theory for stochastic processes. Selected topics include: state-space modeling; discrete- and continuous-time Kalman filter; smoothing; and applications in feedback control. Students learn through hands-on experience. Students cannot receive credit for this course and course 118. Enrollment restricted to graduate students. *D. Milutinovic*

221. Bayesian Decision Theory. *

Explores conceptual and theoretical bases of statistical decision making under uncertainty. Focuses on axiomatic foundations of expected utility, elicitation of subjective probabilities and utilities, and the value of information and modern computational methods for decision problems. Prerequisite(s): course 206. Enrollment restricted to graduate students. *B. Sansó*

223. Time Series Analysis. *

Graduate level introductory course on time series data and models in the time and frequency domains: descriptive time series methods; the periodogram; basic theory of stationary processes; linear filters; spectral analysis;

time series analysis for repeated measurements; ARIMA models; introduction to Bayesian spectral analysis; Bayesian learning, forecasting, and smoothing; introduction to Bayesian Dynamic Linear Models (DLMs); DLM mathematical structure; DLMs for trends and seasonal patterns; and autoregression and time series regression models. Prerequisite: course 206. Enrollment restricted to graduate students. *R. Prado*

225. Multivariate Statistical Methods. *

Introduction to statistical methods for analyzing data sets in which two or more variables play the role of outcome or response. Descriptive methods for multivariate data. Matrix algebra and random vectors. The multivariate normal distribution. Likelihood and Bayesian inferences about multivariate mean vectors. Analysis of covariance structure: principle components, factor analysis. Discriminant, classification and cluster analysis. Prerequisite(s): course 206. Enrollment restricted to graduate students. *D. Draper*

231. Nonlinear Control Theory. *

Covers analysis and design of nonlinear control systems using Lyapunov theory and geometric methods. Includes properties of solutions of nonlinear systems, Lyapunov stability analysis, effects of perturbations, controllability, observability, feedback linearization, and nonlinear control design tools for stabilization. Prerequisite(s): basic knowledge of mathematical analysis and ordinary differential equations is assumed. Enrollment restricted to graduate students or permission of instructor. *Q. Gong*

232. Applied Optimal Control. *

Introduces optimal control theory and computational optimal control algorithms. Topics include: calculus of variations, minimum principle, dynamic programming, HJB equation, linear-quadratic regulator, direct and indirect computational methods, and engineering application of optimal control. Prerequisite(s): course 114 or 214, or Computer Engineering 240 or 241, or Mathematics 145. Enrollment restricted to graduate students. *Q. Gong*

236. Motion Coordination of Robotic Networks. *

Comprehensive introduction to motion coordination algorithms for robotic networks. Emphasis on mathematical tools to model, analyze, and design cooperative strategies for control, robotics, and sensing tasks. Topics include: continuous and discrete-time evolution models, proximity graphs, performance measures, invariance principles, and coordination algorithms for rendezvous, deployment, flocking, and consensus. Techniques and methodologies are introduced through application setups from multi-agent robotic systems, cooperative control, and mobile sensor networks. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

241. Bayesian Nonparametric Methods. F

Theory, methods, and applications of Bayesian nonparametric modeling. Prior probability models for spaces of functions. Dirichlet processes. Polya trees. Nonparametric mixtures. Models for regression, survival analysis, categorical data analysis, and spatial statistics. Examples drawn from social, engineering, and life sciences. Prerequisite(s): course 207. Enrollment restricted to graduate students. *A. Kottas*

245. Spatial Statistics. W

Introduction to the analysis of spatial data: theory of correlation structures and variograms; kriging and Gaussian processes; Markov random fields; fitting models to data; computational techniques; frequentist and Bayesian approaches. Prerequisite(s): course 207. Enrollment restricted to graduate students. *B. Sansó, H. Lee*

256. Linear Statistical Models. W

Theory, methods, and applications of linear statistical models. Review of simple correlation and simple linear regression. Multiple and partial correlation and multiple linear regression. Analysis of variance and covariance. Linear model diagnostics and model selection. Case studies drawn from natural, social, and medical sciences. Course 205 strongly recommended as a prerequisite. Undergraduates are encouraged to take this class with permission of instructor. Prerequisite(s): course 205A or 205B or permission of instructor. Enrollment restricted to graduate students. *B. Sansó, R. Prado*

261. Probability Theory with Markov Chains. S

Introduction to probability theory: probability spaces, expectation as Lebesgue integral, characteristic functions, modes of convergence, conditional probability and expectation, discrete-state Markov chains, stationary distributions, limit theorems, ergodic theorem, continuous-state Markov chains, applications to Markov chain Monte Carlo methods. Prerequisite(s): course 205B or by permission of instructor. Enrollment restricted to graduate students. *A. Kottas*

263. Stochastic Processes. *

Includes probabilistic and statistical analysis of random processes, continuous-time Markov chains, hidden Markov models, point processes, Markov random fields, spatial and spatio-temporal processes, and statistical modeling and inference in stochastic processes. Applications to a variety of fields. Prerequisite(s): course 205A, 205B, or 261, or by permission of instructor. *A. Kottas*

274. Generalized Linear Models. *

Theory, methods, and applications of generalized linear statistical models; review of linear models; binomial models for binary responses (including logistical regression and probit models); log-linear models for categorical data analysis; and Poisson models for count data. Case studies drawn from social, engineering, and life sciences. Prerequisite(s): course 205A, 205B, or 256. Enrollment restricted to graduate students. *A. Kottas*

280A. Seminar in Mathematical and Computational Biology (2 credits). F,W,S

Weekly seminar on mathematical and computational biology. Participants present research findings in organized and critical fashion, framed in context of current literature. Students present own research on a regular basis. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *M. Mangel*

280B. Seminars in Statistical and Applied Mathematical Modeling (2 credits). F,W,S

Weekly seminar series covering topics of current research in applied mathematics and statistics. Permission of instructor required. Enrollment restricted to graduate students. (Formerly *Seminar in Applied Mathematics and Statistics*.) May be repeated for credit. *The Staff*

280C. Seminar in Geophysical and Astrophysical Fluid Dynamics (2 credits). F,W,S

Weekly seminar/discussion group on geophysical and astrophysical fluid dynamics covering both analytical and computational approaches. Participants present research progress and findings in semiformal discussions. Students must present their own research on a regular basis. Enrollment restricted to graduate students. May be repeated for credit. *N. Brummell, P. Garaud*

285. Seminar in Career Skills (2 credits). *

Seminar in career skills for applied mathematicians and statisticians. Learn about professional activities such as the publication process, grant proposals, and the job market. Enrollment restricted to graduate students, typically

within two years of their expected Ph.D. completion date. *The Staff*

290A. Topics in Mathematical and Computational Biology (2 credits). *

Focuses on applications of mathematical and computational methods with particular emphasis on advanced methods applying to organismal biology or resource management. Students read current literature, prepare critiques, and conduct projects. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *M. Mangel*

290B. Advanced Topics in the Numerical Solution of PDEs. *

Modern practical methods for the numerical solution of partial differential equations. Methods considered depend on the expertise of the instructor, but are covered in-depth and up to the cutting-edge of practical contemporary implementation. Content could be method-based (e.g., spectral methods, finite-element methods) or topic-based (e.g., simulations of turbulence). Some programming and numerical analysis (e.g., course 213) highly recommended. Enrollment restricted to graduate students and undergraduates with permission of the instructor. *H. Wang, N. Brummell, P. Garaud*

291. Advanced Topics in Bayesian Statistics (3 credits). *

Advanced study of research topics in the theory, methods, or applications of Bayesian statistics. The specific subject depends on the instructor. Enrollment restricted to graduate students and by permission of instructor. May be repeated for credit. *E. Anderson, The Staff*

296. Masters Project (2 credits). F,W,S

Independent completion of a masters project under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study or Research. F,W,S

Independent study or research under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. *The Staff*

297F. Independent Study (2 credits). F,W,S

Independent study or research under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Thesis research under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. *The Staff*

Bioengineering

Baskin School of Engineering
335 Baskin Engineering Building
(831) 459-2158
<http://www.soe.ucsc.edu>

Participating Faculty and Professional Interests

MARK AKESON (Biomolecular Engineering)
Chair, Biomolecular Engineering
DNA structure and dynamics, single molecule biophysics, bioethics, nanopore technology

MANUEL ARES JR. (Molecular, Cell, and Developmental Biology)

RNA processing, structure and function of RNA

PHILLIP BERMAN (Biomolecular Engineering, Department Chair)

Drug development, vaccines, AIDS, monoclonal antibody therapeutics, immunology, molecular cell/biology, recombinant protein production (commercial scale)

DAVID DEAMER (Biomolecular Engineering and Chemistry and Biochemistry; UC Davis Emeritus)

Membrane biophysics, nanopore analysis, DNA sequencing, biomolecular self-assembly

DAVID DRAPER (Applied Mathematics and Statistics)

Bayesian statistics, hierarchical modeling, Bayesian nonparametric methods, model specification and model uncertainty, quality assessment, risk assessment, statistical applications in the environmental, medical, and social sciences

WILLIAM DUNBAR (Computer Engineering)

Theory and application of feedback control, single-molecule biophysics, nanopore sensors, dynamics and control of biomolecules

CAMILLA FORSBERG (Biomolecular Engineering)

Hematopoietic stem cells, transcriptional regulation, chromatin, blood cell development, cell surface receptors, genomics

DIETLIND L. GERLOFF (Biomolecular Engineering)

Protein to protein interactions, protein function prediction, functional genomics, protein structure prediction

ALEXANDER A. GRILLO (SCIPP)

Neurophysiology, neural systems, high-energy particle physics

GRANT HARTZOG (Molecular, Cell, and Developmental Biology)

Biochemistry, genetics, chromatin and transcriptional regulation

DAVID HAUSSLER (Biomolecular Engineering;

Distinguished Professor of Biomolecular Engineering; Investigator, Howard Hughes Medical Institute; Director, Center for Biomolecular Science and Engineering; Scientific Co-Director, California Institute for Quantitative Biosciences [QB3])

Molecular evolution, neurodevelopment, genomics, bioinformatics, computational molecular biology, statistical models, machine learning, neural networks

RICHARD HUGHEY (Biomolecular Engineering and Computer Engineering)

(Chair, B.S. in Bioengineering)

Computer architecture, parallel processing, computational biology

MICHAEL ISAACSON (Electrical Engineering)

Nano- and microfabrication technology and applications to biomedical and diagnostic devices, nanocharacterization of materials with emphasis on the development of microscopy tools, novel modes of imaging, electron and light optics

KEVIN KARPLUS (Biomolecular Engineering)

Protein structure prediction, protein design, genome assembly from next-generation sequence data

DOUGLAS KELLOGG (Molecular, Cell, and Developmental Biology)

Coordination of cell growth and cell division

JOEL KUBBY (Electrical Engineering)

Micro-Electro-Mechanical-Systems (MEMS), adaptive optics (AO), optical-MEMS, bio-MEMS, bio-imaging, AO microscopy

SRI KURNIAWAN (Computer Engineering)

Human-computer interaction; human factors and ergonomics; accessibility; assistive technology; usability; empirical studies; user-centered design

ALAN M. LITKE (SCIPP)

Neural systems; retinal processing; development and prosthesis; technology development for neurophysiology; high-energy physics

WENTAI LIU (Electrical Engineering)

Retinal prosthesis, biomimetic systems, integrated neuro-electronics, molecular electronics, CMOS and SOI transceiver design, current mode band limited signaling, microelectronic sensor, timing/clock recovery and optimization, noise characterization and modeling, and computer vision/image processing

TODD LOWE (Biomolecular Engineering)

Experimental and computation genomics, ncRNA gene finders, DNA microarrays to study the biology of Archaea

ROBERTO MANDUCHI (Computer Engineering)

Computer vision and sensor processing, with application to assistive technology for the visually impaired

DOMINIC W. MASSARO, Emeritus (Psychology)

GLENN L. MILLHAUSER (Chemistry and Biochemistry)

Electron spin resonance; nuclear magnetic resonance, melanocortin receptor signaling, agouti proteins, prions, peptide synthesis

LINDA OGREN (Molecular, Cellular, and Developmental Biology)

Endocrinology

NADER POURMAND (Biomolecular Engineering)

Biosensors, microarray, nanotechnology, pathogens, sequencing, genotyping, DNA fingerprinting

RAQUEL PRADO (Applied Mathematics and Statistics)

Bayesian non-stationary time series modeling, multivariate time series, biomedical signal processing and statistical genetics

JACOB ROSEN (Computer Engineering)

Biorobotics; human-centered robotics; medical robotics; surgery and rehabilitation; wearable robotics (exoskeleton); teleoperation, haptics and virtual reality, biomechanics, neuromuscular control and human-machine interfaces

WENDY ROTHWELL (Biomolecular Engineering)

Biotechnology, molecular genetics

HOLGER SCHMIDT (Electrical Engineering)

Optofluidics, hollow-core photonics for biomedicine and quantum optics, nanomagnet-optics, single-particle spectroscopy, ultrafast optics

ANDREA STEINER (Community Studies)

Health-care systems, health justice, critical public health, gerontology, ageism, long-term care

JOSHUA STUART (Biomolecular Engineering)

Computational functional genomics, comparative analysis of gene regulation, cross-species inference of gene networks, probabilistic graphical models

ELLEN KAPPY SUCKIEL (Philosophy)

Ethics, William James, American philosophy, genetic ethics, ethics of biotechnology

JOHN TAMKUN (Molecular, Cell, and Developmental Biology)

*Transcriptional regulation, molecular genetics of *Drosophila* development, regulation of gene expression*

JOHN F. VESECKY (Electrical Engineering)

HF radar design and construction and observation of ocean surface winds, waves and currents with applications to coastal and deep water ocean processes; project MEDSAT

ALAN M. ZAHLER (Molecular, Cell, and Developmental Biology)

Molecular biology, splice site selection, and alternative pre-mRNA processing

JIN Z. ZHANG (Chemistry and Biochemistry)

Design, synthesis, characterization, and application of nanomaterials, including semiconductor and metal nanoparticles; femtosecond laser spectroscopy; ultrafast dynamics on surfaces and at interfaces; cancer biomarker detection; surface-enhanced Raman spectroscopy

YI ZUO (Molecular, Cell, and Developmental Biology)

Glia-synapse interaction and synaptic plasticity in vivo

Program Description

Bioengineering focuses on the application of engineering tools and techniques to problems in medicine and the biological sciences. The UC Santa Cruz (UCSC) program in bioengineering, through its participating faculty and departments, provides students with inspiration and quality education in the theory and practice of bioengineering.

The UCSC bachelor of science (B.S.) degree in bioengineering prepares graduates for a career that combines engineering, medicine, and biology. UCSC bioengineering graduates will be trained in the principles and practices of bioengineering and in the scientific and mathematical principles upon which these principles and practices are built; graduates will be prepared for further education (both formal and informal) and for productive employment in industry.

Bioengineering is a broad discipline. To guide students in their study, the faculty have developed three concentrations: bioelectronics, biomolecular engineering, and rehabilitation. The bioelectronics concentration is designed for students interested in the interface between organisms and electronic instrumentation or implants. The biomolecular engineering concentration is designed for students interested in drug design or biomolecular sensors. The rehabilitation concentration is designed for students interested in developing technology to aid disabled individuals.

In the UCSC bioengineering B.S. program, many undergraduates work on faculty research projects, analyzing ideas, developing technologies, and discovering new approaches. Areas include biomolecular sensors and systems, nanoelectronic implants, assistive technologies for the elderly and disabled, bioinformatics, microfluidics, nano-scale biotechnology, and other areas at the junction between engineering, medicine, and the life sciences. More information about bioengineering research and undergraduate research opportunities can be found on the web at www.cbse.ucsc.edu, biomedical.ucsc.edu, marcmbrs.ucsc.edu, surf-it.soe.ucsc.edu, and graddiv.ucsc.edu/ucleads.

The program is sponsored by the Departments of Biomolecular Engineering, Computer Engineering, Electrical Engineering, and Molecular, Cell, and Developmental Biology, with additional participating faculty in the Departments of Applied Mathematics and Statistics, Community Studies, Chemistry and Biochemistry, Philosophy, Physics, and Psychology.

The program has course requirements in mathematics, science, and engineering. Students interested in bioengineering as a major should contact the School of Engineering advising office (advising@soe.ucsc.edu) before enrolling in any courses at UCSC.

Bioengineering students may continue their research and studies at UCSC in the graduate programs of the collaborating department and other departments. Programs and application information may be found at <http://www.graddiv.ucsc.edu>.

Courses for Nonmajors

The following courses are recommended for nonmajors interested in bioengineering. Computer Engineering 80A, *Universal Access: Disability, Technology, and Society*; Biomolecular Engineering/Philosophy 80G, *Bioethics in the 21st Century: Science, Business, and Society*; and Biomolecular Engineering 5, *Introduction to Biotechnology*. Students are also advised to consult the program discussions of the collaborating departments for additional possibilities related to bioengineering.

Admissions Policy

Admission to the major is selective. First-year applicants may receive direct admission at the time they apply to UCSC, based on their high school record and test scores.

Admission to the bioengineering major after a student has entered UCSC is based on performance in courses offered by the School of Engineering (SoE) and the Division of Physical and Biological Sciences (the SoE grade point average [GPA]). Students in their first two years or equivalent (generally, first-year students and sophomores) are required to have an SoE GPA of 2.5 or better at the time of major declaration. Progress in the major and ability to complete the major within campus limits will also be considered.

After the first year, at least six courses required for the major, and any associated laboratories, must be completed prior to declaration. Required courses are listed below.

Transfer Students

Admission of transfer students will be based on GPA and whether lower-division course requirements have been satisfied. Most importantly, transfer students should have completed required courses in calculus and differential equations, as well as required courses in at least three of the four other introductory areas (programming, biology, chemistry, and physics). Students may satisfy the bioethics requirement if they have completed a suitable ethics course at their community college.

Honors in the Major

Bioengineering majors are awarded "Honors in the Major" and "Highest Honors in the Major" based on GPA and on results of undergraduate research. Students with an SoE GPA of 3.7 in most cases receive highest honors. Students with an SoE GPA of 3.3 in most cases receive honors. Students with particularly significant accomplishments in undergraduate research may be considered with a lower SoE GPA.

Letter Grade Policy

The bioengineering program requires letter grades for all courses applied to the degree with the exception of two lower-division courses, which students may elect to take Pass/No Pass.

Baskin School of Engineering Policies

Please refer to the School of Engineering section of the catalog for additional policies that apply to all Baskin School of Engineering programs.

Materials Fee and Miscellaneous Fees

Please see the section on fees in the School of Engineering section.

Major Requirements

Advising and Elective Approval

Every major must have a bioengineering faculty adviser, assigned by the Baskin School of Engineering undergraduate advising office. With assistance from the adviser, students must formulate a program of proposed course work that meets the major requirements. All electives must be pre-approved by the bioengineering undergraduate director.

Optional Courses for Majors

Students desiring or needing an early introduction to the use of mathematics in engineering may wish to take Computer Engineering 8, *Robot Automation*, in their first quarter. Students pursuing the rehabilitation concentration may wish to include one or more psychology courses in their study plan.

Introductory Requirements for All Concentrations, 16 Courses

Mathematics 19A-B, *Calculus for Science, Engineering, and Mathematics*

Applied Mathematics and Statistics 7/L, *Statistical Methods for the Biological and Environmental Sciences/Laboratory*

Applied Mathematics and Statistics 10A and 20A, *Basic Mathematical Methods for Engineers I & II* (3 credits each); or Applied Mathematics and Statistics 10 and 20, *Mathematical Methods for Engineers I and II*; or Mathematics 24, *Ordinary Differential Equations*

Biomolecular Engineering 80G, *Bioethics in the 21st Century: Science, Business, and Society*

Chemistry and Biochemistry 1A, 1B/M, and 1C/N, *General Chemistry*, or (with preapproval) courses completed elsewhere that enable enrollment in 108A/L

Chemistry and Biochemistry 108A/L or 112A/L, *Organic Chemistry/Laboratory*

Biology (BIOL) 20A, *Cell and Molecular Biology*

Biology (BIOE) 20B, *Development and Physiology*

Physics 5A/L or 6A/L, *Introduction to Physics I/Laboratory*

Physics 5C/N or 6C/N, *Introduction to Physics III/Laboratory*

Two (the rehabilitation concentration requires one more, see below) of:

Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*; or

Computer Engineering 13/L, *Computer Systems and C Programming/Laboratory*; or

Computer Science 12A/L, *Introduction to Programming/Laboratory*; or

Computer Science 12B/M, *Introduction to Data Structures/Laboratory*; or

Biomolecular Engineering 160/L, *Research Programming for Biologists and Biochemists/Laboratory*

Advanced Requirements for All Concentrations, 5-6 Courses

Either Biology (BIOL) 100/K, *Biochemistry/Laboratory*, or Biochemistry and Molecular Biology 100A-B, *Biochemistry*

Biomolecular Engineering 150/L, *Molecular Biomechanics/Laboratory*

Electrical Engineering 101/L, *Introduction to Electronic Circuits/Laboratory*

Computer Engineering 9, *Introduction to Statics, Dynamics, and Biomechanics*

Computer Engineering 185, *Technical Writing for Computer Engineers*

Bioelectronics Engineering Concentration, 6 Courses

Electrical Engineering 103, *Signals and Systems*

Electrical Engineering 104/L, *Measurement and Instrumentation in Physiology*; or

Electrical Engineering 171/L, *Analog Electronics*

One design elective, from the approved list

Two upper-division Baskin School of Engineering electives

One upper-division Baskin School of Engineering or Division of Physical and Biological Sciences elective

Electives must be selected and pre-approved in consultation with your faculty adviser. Suggested electives include Electrical Engineering 212, *Introduction to BioMEMS* and 270, *Neural Implant Engineering*, and new courses in development.

Biomolecular Engineering Concentration, 6 Courses

Biomolecular Engineering 5, *Introduction to Biotechnology*

Biomolecular Engineering 105, *Genetics*

One design elective, from the approved list

Two upper-division Baskin School of Engineering electives

One upper-division Baskin School of Engineering or Division of Physical and Biological Sciences elective

Electives must be selected and pre-approved in consultation with your faculty adviser. Suggested electives include Biomolecular Engineering 140, *Bioinstrumentation*; 155, *Biotechnology and Drug Development*; 178, *Stem Cell Biology*; and 110, *Computational Biology Tools*.

Rehabilitation Engineering Concentration, 6 Courses

Students in the rehabilitation concentration must complete Computer Engineering 12/L, Computer Engineering 13/L or Computer Science 12A/L, and Computer Science 12B/M.

Computer Engineering 80A, *Universal Access: Disability, Technology, and Society*

Computer Engineering 131, *Human-Computer Interaction*

One design elective, from the approved list

One upper-division Baskin School of Engineering elective

One upper-division Baskin School of Engineering or Division of Physical and Biological Sciences elective

Electives must be selected and pre-approved in consultation with your faculty adviser.

Students may wish to focus on systems or software for rehabilitation. Suggested electives include Computer Engineering 118/L, *Mechatronics/Laboratory*, 167/L, *Sensing and Sensor Technology/Laboratory*, 232, *Human Factors*; and Computer Science 109, *Advanced Programming*.

Capstone Project, 2 Courses

All bioengineering students complete a senior capstone project in bioengineering. Students may satisfy this requirement with research in a faculty laboratory, concurrent with three offerings of 195, or by forming a student team to address a problem of interest and challenge within 123A and 123B. The project proposal must be approved by the bioengineering undergraduate director as a bioengineering project. (Satisfies the campus comprehensive requirement.)

Biomolecular Engineering, Computer Engineering, or Electrical Engineering 123A, *Engineering Design Project I* and Biomolecular Engineering, Computer Engineering, or Electrical Engineering 123B, *Engineering Design Project II*; or

Three offerings of Biomolecular Engineering, Computer Engineering, or Electrical Engineering 195, *Senior Thesis Research* and Biomolecular Engineering 123T, *Senior Thesis Presentation* (2 credits).

Students pursuing the senior thesis option must seek approval of their project one year before graduation, typically spring quarter of the third year. Students spend three or more quarters working on their thesis projects. Thesis students also enroll in 123T, *Senior Thesis Presentation*, during the final spring quarter.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. Bioengineering majors satisfy the DC Requirement by completing Computer Engineering 185, *Technical Writing for Engineers*.

Exit Requirement

Students are required to submit a portfolio, exit survey, and exit interview. The portfolios must be turned in electronically by the last day of the quarter of graduation.

The portfolios will be reviewed quarterly by the bioengineering undergraduate committee and must include the following:

- 1) The capstone project report
- 2) A second project report of the student's selection
- 3) A narrative as specified at the submission site (<http://www.soe.usc.edu/programs/beng/>)

Exit interviews are scheduled during the last week of the quarter by the Baskin School of Engineering (BSOE) advising office.

Bioengineering Major Planners

The following sample academic plans show possible courses of study for a bioengineering major. Students should consider taking courses during the summer to ensure timely completion of the degree. Courses planned to be taken at institutions other than UCSC require pre-approval. The first plan follows the biomolecular engineering concentration, the second plan follows the rehabilitation engineering concentration

and includes precalculus, and the third plan follows the bioelectronics engineering concentration.

Plan One

| Year | Fall | Winter | Spring |
|---------------|--------------------------|-----------------------|-------------|
| 1st (frsh) | College core | BME 5 | gen ed (C2) |
| | MATH 19A | MATH 19B | CMPS 12A/L |
| | CHEM 1A | CHEM 1B/M | CHEM 1C/N |
| 2nd (soph) | CHEM 108A/L | PHYS 6A/L | PHYS 6C/N |
| | AMS 10 | BIOL 20A | BIOL 20B |
| | BME 80G | AMS 20 | AMS 7/L |
| 3rd (jr) | EE 101/L | BME 160/L | BME 150/L |
| | BIOL 100/K | CMPE 9 | BIOL 105 |
| | gen ed | Design Elective | gen ed |
| 4th (sr) | BME 195 (recommended) | BME 195 | BME 123T |
| | BME 140 (elective) | BME 155 (elective) | BME 195 |
| | CMPE 185 | gen ed | Elective |
| | | | gen ed |

Plan Two

| Year | Fall | Winter | Spring |
|---------------|--------------|-------------------------------|-------------|
| 1st (frsh) | College core | CMPE 80A | gen ed (C2) |
| | AMS 3 | MATH 19A | MATH 19B |
| | BME 80G | CMPE 12/L | CMPE 13/L |
| 2nd (soph) | CHEM 1A | CHEM 1B/M | CHEM 1C/N |
| | PHYS 6A/L | CMPE 9 | PHYS 6C/N |
| | AMS 10 | AMS 20 | gen ed |
| 3rd (jr) | EE 101/L | BIOL 20A | BIOL 20B |
| | CMPS 12B/M | CHEM 108A/L | BIOL 100/K |
| | gen ed | Elective | Elective |
| 4th (sr) | CMPE 131 | CMPE 123A | CMPE 123B |
| | CMPE 185 | CMPE 233 (design elective) | BME 150/L |
| | AMS 7 | gen ed | gen ed |

Plan Three

| Year | Fall | Winter | Spring |
|---------------|-----------------|------------|-------------|
| 1st (frsh) | College core | CMPE 12/L | gen ed (C2) |
| | MATH 19A | MATH 19B | AMS 10 |
| | PHYS 5A/L | CMPE 9 | PHYS 5C/N |
| 2nd (soph) | CHEM 1A | CHEM 1B/M | CHEM 1C/N |
| | AMS 7 | AMS 20 | BIOE 20B |
| | BME 80G | BIOL 20A | CMPE 13/L |
| 3rd (jr) | EE 101/L | EE 103 | EE 171/L |
| | CHEM 108A/L | BIOL 100/K | BME 150/L |
| | gen ed | gen ed | gen ed |
| 4th (sr) | Design Elective | EE 123A | EE 123B |
| | CMPE 185 | Elective | Elective |
| | Elective | gen ed | |

Biomolecular Engineering

Baskin School of Engineering
335 Baskin Engineering Building
(831) 459-2158
<http://www.soe.usc.edu>

Faculty and Professional Interests

Professor

MARK AKESON

DNA structure and dynamics, single-molecule biophysics, bioethics, nanopore technology

PHILLIP BERMAN

Drug development, vaccines, AIDS, monoclonal antibody therapeutics, immunology, molecular cell/biology, recombinant protein production (commercial scale)

DAVID HAUSSLER (Distinguished Professor of Biomolecular Engineering, Investigator, Howard Hughes Medical Institute; Director, Center for Biomolecular Science and Engineering; Scientific Co-Director, California Institute for Quantitative Biosciences [QB3])

Molecular evolution, neurodevelopment, genomics, bioinformatics, computational molecular biology, statistical models, machine learning, neural networks

RICHARD HUGHEY (joint with Computer Engineering)

Computer architecture, parallel processing, computational biology

KEVIN KARPLUS

Protein structure prediction, protein design, genome assembly from next-generation sequence data

Associate Professor

TODD LOWE

Experimental and computation genomics, ncRNA gene finders, DNA microarrays to study the biology of Archaea

JOSHUA STUART

Computational functional genomics, comparative analysis of gene regulation, cross-species inference of gene networks, probabilistic graphical models

Assistant Professor

CAMILLA FORSBERG

Hematopoietic stem cells, transcriptional regulation, chromatin, blood cell development, cell surface receptors, genomics

DIETLIND L. GERLOFF

Protein to protein interactions, protein function prediction, functional genomics, protein structure prediction

RICHARD "ED" GREEN

Genomics, computational molecular biology, genome assembly, human evolutionary genetics, ancient DNA, high-throughput sequencing, mRNA-processing and alternative splicing

NADER POURMAND

Biosensors, microarray, nanotechnology, pathogens, sequencing, genotyping, DNA fingerprinting

Research Professor

DAVID W. DEAMER (joint with Chemistry and Biochemistry; UC Davis Emeritus)

Membrane biophysics, nanopore analysis, DNA sequencing, biomolecular self-assembly

Adjunct Professor

JONATHAN TRENT

Organic aggregates, marine snow, microbial physiology, microenvironments, robust proteins, genetic engineering for nanotechnology

Lecturer

WENDY ROTHWELL

Biotechnology, molecular genetics



MANUEL ARES, JR. (Molecular, Cell, and Developmental Biology)

RNA processing, structure and function of RNA

MANEL CAMPS (Microbiology and Environmental Toxicology)

Molecular mechanisms of reactive DNA methylation toxicity

WILLIAM DUNBAR (Computer Engineering)

Theory and application of feedback control, single-molecule biophysics, nanopore sensors, dynamics and control of biomolecules

A. RUSSELL FLEGAL (Microbiology and Environmental Toxicology)

Anthropogenic perturbations of biogeochemical cycles, applications of isotopic tracers in anthropology and archaeology

ROBERT S. LOKEY (Chemistry and Biochemistry)

Organic chemistry, combinatorial synthesis, biotechnology, molecular cell biology

MARC MANGEL (Applied Mathematics and Statistics, Distinguished Professor of Applied Mathematics and Statistics)

Program Director, Technology and Information Management

Mathematical modeling of biological phenomena, especially quantitative issues in fishery management; mathematical and computational aspects of aging and disease, impact of technology on biological systems

GLENN L. MILLHAUSER (Chemistry and Biochemistry)

Electron spin resonance; nuclear magnetic resonance, melanocortin receptor signaling, agouti proteins, prions, peptide synthesis

KAREN OTTEMANN (Microbiology and Environmental Toxicology)

Environmental responses of pathogenic bacteria

JOHN W. TAMKUN (Molecular, Cell, and Developmental Biology)

Transcriptional regulation, molecular genetics of Drosophila development, regulation of gene expression

HONGYUN WANG (Applied Mathematics and Statistics)

Theoretical biophysics, mathematical modeling of single molecule systems, molecular motors and molecular bonds, statistical physics, numerical analysis, partial differential equations, computer animation, data systems, fast algorithms

MANFRED K. WARMUTH (Computer Science)

Online learning, machine learning, statistical decision theory, game theory, analysis of algorithms

W. TODD WIPKE, Emeritus (Chemistry and Biochemistry)

FITNAT H. YILDIZ (Microbiology and Environmental Toxicology)

Microbiology, molecular genetics, genomics; the mechanism of persistence of survival of Vibrio cholerae

ALAN M. ZAHLER (Molecular, Cell, and Developmental Biology)

Molecular biology, splice site selection, and alternative pre-mRNA processing

Program Description

The Department of Biomolecular Engineering is an interdisciplinary department that combines expertise from the biology, mathematics, chemistry, computer science, and engineering to train students and develop

technologies to address major problems at the forefront of biomedical and bio-industrial research. Students trained in the Department of Biomolecular Engineering can look forward to careers in academia, information and biotechnology industries, public health, or medical sciences.

The department offers an undergraduate minor and a bachelor of science (B.S.) degree in bioinformatics, and graduate master of science (M.S.) and doctor of philosophy (Ph.D.) degrees in biomolecular engineering and bioinformatics. The department co-sponsors the B.S. in bioengineering program, described elsewhere in this catalog, with the departments of Computer Engineering, Electrical Engineering, and Molecular, Cell, and Developmental (MCD) Biology. The department co-sponsors the Program in Biomedical Science and Engineering (PBSE), a doctoral training program, with the departments of MCD Biology, Chemistry and Biochemistry, and Microbiology and Environmental Toxicology.

Departmental faculty advise undergraduate and graduate researchers enrolled in the bioinformatics, bioengineering, and related degree programs. Members of the Department of Biomolecular Engineering actively collaborate with faculty from other Baskin School of Engineering departments, such as Applied Mathematics and Statistics, Computer Engineering, Computer Science, and Electrical Engineering; and with the Physical and Biological Sciences departments of MCD Biology, Chemistry and Biochemistry, Microbiology and Environmental Toxicology, Ecology and Evolutionary Biology, and Ocean Sciences.

Bioinformatics Major

Bioinformatics combines mathematics, science, and engineering to explore and understand biological data from high-throughput experiments, such as genome sequencing, gene-expression chips, and proteomics experiments. The program builds upon the research and academic strengths of the faculty in the Center for Biomolecular Science and Engineering, <http://cbse.ucsc.edu>.

The Human Genome Project, the international collaboration to determine the sequence of human DNA and understand its function, had its origin in a conference that took place at UCSC in 1985. One notable output from our research is that UCSC is the primary release site for the public version of the human genome (<http://genome.ucsc.edu>), as well as the repository for the ENCODE (Encyclopedia Of DNA Elements) project, a national effort to annotate the entire human genome with multiple functional assays. We are also a major player in protein-structure prediction, have a strong research group in systems biology, functional genomic characterization of stem cells and play a lead role in national efforts to discover molecular underpinnings of various cancers including participating as a Dream Team for the Stand Up To Cancer project and a data-analysis center for The Cancer Genome Atlas project.

The undergraduate bioinformatics degree program prepares students for graduate school or a career in the pharmaceutical or biotechnology industries.

The immense growth of biological information stored in computerized databases has led to a critical need for people who can understand the languages, tools, and techniques of statistics, science, and engineering.

A classically trained scientist may be unfamiliar with the statistical and algorithmic knowledge required in this field. A classically trained engineer may be unfamiliar with the chemistry and biology required in the field.

Thus, this program strives for a balance of the two: an engineer focused on the problems of the underlying science or, conversely, a scientist focused on the use of engineering tools for analysis and discovery.

The undergraduate degree program in bioinformatics builds a solid foundation in the constituent areas of the field. Students complete core sequences in mathematics (including calculus, statistics, and discrete mathematics), science (including biology, chemistry, and biochemistry), and engineering (including programming, algorithms, and databases). The core topics are brought together in two bioinformatics courses: Biomolecular Engineering 110, *Computational Biology Tools*, and Biomolecular Engineering 205, *Bioinformatics Models and Algorithms*. Students have two electives for specialization within the fields of bioinformatics and are required to take a bioethics course (either Biomolecular Engineering 80G, *Bioethics in the Twenty-First Century: Science, Business, and Society* or Philosophy 145, *Brave New World: Ethical Issues in Genetics*) to study the ethical, legal, and social implications of this new technology. As a comprehensive requirement, all students complete a graduate project course: Biomolecular Engineering 210, *Experimental Systems Biology*, Biomolecular Engineering 211, *Computational Systems Biology*, Biomolecular Engineering 220/L, *Protein Bioinformatics*, or Biomolecular Engineering 230/L, *Computational Genomics*. Students who work on independent research projects with faculty (as all students are encouraged to do) may substitute a senior thesis, Biomolecular Engineering 195, for the graduate project course.

Courses for Nonmajors

Biomolecular Engineering 5, *Introduction to Biotechnology*, presents a broad overview of the impact of biotechnology on the diagnosis and treatment of disease.

Biomolecular Engineering 60 and 160, *Programming for Biologists* and *Biochemists*, provide an introductory programming class using Perl and BioPerl to analyze, transform, and publish biological data.

Biomolecular Engineering 80G, *Bioethics in the Twenty-First Century: Science, Business, and Society*, is particularly appropriate to all students interested in the societal issues surrounding the revolutions in bioinformatics and biotechnology.

Biomolecular Engineering 110, *Computational Biology Tools*, provides an introduction to the tools and techniques of bioinformatics from a user's view. It is intended for biologists and biochemists who need to use bioinformatics tools, but are not primarily interested in building new bioinformatics tools.

Biomolecular Engineering 130, *Genomics*, uses genome browsers and web-based bioinformatics analyses to solve molecular biology problems.

Biomolecular Engineering 109, *Resource-efficient Programming*, provides advice and practice for people working at the limits of their computer hardware. It is of use for bioinformaticians, game programmers, and embedded-system designers.

Biomolecular Engineering 155, *Biotechnology and Drug Development*, examines the science and process of discovering, testing, and manufacturing new drugs within the pharmaceutical industry.

Bioinformatics Policies

Admissions Policy

Admission to the bioinformatics major is selective. First-year applicants may receive direct admission at the

time they apply to UCSC, based on their high school record and test scores.

Admission to the bioinformatics major after a student has entered UCSC is based on performance in courses offered by the School of Engineering (SOE) and the Division of Physical and Biological Sciences (the SOE grade point average—GPA). Due to the required graduate courses in the senior years, a School of Engineering GPA of 2.9 or better is expected at the time of major declaration. After the first year, the following foundation courses must be completed before admission to the major: Computer Science 12A/L (or 5J and 11 or Computer Engineering 12/L and 13/L) and Computer Science 12B, Chemistry 1A, 1B/M and 1C/N, and Mathematics 19A-B.

Courses Taken Elsewhere

Please refer to the School of Engineering section of the catalog for policies about taking courses at other institutions after enrolling at UCSC.

Disqualification Policy

Students who do not make adequate progress in the major (normally passing six required courses per year) may be disqualified from the major. All students not meeting the progress in the major or grade point average requirements must meet with the undergraduate director to discuss their options for continuing in the major. Please refer to the Engineering section of this catalog for the School of Engineering's major disqualification policy.

Honors in the Major

Bioinformatics majors are considered for "Honors in the Major" and "Highest Honors in the Major" based on the School of Engineering GPA and on results of undergraduate research. Students with an SOE GPA of 3.7, in most cases, receive "Highest Honors in the Major." Students with an SOE GPA of 3.3, in most cases, receive "Honors in the Major." Students with particularly significant accomplishments in undergraduate research may be considered with a lower SOE GPA.

Transfer Students

Please refer to the School of Engineering section of the catalog for the policy regarding transfer students.

School of Engineering Policies

Please refer to the School of Engineering section of the catalog for additional policies that apply to all School of Engineering programs.

Preparation for the Major

Students applying for admission to the bioinformatics major should have completed four years of high school mathematics (through advanced algebra and trigonometry) and three years of science, including one year of chemistry and one year of biology. Comparable college mathematics and science courses completed at other institutions may be accepted in place of high school preparation. Students without this preparation may be required to take additional courses to prepare themselves for the program.

Bioinformatics Major Requirements

Every bioinformatics major must have a faculty adviser, assigned by the Baskin School of Engineering undergraduate advising office, and with that adviser must formulate a program of proposed course work that meets the major requirements. Because of the enormous breadth of requirements, bioinformatics majors are urged to take honors courses or sections whenever possible

to get as much as possible out of the courses they take in each field.

Lower-Division Requirements

Majors must complete the following lower-division courses:

Biology

Biology (BIOL) 20A, *Cell and Molecular Biology*

Biomolecular Engineering

Biomolecular Engineering 80G, *Bioethics in the Twenty-First Century: Science, Business, and Society*; or Philosophy 145, *Brave New World: Ethical Issues in Genetics*

Chemistry

Chemistry 1A, 1B/M, and 1C/N, *General Chemistry/Laboratory*

Computer Engineering

Computer Engineering 16, *Applied Discrete Mathematics Programming 1*

Computer Science 12A/L, *Introduction to Programming/Laboratory*; or

Computer Science 5J, *Introduction to Programming in Java*, and 11, *Intermediate Programming*; or

Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*, and 13/L, *Computer Systems and C Programming/Laboratory*

Programming 2

Computer Science 12B/M, *Introduction to Data Structures/Laboratory*

Mathematics

Mathematics 20A-B, *Honors Calculus*; or

Mathematics 19A-B, *Calculus for Science, Engineering, and Mathematics* (Credit for one or both can be granted with adequate performance on the College Entrance Examination Board (CEEB) calculus AB or BC Advanced Placement examination.)

Mathematics 23A, *Multivariable Calculus*

Upper-Division Requirements

Majors must complete the following upper-division courses:

Applied Mathematics and Statistics

Computer Engineering 107, *Mathematical Methods of Systems Analysis: Stochastic*; or

Applied Mathematics and Statistics 131, *Introduction to Probability Theory*

Applied Mathematics and Statistics 206, *Bayesian Statistics*; or

Applied Mathematics and Statistics 132, *Statistical Inference*

Biochemistry and Molecular Biology

Biochemistry 100A, *Biochemistry* (first in three-part sequence)

Bioinformatics

Biomolecular Engineering 110, *Computational Biology Tools*

Biomolecular Engineering 205, *Bioinformatics Models and Algorithms*

One of the following:

Biomolecular Engineering 210, *Experimental Systems Biology*; or

Biomolecular Engineering 211, *Computational Systems Biology*; or

Biomolecular Engineering 220/L, *Protein Bioinformatics/Laboratory*; or

Biomolecular Engineering 230/L, *Computational Genomics/Laboratory*; or

Biomolecular Engineering 195, *Senior Thesis Research*

Biology (BIOL)

Biology 105, *Genetics*

One of the following:

Biology 110, *Cell Biology*; or

Biology 115, *Eukaryotic Molecular Biology*; or

Biology 119, *Microbiology*; or

Biomolecular Engineering 155, *Biotechnology and Drug Development*

Chemistry

Chemistry 108A/L, *Organic Chemistry/Laboratory*; or

Chemistry 112A/L and 112B/M, *Organic Chemistry/Laboratory*

Computer Engineering

Computer Engineering 185, *Technical Writing for Computer Engineers*

Computer Science

Computer Science 101, *Algorithms and Abstract Data Types*

One of the following:

Computer Science 182, *Introduction to Database Management Systems*, or

Computer Science 180, *Database Systems*. Note that Computer Science 180 may require an additional course as a prerequisite, such as Computer Science 101.

Advanced Programming

Computer Science 109, *Advanced Programming*

Required Electives

Students must select two additional courses as electives, justify their choices in writing, and get the choices approved by their faculty adviser. The following courses are typical of the ones chosen, but do not constitute a pre-approved list:

Applied Mathematics and Statistics 132, 162, 203, 205, 207, 215

Biochemistry 100B, 100C, 110

Biology 100L, 105L, 105M, 109L, 110, 115, 115L, 117A, 117B, 119, 119L, 187L, 200A, 200B

Biomolecular Engineering 102, 109, 130, 210, 220, 230

Chemistry 103, 108B/M, 112C/N, 200A, 200B, 200C

Computer Engineering 108, 177

Computer Science 101, 104A, 105, 115, 116, 130, 140, 142, 160/L

Information Systems Management 206, 250

Note: many of these courses are offered only once a year and have long prerequisite chains, so advance planning is necessary to make sure elective courses can be fit into the student's schedule.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division disciplinary communication (DC) requirement. Bioinformatics majors satisfy the DC requirement by completing Computer Engineering 185, *Technical Writing for Engineers*.

Comprehensive Requirement

The bioinformatics comprehensive requirement can be met by taking Biomolecular Engineering 210, *Experimental Systems Biology*, or Biomolecular Engineering 211, *Computational Systems Biology*, or Biomolecular Engineering 220/L, *Protein Bioinformatics*,

or Biomolecular Engineering 230/L, *Computational Genomics*, which include substantial projects; or Biomolecular Engineering 195, *Senior Thesis Research*. Students electing the senior thesis must submit a written thesis proposal to the undergraduate director of bioinformatics for approval one quarter prior to submitting the final thesis.

The Bioinformatics Minor

Where the bioinformatics major is intended for people who wish to become bioinformaticians and create the tools needed to solve new problems in computational biology, the bioinformatics minor is intended primarily for bioinformatics tool users who are majoring in a biological or chemical specialty. The bioinformatics minor is also appropriate for computer science or computer engineering majors who are considering graduate work in bioinformatics.

A bioinformatics minor consists of the following 15 courses:

Lower-division (10 courses)

Biology (2)

Biology 20A, *Cell and Molecular Biology*; and

One of the following:

Biology 20B, *Ecology and Evolutionary Biology*; or

Biology 110, *Cell Biology*; or

Biology 105, *Genetics*; or

Biology 115, *Eukaryotic Molecular Biology*; or

Biology 119, *Microbiology*

General chemistry (3)

Chemistry 1A, 1B/M, and 1C/N

Single-Variable Calculus (2)

Mathematics 19A and 19B—preferred; or

Mathematics 11A and 11B; or

Mathematics 20A and 20B

Programming 1 (1)

Computer Science 12A/L; or

Computer Science 5C; or

Computer Science 5J; or

Computer Science 5P; or

Computer Engineering 12/L and 13/L

Programming 2 (1)

Biomolecular Engineering 160/L; or

Computer Science 12B/M

Bioethics (1)

Biomolecular Engineering 80G; or

Philosophy 145; or

Biomolecular Engineering 247

Upper-division (5 courses)

Organic chemistry (1)

Chemistry 108A; or

Chemistry 112A and 112B

Biochemistry (1)

Biochemistry 100A; or

Biology 100

Statistics (1)

Computer Engineering 107; or

Applied Mathematics and Statistics 131

Bioinformatics (1)

Biomolecular Engineering 110

Elective(1)

Applied Mathematics and Statistics 132; or

Biochemistry 100B; or

any other upper-division or graduate biomolecular engineering course

The bioinformatics minor requirements may satisfy the requirements of other majors or minors under the campus policy discussed in Major and Minor Requirements. Majors with substantial overlap include biochemistry, bioengineering, all biology majors, chemistry, computer science, and computer engineering. Students pursuing one of these majors are particularly encouraged to consider the bioinformatics minor.

The Bioinformatics Combined B.S./Graduate Degree Program

Because our bioinformatics B.S. program provides excellent preparation for a graduate program in bioinformatics, we offer a combined B.S./graduate degree program that allows our B.S. students to complete the M.S. (or Ph.D.) somewhat sooner than students with a less tailored preparation.

The current B.S. and graduate requirements have four courses in common:

Biomolecular Engineering 80G, *Bioethics in the 21st Century*; or Philosophy 145/245, *Brave New World: Ethical Issues in Genetics*

Biomolecular Engineering 205, *Bioinformatics Models and Algorithms*

Biomolecular Engineering 220, *Protein Bioinformatics*; or Biomolecular Engineering 230, *Computational Genomics*

Applied Mathematics and Statistics 206, *Bayesian Statistics*

Masters students take nine courses, two seminars (four credits), Biomolecular Engineering 200, and two independent project courses (such as Biomolecular Engineering 220L and Biomolecular Engineering 230L). The course work for Ph.D. students is essentially the same, except that eight credits of seminars are required and three research laboratory rotations are required in place of the two project courses.

The combined B.S./graduate degree program does not make any changes to the undergraduate program, except that students must pass the four overlapping courses listed above for a grade of B- or better.

The requirements at the graduate level are changed to remove the four courses that overlap with the B.S. and to add two graduate electives to be chosen by the students with the approval of their advisers. Thus, the total number of full courses required is reduced from nine to seven.

To apply for the combined program, students apply to the M.S. or Ph.D. program through the normal graduate admission process in the fall of their senior year. If admitted into the graduate program, they are automatically included in the combined B.S./M.S. or B.S./Ph.D. program.

Bioinformatics Major Planners

As in all engineering and science programs, it is recommended that students spread their general education requirements out over all 12 quarters. Students considering pursuing a bioengineering or bioinformatics degree should follow the biomolecular engineering concentration of the bioengineering B.S. program and complete the programming sequence (Computer Science 12A and 12B) by the end of their second year.

Four-year plans require individual design to fit in the desired electives, so only the first two years of the ac-

ademic plan are presented here. It is recommended that students reserve the summer after the junior year for undergraduate research. One popular plan involves taking organic chemistry and the associated laboratories in the summer after completing general chemistry, so that biochemistry may be started in the junior year.

Biomolecular Engineering 205, *Bioinformatics Models and Algorithms*, should be taken after Biomolecular Engineering 110, *Computational Biology Tools*.

Sample Plan

| Year | Fall | Winter | Spring |
|---------------|-------------------------------------|----------------------------------|----------------------------------|
| 1st (frsh) | MATH 19A CHEM 1A college core | MATH 19B CHEM 1B/M gen ed | MATH 23A CHEM 1C/N gen ed |
| 2nd (soph) | CMPE 16 CHEM 108A/L BME 80G | CMPS 12A/L BIOL 20A gen ed | CMPS 12B/M BIOL 105 gen ed |

Biomolecular Engineering and Bioinformatics Graduate Program

The Department of Biomolecular Engineering offers interdisciplinary M.S. and Ph.D. degrees in biomolecular engineering and bioinformatics.

Course Requirements

Both masters and doctoral students must complete eight, 5-credit courses and one 3-credit research and teaching course. In addition, M.S. students must complete three seminar courses, while Ph.D. students must complete five seminar courses. M.S. students must complete two (1-credit or 2-credit) research project courses (such as course 220L, 230L, 297F, or 297), and Ph.D. students must complete three research laboratory rotations (course 296) with different supervisors.

Core courses (5-credit)—six are required

Bioinformatics Emphasis

Biomolecular Engineering 205, *Bioinformatics Models and Algorithms*

Two Biomolecular Engineering graduate courses from the bioinformatics list

One Biomolecular Engineering graduate course from the biomolecular engineering list

One graduate statistics course (Applied Mathematics and Statistics 206 recommended)

One graduate course from MCD Biology, Chemistry and Biochemistry, or Microbiology and Environmental Toxicology

Biomolecular Engineering Emphasis

Biomolecular Engineering 207, *Molecular Recognition*

Two Biomolecular Engineering graduate course from the biomolecular engineering list

One Biomolecular Engineering graduate courses from the bioinformatics list

Two graduate courses from Applied Mathematics and Statistics, MCD Biology, Chemistry and Biochemistry, or Microbiology and Environmental Toxicology

Ethics Course (5-credit)—one is required

Biomolecular Engineering 80G, *Bioethics in the Twenty-First Century: Science, Business, and Society*; or Philosophy 245, *Brave New World: Ethical Issues in Genetics*; or Biomolecular Engineering 247, *Stem Cell Research; Scientific, Ethical, Social and Legal Issues*, or Sociology 268A, *Science and Justice: Experiments in Collaboration*.

Electives (5-credit)—two are required

Two graduate courses consistent with the student's degree objectives. With preapproval by the graduate director, one or two of these electives may be upper-division undergraduate courses selected to improve background in areas not studied as an undergraduate.

For M.S. students, 5 credits of independent research (297) or thesis research (299) courses may count as one elective toward the degree requirements.

For Ph.D. students, independent or thesis research courses cannot be counted as electives.

Students must choose courses with faculty guidance and approval to balance their preparation and make up for deficiencies in background areas. With consent of the graduate director, variations in the composition of the required courses may be approved.

Other Curriculum Requirements

Biomolecular Engineering 200, *Research and Teaching in Bioinformatics*, 3 credits

Seminars

M.S. students: a minimum of three seminar courses, including at least one quarter of the 2-credit Biomolecular Engineering seminar, 280B

Ph.D. students: a minimum of six seminar courses, including at least two quarters of the 2-credit Biomolecular Engineering seminar, 280B

Before and after advancement, full-time Ph.D. students are required to enroll in at least one seminar course each quarter (e.g., 280 or 281), and must present the results of their ongoing research at least once each year.

Research Experience

M.S. students: a minimum of two research project courses. This requirement can be met by taking course 220L, 230L, and/or independent study (course 297F or course 297).

Ph.D. Students: three quarters of laboratory rotations (course 296), generally within the first 12 months. One of the laboratory rotations must be with a faculty supervisor who does wet-lab research, though the student's rotation project may be purely computational.

Course Lists

The following are the bioinformatics and biomolecular engineering course lists. The lists are subject to change as courses and course content changes. The graduate office maintains the current list.

Bioinformatics list: 205, 211, 220, 225, 230

Biomolecular Engineering list: 207, 210, 215, 222, 250, 255

Qualifying Examinations

Ph.D. students are required to pass an oral qualifying examination by the end of their second year and to advance to candidacy by the end of their third year.

Adequate Progress

Graduate students receiving two or more U (unsatisfactory) grades or grades below B in courses relevant to the program are not making adequate progress and will be placed on academic probation for the next three quarters of registered enrollment.

Graduate students who fail (unsatisfactory or lower than B) a relevant course while on probation may be dismissed from the program. Students may appeal their dismissal. Graduate students who fail a relevant course after being removed from probation are immediately returned to academic probation.

Graduate students experiencing circumstances that may adversely affect their academic performance should consult with their adviser and the graduate director.

Master's Capstone Requirement

M.S. students must complete a one-quarter research project with written report to fulfill the capstone requirement. Most often, this requirement is satisfied with Biomolecular Engineering 296 or Biomolecular Engineering 297, above, but may also be satisfied with a Ph.D. dissertation proposal, below.

Doctoral Dissertation Requirements

Ph.D. students must pass an oral comprehensive examination by the end of the second year.

Ph.D. students must select a faculty research adviser by the end of the second year. A qualifying committee is then formed, which consists of the adviser and three additional members, and which is approved by the graduate director and the campus graduate dean.

At least two of the four must be members of the Department of Biomolecular Engineering. The student must submit a written dissertation proposal to all members of the committee and the graduate assistant one month in advance of the examination. The dissertation proposal is publicly and formally presented in an oral qualifying examination given by the qualifying committee. This examination must be completed within six months of a successful comprehensive exam.

Ph.D. candidates will submit the completed dissertation to a reading committee at least one month prior to the dissertation defense. The reading committee, formed upon advancement to candidacy, consists of the dissertation supervisor and two readers appointed by the graduate director upon the recommendation of the dissertation supervisor. At least one of the three must be a member of the Department of Biomolecular Engineering. The candidate will present his or her research in a public seminar. The seminar will be followed by a defense of the dissertation to the reading committee and attending faculty, who will then decide whether the dissertation is acceptable or requires revision.

Transfer Limitations

Up to two courses may be transferred from other graduate institutions with the approval of the faculty adviser and the graduate director.

Lower-Division Courses

5. Introduction to Biotechnology. F,W,S

Introduces the tools and applications of biotechnology in the fields of medicine, agriculture, the environment, and industry. (General Education Code(s): IN.) *W. Rothwell, The Staff*

60. Introductory Programming for Biologists and Biochemists. W

Lecture and lab-based course teaching programming skills needed by biologists and biochemists. No programming experience required, but basic computer skills assumed. Students without prior programming experience will be taught the basic proficiency in Perl, BioPerl, and other Perl libraries needed to analyze, transform, and publish biological data. Students cannot receive credit for this course and Biomolecular Engineering 160 or Biology 180. (Formerly Programming for Biologists and Biochemists.) Prerequisite(s): Biology 20A or 21A. Concurrent enrollment in course 60L required. (General Education Code(s): ME.) *J. Stuart, The Staff*

60L. Introductory Programming for Biologists and Biochemists Laboratory (1 credit). W

Laboratory sequence illustrating topics covered in course 60. One two-hour laboratory per week. Concurrent enrollment in course 60 required. Students cannot receive

credit for this course and Biomolecular Engineering 160L or Biology 180L. (Formerly *Programming for Biologists and Biochemists Laboratory*.) Prerequisite(s): Biology 20A or 21A. Concurrent enrollment in course 60 is required. *J. Stuart, The Staff*

80G. Bioethics in the 21st Century: Science, Business, and Society. F

Serves science and non-science majors interested in bioethics. Guest speakers and instructors lead discussions of major ethical questions arising from research in genetics, medicine, and industries supported by this knowledge. (Also offered as Philosophy 80G. Students cannot receive credit for both courses.) (General Education Code(s): PE-T, T6-Natural Sciences or Humanities and Arts.) *M. Akeson*

80H. The Human Genome. F,W,S

Course will focus on understanding human genes. Accessible to non-science majors. Will cover principles of human inheritance and techniques used in gene analysis. The evolutionary, social, ethical, and legal issues associated with knowledge of the human genome will be discussed. (General Education Code(s): T2-Natural Sciences.) *W. Rothwell, The Staff*

83. The Genetic Revolution: Science and Technology (2 credits). *

Biotechnology of the genetic revolution. Overview of the scientific and engineering foundations of emerging technologies. Required supplement to the Crown College Core Courses 80A and 80B. Enrollment restricted to first-year Crown College students. *W. Rothwell, The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

94E. Group Tutorial (2 credits). F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99E. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

110. Computational Biology Tools. F,S

Hands-on laboratory geared to teach basic tools used in computational biology (motif searching, primer selection, sequence comparison, multiple sequence alignment, gene finders, phylogenetics analysis, X-ray crystallography software). Web- and Unix-based tools/databases are used. Open to all science students; no prior Unix experience required. (Also offered as *Biology: Molecular Cell and Developmental Biology* 181. Students cannot receive credit for both courses.) Prerequisite(s): Biology 100, 105, or Biochemistry 100A or declared Bioinformatics majors. Enrollment limited to 25. *D. Gerloff, T. Lowe*

123A. Engineering Design Project I (7 credits). F

First of a two-course sequence that is the culmination of the engineering program. Students apply knowledge and skills gained in elective track to complete a major design project. Students complete research, specification, planning, and procurement for a substantial project.

Includes technical discussions, design reviews, and formal presentations; engineering design cycle, engineering teams, and professional practices. Formal technical specification of the approved project is presented to faculty. Prerequisite(s): Electrical Engineering 171 or Computer Engineering 121; previous or concurrent enrollment in Computer Engineering 185; permission of department and instructor. Students are billed a materials fee. *K. Karplus*

123B. Bioengineering Project 2 (7 credits). W

Second of two-course sequence in engineering system design. Students fully implement and test system designed and specified in course 123A. Formal written report, oral presentation, and demonstration of successful project to review panel of engineering faculty required. Students are billed a materials fee. Prerequisite(s): course 123A. Enrollment limited to 30. May be repeated for credit. *The Staff*

123T. Senior Thesis Presentation (2 credits). S

For bioengineering senior thesis students, guidance in preparing a research seminar and a draft manuscript describing their senior research project. Students collaborate with each other and with investigators from their sponsoring laboratory as they fulfill the course requirements. Prerequisite(s): CMPE 185, and one of the following: BME 195 or BME 198 or CMPE 195 or CMPE 198 or EE 195 or EE 198. *M. Akeson*

130. Genomes. F

Advanced elective for biology majors, examining biology on the genome scale. Topics include genome sequencing; large scale computational and functional analysis; features specific to prokaryotic, eukaryotic, or mammalian genomes; proteomics; SNP analysis; medical genomics; and genome evolution. Prerequisite(s): Biology 100 or Biochemistry 100A and Biology 105, or approval of instructor. Enrollment limited to 30. *E. Green, T. Lowe*

140. Bioinstrumentation. F

Introduction to theory, design, and application of bioinstrumentation in clinical, pharmaceutical, and biotechnology laboratories. Highly recommended for students planning careers in the biomolecular industries. Typical topics and demonstrations include thermocycler, polymerase chain reaction (PCR), pyrosequencing, fabless nanofabrication, ion-sensitive measurements, microarray fabrication, and fluorescent-activated cell sorter (FACS). Students are billed a materials fee. Prerequisite(s): course 5, or Biology 100, or Biochemistry and Molecular Biology 100A. *N. Pourmand*

150. Molecular Biomechanics. S

Considers how assemblies of macromolecules (molecular motors) convert chemical energy into mechanical work on the nanometer-to-Angstrom scale. Processes examined include ATP-dependent movement of organelles in the cytosol facilitated by kinesin; proton pumping by ATPases in the mitochondrial membrane; viral genome packaging; bacterial movement driven by flagella; processive addition of nucleotides by polymerases during replication and transcription; and protein synthesis by ribosomes. Cannot receive credit for this course and course 250. Prerequisite(s): Biology 20A; and Biology 20B or 105; and Biology 100 or Biochemistry 100A; and Physics 5C or 6C. Concurrent enrollment in course 150L required. *M. Akeson*

150L. Molecular Biomechanics Laboratory (2 credits). S

Students address a current scientific question about molecular motor function using techniques established in the UCSC Nanopore Laboratory. Specifically, students

use recombinant DNA technology to produce an enzyme (e.g., a DNA polymerase) bearing a point mutation that is predicted to alter function in a defined manner. Students then use nanopore force spectroscopy to model the energy landscape for a mechanical or chemical step altered by the critical amino acid. Cannot receive credit for this course and course 250L. Prerequisite(s): Biology 20A; and Biology 20B or 105; and Biology 100 or Biochemistry 100A; and Physics 5C or 6C. Concurrent enrollment in course 150 required. *M. Akeson*

155. Biotechnology and Drug Development. W

Recommended for students interested in careers in the biopharmaceutical industry. Focuses on recombinant DNA technology and the drug-development process, including discovery research; preclinical testing; clinical trials; and regulatory review, as well as manufacturing and production considerations. Students may not receive credit for this course and Biomolecular Engineering 255 and Chemistry 255. (Also offered as *Biology: Molecular Cell and Developmental Biology* 179. Students cannot receive credit for both courses.) Prerequisite(s): Biology 20A and Biology 100 or Biochemistry and Molecular Biology 100A. Enrollment limited to 15. *P. Berman*

160. Research Programming for Biologists and Biochemists. W

No programming experience required, but basic computer skills assumed. Students without prior programming experience taught basic proficiency in Perl, BioPerl, and other Perl libraries needed to analyze, transform, and publish biological data. Students required to solve a research problem as a final project. Lectures and labs are shared with Biomolecular Engineering 60. Students cannot receive credit for this course and Biomolecular Engineering 60. (Also offered as *Biology: Molecular Cell and Developmental Biology* 180. Students cannot receive credit for both courses.) Prerequisite(s): Biology 20A or 21A. Previous or concurrent enrollment in course 160L is required. (General Education Code(s): ME) *J. Stuart, The Staff*

160L. Research Programming for Biologists and Biochemists Laboratory (1 credit). W

Laboratory sequence illustrating topics covered in course 160. One two-hour laboratory per week. Students cannot receive credit for this course and Biomolecular Engineering 60L. (Also offered as *Biology: Molecular Cell and Developmental Biology* 180L. Students cannot receive credit for both courses.) Prerequisite(s): Biology 20A or 21A. Previous or concurrent enrollment in course 160 is required. *J. Stuart, The Staff*

178. Stem Cell Biology. W

Basic concepts, experimental approaches, and therapeutic potential are discussed. Students gain experience in reading the primary scientific literature. (Also offered as *Biology: Molecular Cell and Developmental Biology* 178. Students cannot receive credit for both courses.) Prerequisite(s): Biology 110; Biology 115 recommended. *C. Forsberg*

193. Field Study. F,W,S

Provides for individual programs of study with specific aims and academic objectives carried out under the direction of a BME faculty member and a willing sponsor at a field site, using resources not normally available on campus. Credit is based upon written and oral presentations demonstrating the achievement of the objectives of the course. Students submit petition to sponsoring agency. *The Staff*

193F. Field Study (2 credits). F,W,S

Provides for individual programs of study with specific

aims and academic objectives carried out under the direction of a BME faculty member and a willing sponsor at a field site, using resources not normally available on campus. Credit is based upon written and oral presentations demonstrating the achievement of the objectives of the course. Students submit petition to sponsoring agency. *The Staff*

194. Group Tutorial. F,W,S

A program of study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195. Senior Thesis Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195F. Senior Thesis or Research (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Individual Study or Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Individual Study or Research (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

For fourth-year students majoring in bioinformatics or bioengineering. May be repeated for credit. *The Staff*

Graduate Courses

200. Research and Teaching in Bioinformatics (3 credits). F

Basic teaching techniques for teaching assistants, including responsibilities and rights of teaching assistants, resource materials, computer security, leading discussion or lab sessions, presentation techniques, maintaining class records, electronic handling of homework, and grading. Examines research and professional training, including use of library and online databases, technical typesetting, writing journal and conference papers, publishing in bioinformatics, giving talks in seminars and conferences, and ethical issues in science and engineering. Required for all teaching assistants. Enrollment restricted to graduate students. *K. Karplus*

205. Bioinformatics Models and Algorithms. F

Covers bioinformatics models and algorithms: the use of computational techniques to convert the masses of information from biochemical experiments (DNA sequencing, DNA chips, and other high-throughput experimental methods) into useful information. Emphasis is on DNA and protein sequence alignment and analysis. Enrollment restricted to graduate students. Undergraduates may enroll with prerequisite(s): Computer Science 12B; and Computer Engineering 107 or Applied Math and Statistics 131; and Biology 20A; and concurrent enrollment in Biochemistry 100A. *K. Karplus*

207. Biomolecular Recognition. F

Course is the core biomolecular-engineering emphasis graduate course. Focuses on the molecular mechanism enabling the flow of information within and between cells in living systems, and its application to engineering new tools for high-throughput molecular-biology research,

improving biomedical diagnostics, and aiding treatment of human disease. Prerequisite(s): Equivalent of one full year of undergraduate biochemistry. Enrollment restricted to graduate students. *T. Lowe, N. Pourmand, C. Forsberg, D. Gerloff*

210. Experimental Systems Biology.*

Topics include, but are not limited to, microarray production techniques, experimental strategies using microarrays, extraction and analysis of microarray data, DNA and protein arrays, SNP analysis, gene expression analysis, materials analysis, and advanced analysis of data using bioinformatic techniques. (Formerly *Application and Analysis of Microarrays*.) Enrollment restricted to graduate students; undergraduates by permission of instructor. *T. Lowe*

211. Computational Systems Biology. S

Teaches machine-learning methods relevant for the analysis of high-throughput molecular biology experiments. Students should be fluent in a programming language and should have taken basic molecular biology courses. Prerequisite(s): course 205. Enrollment restricted to graduate students; undergraduates may enroll if they have completed course 205, Computer Science 101, and any upper-division molecular biology or biochemistry course, such as Biochemistry 100 or 100A. *J. Stuart*

215. Applied Gene Technology. S

Detailed insight into the techniques and technological trends in genomics and transcriptomics, building the necessary foundations for further research in genetic association studies, population genetic association studies, population genetics, diagnostics, medicine, and drug development. Students should already have a deeper understanding of the basic tools of molecular biotechnology than acquired in introductory courses in biotechnology, biochemistry, and molecular biotechnology. Enrollment restricted to graduate students. *N. Pourmand*

220. Protein Bioinformatics. S

Covers the application of bioinformatics techniques to protein sequences and structures. Topics include protein sequence analysis, protein structure prediction, and sources of experimental data about proteins. Prerequisite(s): course 205, or Chemistry 200B; concurrent enrollment in course 220L, 296, or 297 is required. Enrollment restricted to graduate students; undergraduates may enroll if they have completed course 205 and Biochemistry 100A. *K. Karplus*

220L. Protein Bioinformatics Laboratory (1 credit). S

Project in protein bioinformatics. Prerequisite(s): course 205; concurrent enrollment in course 220 is required. *K. Karplus*

222. Applied Biotechnology: Protein and Cell Engineering.*

For students interested in careers in the biotech industry. Focus is applied technology, with particular emphasis on the application of cell engineering and protein engineering to solve problems encountered in the design and manufacturing of biopharmaceutical products and industrial enzymes produced by recombinant DNA technology. Prior course work in biochemistry, molecular biology, genetics, and cell biology highly recommended. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. *P. Berman*

225. Protein Function in Biology and Bioinformatics.*

Reviews functional roles of proteins and computational methods used to predict functional aspects of proteins. Focus is on molecular function and structure-function relationships. Wider-reaching notions of function (path-

ways, interaction networks) are considered peripherally, as the context in which molecular function occurs. Course includes lectures, (computational) lab work, and discussions of topical publications. Prerequisite(s): Biochemistry and Molecular Biology 100A (or equivalent knowledge) and courses 205 and 220, or by instructor's permission. Enrollment limited to 15. *D. Gerloff*

230. Computational Genomics. W

Genomics databases: analysis of high-throughput genomics datasets; BLAST and related sequence comparison methods; pairwise alignment of biosequences by dynamic programming; statistical methods to discover common motifs in biosequences; multiple alignment and database search using motif models; constructing phylogenetic trees; hidden Markov models for finding genes, etc.; discriminative methods for analysis of bioinformatics data, neural networks, and support vector machines; locating genes and predicting gene function, including introduction to linkage analysis and disease association studies using SNPs; and modeling DNA and RNA structures. Prerequisite(s): course 205; concurrent enrollment in course 230L, 296, or 297 is required. Enrollment restricted to graduate students; undergraduates may enroll if they have completed course 205, Computer Science 101, and BIOC 100A. *D. Haussler, J. Stuart*

230L. Computational Genomics Laboratory (1 credit). W

Project in computational genomics. Prerequisite(s): course 205; concurrent enrollment in course 230 is required. *D. Haussler, J. Stuart*

235. Banana Slug Genomics. S

Students will assemble and annotate the banana slug genome (*Ariolimax dolichophallus*) from next-generation sequencing data. Students also will explore the capabilities of the latest next-generation bioinformatics tools and write their own as needed. Prerequisite(s): course 205 or graduate status. Seniors who have taken course 110 and a computer programming course may enroll with permission of instructor. May be repeated for credit. *N. Pourmand, K. Karplus*

247. Stem Cell Research: Scientific, Ethical, Social, and Legal Issues.*

Scientific, ethical, social, and legal dimensions of human embryonic stem-cell research, including the moral status of the embryo; the concept of respect for life; ethical constraints on oocyte procurement; creation of embryonic chimeras; federal policies; and political realities. (Also offered as *Biology: Molecular Cell and Developmental Biology* 288. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *E. Suckiel, The Staff*

250. Molecular Biomechanics. S

Considers how assemblies of macromolecules (molecular motors) convert chemical energy into mechanical work on the nanometer-to-Angstrom scale. Processes examined in the course include ATP-dependent movement of organelles in the cytosol facilitated by kinesin; proton pumping by ATPases in the mitochondrial membrane; viral genome packaging; bacterial movement driven by flagella; processive addition of nucleotides by polymerases during replication and transcription; and protein synthesis by ribosomes. Cannot receive credit for this course and course 150. Enrollment restricted to graduate students. Concurrent enrollment in course 250L required. *M. Akeson*

250L. Molecular Biomechanics Laboratory (2 credits). S

Laboratory course taken in conjunction with course 250. Students address a current scientific question about mo-

lecular motor function using techniques established in the UCSC Nanopore Laboratory. Specifically, students use recombinant DNA technology to produce an enzyme (e.g., a DNA polymerase) bearing a point mutation that is predicted to alter function in a defined manner. Students then use nanopore force spectroscopy to model the energy landscape for a mechanical or chemical step altered by the critical amino acid. Cannot receive credit for this course and course 150L. Concurrent enrollment in course 250 required. Enrollment restricted to graduate students. *M. Akeson*

255. Biotechnology and Drug Development. W

Recommended for students interested in careers in the biopharmaceutical industry. Focuses on recombinant DNA technology and the drug-development process, including discovery research; preclinical testing; clinical trials; and regulatory review, as well as manufacturing and production considerations. Students may not receive credit for this course and Biomolecular Engineering 155 and Biology 179. (Also offered as Chemistry and Biochemistry 255. Students cannot receive credit for both courses.) Enrollment limited to graduate students. Enrollment limited to 15. *P. Berman*

268A. Science and Justice: Experiments in Collaboration. S

Considers the practical and epistemological necessity of collaborative research in the development of new sciences and technologies that are attentive to questions of ethics and justice. Enrollment by permission of instructor. Enrollment restricted to graduate students. (Also offered as Feminist Studies 268A. Students cannot receive credit for both courses.) Enrollment limited to 10. *The Staff*

268B. Science and Justice Research Seminar. F

Provides in-depth instruction in conducting collaborative interdisciplinary research. Students produce a final research project that explores how this training might generate research that is more responsive to the links between questions of knowledge and questions of justice. Prerequisite(s): course 268A. Enrollment by permission of instructor. Enrollment restricted to graduate students. (Also offered as Feminist Studies 268B. Students cannot receive credit for both courses.) Enrollment limited to 10. *The Staff*

280B. Seminar on Bioinformatics (2 credits). F,W,S

Weekly seminar series covering topics of current research in computational biology or bioinformatics. Current research work and literature in these areas are discussed in weekly meetings. May be repeated for credit. *J. Stuart, D. Haussler, T. Lowe, N. Pourmand, D. Gerloff, C. Forsberg, M. Akeson*

281A. Seminar on Processive Enzymes and Nanopores (2 credits). F,W,S

Weekly seminar series covering experimental research in nanopore technology and single-molecule analysis of polymerase function. Current research work and literature is discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students. Qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *M. Akeson*

281B. HIV Vaccine Research (2 credits). F,W,S

Weekly seminar series covering topics of HIV vaccine research. Current research work and literature in this

*Not offered in 2010-11

area discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *P. Berman*

281F. Blood Cell Development (2 credits). F,W,S

Weekly seminar covering topics in current research on blood cell development and stem cell biology. Current research and literature in these areas discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. Enrollment limited to 10. May be repeated for credit. *C. Forsberg*

281G. Seminar on Protein Structure and Function (2 credits). F,W,S

Weekly seminar series covering topics of current computational and experimental research in protein structure prediction and design, structure-function relationships and protein evolution. Current research work and literature in these areas discussed. Students lead some discussions and participate in all meetings. (Formerly course 281R.) Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *D. Gerloff*

281H. Seminar in Comparative Genomics (2 credits). F,W,S

Weekly seminar series covering topics of current computational and experimental research in comparative genomics. Current research work and literature in this area discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *D. Hausler*

281K. Seminar on Protein Structure Prediction (2 credits). F,W,S

Weekly seminar series covering topics of current computational and experimental research in protein structure prediction. Current research work and literature in this area discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *K. Karplus*

281L. Seminar in Computational Genetics (2 credits). F,W,S

Weekly seminar series covering topics and experimental research in computational genetics. Current research work and literature in this area discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *T. Lowe*

281P. Seminar on Nanotechnology and Biosensors (2 credits). F,W,S

Weekly seminar covering topics of research in the development of new tools and technologies to detect and study genes and proteins. Latest research work and literature in these areas are discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *N. Pourmand*

281S. Seminar in Computational Functional Genomics (2 credits). F,W,S

Weekly seminar series covering topics of current computational and experimental research in computational functional genomics. Current research work and literature in this area discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to

graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *J. Stuart*

293. Seminar in Biomolecular Engineering.*

Weekly seminar series covering topics of bioinformatics and biomolecular engineering research. Current research work and literature in this area discussed. Students lead some discussions and participate in all meetings. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. *The Staff*

296. Research in Bioinformatics. F,W,S

Independent research in bioinformatics under faculty supervision. Although this course may be repeated for credit, not every degree program accepts a repeated course towards degree requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study or Research. F,W,S

Independent study or research under faculty supervision. Although course may be repeated for credit, not every degree program accepts a repeated course towards degree requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297F. Independent Study or Research (2 credits). F,W,S

Independent study or research under faculty supervision. Although course may be repeated for credit, not every degree program accepts a repeated course towards degree requirements. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Thesis research conducted under faculty supervision. Although course may be repeated for credit, not every degree program accepts a repeated course towards degree requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Computer Engineering

Baskin School of Engineering
(831) 459-2158
<http://www.soe.ucsc.edu>

Faculty and Professional Interests

Professor

ALEXANDRE BRANDWAJN
Computer architecture, performance modeling, queueing network models of computer systems, operating systems

F. JOEL FERGUSON
Fault diagnosis, failure analysis, logic fault modeling, digital test pattern generation, design-for-test of digital circuits and systems

J. J. GARCÍA-LUNA-ACEVES (Department Chair)
Baskin Professor of Computer Engineering and Director of Networking Sciences Institute
Computer communication, wireless networks, Internet, network science

RICHARD HUGHEY (joint with Biomolecular Engineering)
Computer architecture, parallel processing, computational biology

GLEN G. LANGDON Jr., Emeritus

TRACY LARRABEE
Test-pattern simulation and generation, fault modeling, fault diagnosis, design verification, technical writing, logic simulation

PATRICK E. MANTEY
Baskin Professor of Computer Engineering
CITRIS Campus Director
Multimedia systems, digital signal processing, sensor systems and networks, real-time monitoring and control, image systems, image processing, visualization, geographic information systems, decision support systems

KATIA OBRACZKA
Computer networks, distributed systems, operating systems, Internet information systems, mobile computing, wireless networks

MARTINE D. F. SCHLAG
VLSI design tools and algorithms, VLSI theory, field-programmable gate arrays, FPGA-based computing engines

ANUJAN VARMA
Computer networking, computer architecture, optical networks

Associate Professor

PAK K. CHAN
Placement and routing algorithms, field-programmable gate arrays, spectral-based partitioning, circuit theory, computer arithmetic

WILLIAM DUNBAR
Theory and application of feedback control, single molecule biophysics, nanopore sensors, dynamics and control of biomolecules

GABRIEL ELKAIM
Embedded systems; robust software architectures for real-time reactive systems; sensor fusion; guidance, navigation, and control (GNC) system identification; robust and advanced control schemes; feedback control systems; robotics; unmanned autonomous vehicles (UAVs); and cooperative control

ROBERTO MANDUCHI
Computer vision and sensor processing, with application to assistive technology for the visually impaired

JACOB ROSEN
Biorobotics; human-centered robotics; medical robotics, surgery and rehabilitation; wearable robotics (exoskeleton); teleoperation, haptics and virtual reality, biomechanics, neuromuscular control and human-machine interfaces

HAI TAO
Image and video processing, computer vision, vision-based graphics, and human-computer interaction

Assistant Professor

MATTHEW R. GUTHAUS
VLSI, CAD, design for reliability and variability, system-on-chip, 3D IC, system-in-package

SRI KURNIAWAN
Human-computer interaction; human factors and ergonomics; accessibility; assistive technology; usability; empirical studies; user-centered design

JOSE RENAU
Computer architecture, including design effort metrics and models, infrared thermal measurements, thermal modeling, process variability, energy efficient data-centers, thread level speculation, and FPGA/ASIC design

Adjunct Professor

GLENN ALERS
Nanoscale devices, copper interconnects

RENWICK CURRY

Control and optimization with special attention to aviation; air-traffic control; and collision-avoidance system design and analysis

PETER DANZIG

Internet web caching, scalable techniques to stream internet media around the world, scalable mechanisms to dynamically transform web content as applied to security for residential and enterprise networks

HARWOOD G. KOLSKY, Retired**Assistant Adjunct Professor****ANDREA DI BLAS**

Parallel computer architectures, parallel applications and programming models, combinatorial optimization

DAVID PEASE

File systems, operating systems, storage, programming languages

BRADLEY SMITH

Computer communications, distributed systems, policy-based routing, routing protocols, security and trust in distributed systems

CEDRIC WESTPHAL

Internet working and wireless networks, with special attention to analytical modeling

Lecturer**CYRUS BAZEGHI**

Computer architecture, VLSI, FPGA, embedded systems, and system architecture

GERALD MOULDS

Technical writing, professional communications

STEPHEN C. PETERSEN

Embedded controller systems, RF wireless systems, modulation and spectrum reuse, digital signal processing, circuit theory

Visiting Professor**EUGENE MORIARTY**

Ethics, philosophy of technology, philosophy of engineering, systems theory, control systems

**LUCA DE ALFARO (Computer Science)**

Formal methods, game theory, embedded systems, software engineering

BENJAMIN FRIEDLANDER (Electrical Engineering)

Digital communications, wireless communication system, array processing, adaptive signal processing

QI GONG (Applied Mathematics and Statistics)

Computational methods for real-time control systems, trajectory optimization and motion planning, nonlinear filtering and observer design, robust and adaptive control of nonlinear systems, industry applications of control theory

CLAIRE GU (Electrical Engineering)

Fiber sensors for bio-applications, optical fiber communications, volume holographic data storage, liquid crystal displays, nonlinear optics, optical information processing

KEVIN KARPLUS (Biomolecular Engineering)

Protein structure prediction, protein design, genome assembly from next-generation sequence data

SURESH K. LODHA (Computer Science)

Visualization, vision, innovation, entrepreneurship

DARRELL D. E. LONG (Computer Science)

Storage systems, distributed computing systems, operating systems, mobile computing, performance evaluation, fault

tolerance, computer security, multimedia, and video-on-demand systems

DOMINIC W. MASSARO (Psychology)

Understanding language, speech perception and reading, language learning and speech technology, pattern recognition, psychology of interactive media, psychology of art and new media, human-machine interface

CHARLES E. MCDOWELL (Computer Science)

Programming languages, parallel computing, and computer science education

ETHAN L. MILLER (Computer Science)

Archival storage systems, metadata management and information retrieval, non-volatile memory file systems, scalable file systems, reliable and secure storage, distributed systems, computer security

PEYMAN MILANFAR (Electrical Engineering)

Statistical signal, image, and video processing; computer vision; modeling and inverse problems in imaging; detection and estimation theory

DEJAN MILUTINOVIĆ (Applied Mathematics and Statistics)

Stochastic, dynamical systems and statistical signal processing, multi-agent systems/robotics, systems biology/immune system, optimal control, hybrid and discrete event systems

JOHN MUSACCHIO (Information Systems Management)

Control, analysis, and pricing of communications networks; applications of game theory in networking; wireless ad-hoc networks; and management of technology

ALEX T. PANG (Computer Science)

Uncertainty visualization, tensor visualization, scientific visualization, comparative visualization, collaboration software, virtual reality interfaces

IRA POHL (Computer Science)

Artificial intelligence, programming languages, heuristic methods, educational and social issues, combinatorial algorithms

KEVIN ROSS (Information Systems Management)

Service engineering and management; resource allocation; operations research, pricing, scheduling; queueing theory; networks

HAMID SADJADPOUR (Electrical Engineering)

Wireless communication systems, network information theory and scaling laws, performance analysis of wireless ad hoc and sensor networks, routing and MAC protocol design for wireless networks

PATRICK TANTALO

Graph theory, combinatorics, optimization, algorithms

LINDA WERNER

Software engineering testing, educational and societal issues of computer science

E. JAMES WHITEHEAD, JR. (Computer Science)

Software engineering, software evolution, software bug prediction, automated software construction, video game level design

DONALD WIBERG, Emeritus (UCLA)

Control systems, Kalman filtering, system parameter estimation, adaptive optics for large telescopes, and biomedical system modeling

YI ZHANG (Information Systems Management)

Information retrieval, knowledge management, natural language processing, machine learning

Program Description

Computer engineering focuses on the design, analysis, and application of computers and on their applications as components of systems. The UCSC Department

of Computer Engineering sustains and strengthens its teaching and research program to provide students with inspiration and quality education in the theory and practice of computer engineering. The department offers bachelor of science (B.S.), master of science (M.S.) and doctor of philosophy (Ph.D) degrees as well as an undergraduate minor. A combined B.S./M.S. program allows students to complete both degrees in five years. The department administers the interdisciplinary graduate designated emphasis in robotics and control that may be pursued along with a graduate degree in computer engineering or another field such as applied mathematics and statistics or electrical engineering.

Undergraduate Program Description

The UCSC B.S. in computer engineering prepares graduates for a rewarding career in engineering. UCSC computer engineering graduates will have a thorough grounding in the principles and practices of computer engineering and the scientific and mathematical principles upon which they are built; they will be prepared for further education (both formal and informal) and for productive employment in industry.

Because computer engineering is so broad, we offer five specialized concentrations for completing the program: systems programming, computer systems, robotics and control, networks, and digital hardware. Descriptions of these concentrations follow in the section on major requirements.

The Department of Computer Engineering offers an undergraduate minor, described after the B.S. program below. The minor in computer engineering focuses on the technical aspects of computer hardware, embedded systems, and software design. This minor is particularly recommended for students interested in the design of computer technology for use in another discipline.

The Department co-sponsors the B.S. in bioengineering with the Departments of Biomolecular Engineering, Electrical Engineering, and Molecular, Cell and Developmental Biology.

Beyond the extensive research, design, and development projects taking place within courses required for the major, many computer engineering students join faculty labs to take part in cutting-edge research. The department sponsors the summer undergraduate research fellowship in information technology (SURF-IT, <http://surf-it.soe.ucsc.edu>), as well as many other research opportunities. The department holds regular faculty-undergraduate lunches to discuss research and other issues of interest.

Many computer engineering students continue their education through the M.S. degree. The Department of Computer Engineering offers an accelerated combined B.S./M.S. degree in computer engineering that enables eligible undergraduates to move without interruption to the graduate program. Interested computer engineering majors should contact their adviser for more details. The graduate program of the Department of Computer Engineering also offers both the standard M.S. and the Ph.D. degrees.

The computer engineering B.S. program is accredited by the Engineering Accreditation Commission of ABET.

Courses for Nonmajors

The Department of Computer Engineering offers course 1, *Hands-on Computer Engineering*: a two-credit laboratory course designed to introduce students to computer engineering via many short fun projects; course 3, *Personal Computer Concepts: Software and Hardware*, providing students an introductory course on the design and use of computers from an engineering viewpoint;

and course 8, *Robot Automation: Intelligence through Feedback Control*. Other computer engineering courses of interest to nonmajors include course 12, *Computing Systems and Assembly Language*, an introductory course on computer systems, system software, and machine-level programming; course 80N, *Introduction to Networking and the Internet*, an introduction to technological services of the Internet; course 80U, *Ubiquitous and Mobile Computing*; course 80E, *Engineering Ethics*; and course 80A, *Universal Access: Disability, Technology, and Society*.

Computer Engineering Policies

Admissions Policy

Lower-division students will be accepted into the computer engineering major on completion of the School of Engineering (SoE) major declaration process during any of their first three quarters at UCSC. See <http://www.soe.ucsc.edu/advising/undergraduate/> for quarterly deadlines and mandatory major declaration workshops. Students considering the computer engineering major among other possibilities are strongly encouraged to take course 1 (2 credits) or course 8 within the first two quarters, and course 12 within the first three quarters.

After the first three quarters, petitions to declare the major are reviewed individually. Students must have completed at least five courses required for the major, and are expected to have a grade point average (GPA) among School of Engineering and Division of Physical and Biological Sciences courses (the SoE GPA) of 2.5. Progress in the major and ability to complete the major within campus limits will also be considered.

Transfer Students

Admission to the computer engineering major for transfer students is based on performance in all transferable science, mathematics, and engineering courses. To be admitted, at least four courses required for the major must transfer for a student to be eligible for admission. Requirements are listed below. We recommend, in particular, substantial completion of the mathematics series, as well as programming and physics.

Advising

Every major and minor must have a computer engineering faculty adviser, assigned by the Baskin School of Engineering undergraduate advising office, and with that adviser must formulate a program of proposed course work that meets the major or minor requirements (see <http://www.soe.ucsc.edu/advising/undergraduate/>).

Honors in the Major

Computer engineering majors are considered for "Honors in the Major" and "Highest Honors in the Major" based on the School of Engineering GPA and on results of undergraduate research and other significant contributions to the School of Engineering. Students with an SoE GPA of 3.7, in most cases, receive highest honors. Students with an SoE GPA of 3.3, in most cases, receive honors. Students with particularly significant accomplishments in undergraduate research or contributions to the School of Engineering may be considered with a lower SoE GPA. Computer engineering juniors and seniors may also be eligible for election to the UCSC chapter of Tau Beta Pi, the national engineering honor society founded in 1885.

Progress in the Major

Declared majors must complete courses required for the major in a manner that will enable graduation within campus limits. Students not making sufficient progress may be required to take a higher course load, complete courses during summer, or otherwise adjust their study

plan, at the discretion of the faculty. Students who do not complete required changes to the study plan may be disqualified from the major.

Disqualification Policy

Please refer to the Engineering section of this catalog for the School of Engineering's Major Disqualification Policy.

Letter Grade Policy

The Computer Engineering Department requires letter grading for all courses applied to the degree with the exception of two lower-division courses, which students may elect to take Pass/No Pass. This policy includes courses required for the computer engineering major but sponsored by other departments.

School of Engineering Policies

Please refer to the School of Engineering section of the catalog for additional policies that apply to all School of Engineering programs.

Materials Fee and Miscellaneous Fees

Please see the section on fees under the School of Engineering.

Computer Engineering Major Requirements

All students in the computer engineering major take the same core courses, which give the fundamentals of programming and hardware design, supported by the physics and mathematics necessary to understand them. Students must complete all of the courses listed within their selected concentration, and they must complete the capstone sequence. The senior comprehensive requirement for computer engineering majors is satisfied by completion of the capstone course and the portfolio exit requirement.

Lower-Division Core Requirements

Applied Mathematics and Statistics 10, *Mathematical Methods for Engineers I*; or Mathematics 21, *Linear Algebra*

Applied Mathematics and Statistics 20, *Mathematical Methods for Engineers II*; or Mathematics 24, *Ordinary Differential Equations*

Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*

Computer Engineering 13/L, *Computer Systems and C Programming/Laboratory* (recommended); or Computer Science 12A/L, *Introduction to Programming/Laboratory*

Computer Science 12B/M, *Introduction to Data Structures/Laboratory*

Computer Engineering 16, *Applied Discrete Mathematics*
Mathematics 19A-B, *Calculus for Science, Engineering, and Mathematics*

Mathematics 23A, *Multivariable Calculus*

Physics 5A/L, *Introduction to Physics I/Laboratory*; or Physics 6A/L, *Introductory Physics I/Laboratory*;

Physics 5B/M, *Introduction to Physics III/Laboratory*; or 6B/M, *Introductory Physics III/Laboratory*; or Computer Engineering 9, *Statics, Dynamics, and Biomechanics* (recommended for robotics concentration).

Physics 5C/N, *Introduction to Physics III/Laboratory*; or Physics 6C/N, *Introductory Physics III/Laboratory*;

Computer Engineering 80E, *Engineering Ethics*; or another approved ethics course. This course is

required even for transfer students who have had their general education requirements waived.

Upper-Division Core Requirements

Computer Engineering 100/L, *Logic Design/Laboratory*

Computer Engineering 107, *Mathematical Methods of Systems Analysis: Stochastic*

Computer Engineering 110, *Computer Architecture*

Computer Engineering 121/L, *Microprocessor System Design/Laboratory*

Computer Science 101, *Abstract Data Types*

Electrical Engineering 101/L, *Introduction to Electronics/Laboratory*

Electrical Engineering 103, *Signals and Systems*

Concentrations

The following concentrations are specializations for the computer engineering student. Students must complete all of the courses listed within their selected concentration.

Systems Programming Concentration

The systems programming concentration focuses on software systems: courses include operating systems, compilers, software engineering, and advanced programming. Students finishing this concentration are very well prepared for building large software systems of all types. This concentration is the closest one to a computer science major—the main differences are that it does not require computer science theory courses, but because of the core computer engineering requirements, includes more hardware and electronics than a computer science bachelor's degree.

Computer Science 111, *Introduction to Operating Systems*

Computer Science 115, *Software Methodology*

Elective: Upper-division elective from the approved list
Any two of the following courses:

Computer Engineering 113, *Parallel and Concurrent Programming*

Computer Engineering 118/L, *Introduction to Mechatronics/Laboratory*

Computer Engineering 156/L, *Network Programming/Laboratory* (requires Computer Engineering 150)

Computer Science 104A, *Fundamentals of Compiler Design I*

Computer Science 104B, *Fundamentals of Compiler Design II*

Computer Science 116, *Software Design Project*

Computer Systems Concentration

The computer systems concentration provides a balance between software and hardware design. Students are prepared for a large variety of different design tasks, especially those requiring the integration of hardware and software systems, but may need further training for any particular specialization.

Computer Engineering 125/L, *Logic Design with Verilog/Laboratory*

Computer Science 111, *Introduction to Operating Systems*

Electives: Two upper-division or graduate electives from approved list

Robotics and Control Concentration

This concentration covers the hardware, software, sensing, and control aspects of autonomous and embedded systems. Students receive training in the theory, design,

and realization of complex systems such as mobile robots. The concentration emphasizes integration of embedded software with hardware systems that interact with the environment. The Computer Engineering 9 option, above, is highly recommended.

Computer Engineering 118/L, *Introduction to Mechatronics/Laboratory*

Electrical Engineering 154, *Feedback Control Systems*

Any two of the following:

Computer Engineering 153, *Digital Signal Processing*

Computer Engineering 167/L, *Sensing and Sensor Technologies/Laboratory*

Applied Mathematics and Statistics 114, *Introduction to Dynamical Systems*; or Computer Engineering 240, *Introduction to Linear Dynamical Systems*

Computer Engineering 215, *Models of Robotic Manipulation*

Computer Engineering 242, *Applied Feedback Control*

Networks Concentration

The networks concentration focuses on communication between computers, covering both network hardware and protocols. Students finishing this concentration are well prepared for the design of wired and wireless network systems.

Computer Engineering 150/L, *Introduction to Computer Networks/Laboratory*

Computer Engineering 156/L, *Network Programming/Laboratory*

Computer Science 111, *Introduction to Operating Systems*
Elective: Computer Engineering 151/L, *Network Administration/Laboratory*; or an upper-division or graduate elective from approved list.

Digital Hardware Concentration

The digital hardware concentration focuses on hardware design and includes more electronics than the other concentrations. Students finishing this concentration are well prepared for building hardware systems. This concentration is the closest one to an electronics major; the main differences are that it does not require as much electronics theory or analog electronic design, but because of the core computer engineering requirements, requires more software skills.

Computer Engineering 125/L, *Logic Design with Verilog/Laboratory*

Computer Engineering 173/L, *High-Speed Digital Design/Laboratory*

Computer Engineering 174, *Introduction to the EDA Tools for PCB Design* (three credits)

Electrical Engineering 171/L, *Analog Electronics/Laboratory*

Elective: Upper-division or graduate elective from approved list

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in computer engineering is satisfied by completing Computer Engineering 185, *Technical Writing for Computer Engineers*.

Capstone Requirement

All computer engineering students complete a two-quarter capstone project sequence. Working with students from different concentrations and majors, students apply the skills and techniques from their own chosen concentration to a major design problem.

Computer Engineering 123A, *Computer Engineering Design Project I*

Computer Engineering 123B, *Computer Engineering Design Project II*; or 195, *Senior Thesis Research*

Exit Requirement

Students are required to submit a portfolio, exit survey, and exit interview. Students whose submissions are deemed inadequate, either in presentation or in content, may be required to revise and rewrite the portfolio or to complete an additional project course. The portfolios must be turned in electronically via <http://www.ce.ucsc.edu/node/20> by the last day of the quarter of graduation. The portfolios will be reviewed quarterly by the computer engineering undergraduate committee and must include the following:

A hardware-oriented project report

A software-oriented project report

A third project report of the student's selection

A one- to two-page overview of the three projects, the student's contribution to them, and a narrative as specified at <http://www.ce.ucsc.edu/node/20>.

If a project report is associated with a course, it must be an upper-division or graduate course. One of the reports must be the result of a multi-person project. One of the reports must be the result of an individual project. One of the reports must be the result of the student's capstone design project.

Exit interviews are scheduled during the last week of the quarter.

Computer Engineering Major Planners

The following are two sample academic plans for students to complete during their first two years as preparation for the computer engineering major. Plan One is suggested guidelines for students who are committed to the major early in their academic career. Plan Two is for students who are considering the major. Students who take precalculus at UCSC, or who have little programming experience, are strongly advised to take course 8, *Robot Automation* in the fall quarter.

Plan One

| Year | Fall | Winter | Spring |
|---------------|---------------------------------------|-----------------------------------|------------------------------------|
| 1st (frsh) | MATH 19A CMPS 12A/L core course | MATH 19B CMPS 12/L gen ed | CMPE 80E CMPS 12B/M MATH 23A |
| 2nd (soph) | PHYS 5A/L AMS 10 CMPE 16 | AMS 20 CMPE 100/L PHYS 5B/M | PHYS 5C/N CMPE 110 CMPS 101 |

Plan Two

| Year | Fall | Winter | Spring |
|---------------|---|---------------------------------|-----------------------------------|
| 1st (frsh) | MATH 3 (pre-calc) CMPE 8 core course | MATH 19A CMPE 12/L gen ed | MATH 19B CMPE 13/L CMPE 80E |
| 2nd (soph) | PHYS 5A/L CMPS 12B/M AMS 10 | CMPE 100/L CMPE 9 AMS 20 | PHYS 5C/N MATH 23A CMPE 110 |

Computer Engineering Minor

The computer engineering minor provides a solid foundation in digital hardware, electronics, and computer software, as well as the prerequisite material in mathematics and physics. The minor is well-suited to students who wish to take part in the design of computer and embedded systems in any discipline. Computer Engineering 118/L, *Introduction to Mechatronics/Introduction to Mechatronics Laboratory* or course 121/L, *Microprocessor System Design/Microprocessor System Design Laboratory* provides a capstone engineering design experience for students pursuing the computer engineering minor.

Computer Engineering Minor Requirements

Requirements for the minor in computer engineering are the following:

Applied Mathematics and Statistics 20A or 20, (*Basic Mathematical Methods for Engineers II* (requires prerequisite); or Mathematics 24, *Ordinary Differential Equations*)

Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*

Computer Engineering 16, *Applied Discrete Mathematics*

Computer Engineering 100/L, *Logic Design/Laboratory*

Computer Engineering 110, *Computer Architecture*

Computer Engineering 118/L, *Introduction to Mechatronics/Laboratory* or 121/L, *Microprocessor System Design/Laboratory*

Computer Engineering 13/L, *Computer Systems and C Programming* (recommended); or

Computer Science 12A/L, *Introduction to Programming/Laboratory*

Computer Science 12B/M, *Introduction to Data Structures/Laboratory*; or 13H/L, *Introduction to Programming and Data Structures (Honors)/Laboratory*

Computer Science 101, *Abstract Data Types*

Electrical Engineering 101/L, *Introduction to Electronics/Laboratory*

Mathematics 19A-B, *Calculus for Science, Engineering, and Mathematics*

Physics 5A/L, *Introduction to Physics II/Laboratory*; or Physics 6A/L, *Introductory Physics II/Laboratory*

Physics 5C/N, *Introduction to Physics III/Laboratory*; or Physics 6C/N, *Introductory Physics III/Laboratory*

Computer Technology Minor

The computer technology minor provides a broad exposure to computer hardware and software technology. The minor is intended for non-engineering majors who would like to develop an understanding of the design and use of computer technology. The minor may be particularly valuable for students who expect to use computer technology in another discipline, who are interested in K-12 teaching, or who have a general interest in computer technology and how it works. The minor includes a required capstone essay.

Computer Technology Minor Requirements

Computer Engineering 1, *Hands-On Computer Engineering*

Computer Engineering 8, *Robot Automation: Intelligence through Feedback Control*

Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*

Computer Engineering 100/L, *Logic Design/Laboratory*

Computer Engineering 80N, *Networking and the Internet*; or 80U, *Ubiquitous and Mobile Computing*; or 150/L, *Introduction to Computer Networks/Laboratory* (requires pre-requisites)

Computer Engineering 80E, *Engineering Ethics*; or 80A, *Universal Access: Disability, Technology, and Society*

Information Systems Management 101, *Management of Technology Seminar* (1 credit)

Two of the following courses:

Biomolecular Engineering 60/L, *Programming for Biologists and Biochemists/Laboratory*

Computer Engineering 13/L, *Computer Systems and C Programming/Laboratory*

Computer Science 5C, *Introduction to Programming in C/C++*

Computer Science 5J, *Introduction to Programming in Java*

Computer Science 5P, *Introduction to Programming Python*

Computer Science 11, *Intermediate Programming*

Computer Science 12A/L, *Introduction to Programming/Laboratory*

Computer Science 12B/M, *Introduction to Data Structures/Laboratory*

Elective Requirement

Two 5-credit, upper-division School of Engineering electives and any associated laboratories. Only one is required if Computer Engineering 150/L is used in satisfying the requirements above.

Capstone Requirement

194F, *Group Tutorial* (2 credits). A group tutorial completed during the winter quarter prior to graduation considering the impact of computer technology. Students will complete papers considering aspects of the impact of computer technology on the students' discipline. Contact the School of Engineering Undergraduate Advising office during fall quarter to join this course.

B.S./M.S. Undergraduate Program

The Department of Computer Engineering offers a combined bachelor and master of science degree program in computer engineering, providing the opportunity to earn both degrees in five years. The B.S./M.S. program offers a competitive edge to students who are completing their undergraduate degree at UCSC, by enabling those with advanced preparation to move directly from the undergraduate to the graduate program. The program assists qualified enrolled students with a simplified graduate application process and makes it possible to complete an M.S. degree with just seven courses beyond the B.S. program.

The program prepares students for engineering positions in industry, and it is particularly attractive for undergraduate students planning to engage in engineering research in industry or academia. The School of Engineering has many opportunities for undergraduate research, and B.S./M.S. students can continue their undergraduate research projects with the same research group. Upon advancement to graduate standing, B.S./M.S. students are eligible for support as graduate research assistants.

Particularly motivated B.S./M.S. students can complete the entire program in 14 quarters (or fewer with Advanced Placement credit); however, advance planning is essential. Interested students should contact the department and their faculty adviser early in their college career—no later than the start of their junior year.

B.S./M.S. students retain undergraduate status until the completion of all undergraduate requirements, but may begin graduate course work in advance of graduate standing.

Admission to the B.S./M.S. Program

The undergraduate degree requirements are the same as those for other computer engineering majors; however, the B.S./M.S. program capitalizes on graduate-level courses that may apply toward both degree requirements. B.S./M.S. candidates may apply (at most) two graduate courses taken as undergraduates toward both the M.S. degree and B.S. degree electives. At the time graduate status is achieved, no more than three graduate courses taken as an undergraduate may count toward the nine courses required for the M.S. degree. B.S./M.S. students may not apply undergraduate courses toward the M.S. degree.

Admission to the B.S./M.S. program is by formal application, and it is very simple. Undergraduate applicants seeking admission to the program can apply at any time starting in the first quarter of junior standing, and no graduate record examination (GRE) is required to apply. To qualify, applicants must have a 3.0 SoE GPA when they apply to the B.S./M.S. program, and must maintain a 3.0 SoE GPA or higher until the completion of their undergraduate requirements.

Students who cannot meet the B.S./M.S. application requirements or who are not admitted into the program are encouraged to apply for admission to the standard M.S. or Ph.D. program during their senior year.

Additional information about this program can be found on the department's web pages at <http://www.ce.ucsc.edu/academics/undergraduate/bs-ms>.

Graduate Programs

M.S. and Ph.D. Degree Programs

The graduate program in computer engineering accepts students for both the M.S. and the Ph.D. degrees. Graduate students in this program establish a solid foundation in computer algorithms and architectures and then proceed to a thorough study of recent developments in their selected area of specialization. This provides the basis for the M.S. degree and Ph.D. thesis work. The major areas of research concentration in computer engineering at UCSC are networks; embedded and autonomous systems; computer systems design and computer-aided design; and sensing and interaction.

The computer engineering program benefits from a close relationship with, among others, the computer science and electrical engineering programs at UCSC and ties to industry in the Silicon Valley and Monterey Bay areas. Graduates of the program are prepared for careers in teaching and research as well as for positions in industrial research and development.

While in the program, most graduate students are supported as research assistants on faculty-sponsored projects or as teaching assistants for undergraduate courses.

Additional information on the computer engineering M.S. and Ph.D. degrees, including degree requirements and applications for admission, can be found on the department's web pages at <http://www.ce.ucsc.edu/academics/graduate/requirements>.

Requirements for the Master's Degree

Base Requirement

In their first year, graduate students must show proficiency in three fundamental subjects: 1) data structures; 2) computer architecture; and 3) one of the following three subjects—logic design, circuits, or software systems.

Proficiency can be demonstrated by either completing one of the associated undergraduate courses, by establishing that an equivalent undergraduate course has been completed elsewhere, or by passing the final examination (or project when deemed appropriate by the faculty responsible) of an associated course. Students should obtain a computer engineering base worksheet for the list of associated courses and instructions on fulfilling this requirement.

The base requirement must be met by all graduate students (both M.S. and Ph.D.) by the end of the spring quarter of their first year in the program.

Course Requirements

Each student is required to complete a total of 48 credits. The course work must include:

Computer Engineering 200, *Research and Teaching in Computer Science and Engineering*

Computer Science 201, *Analysis of Algorithms*;

Computer Engineering 202, *Computer Architecture*;

Up to 10 credits of Computer Engineering 297, *Independent Study or Research*; or Computer Engineering 299, *Thesis Research*;

Up to 10 credits of either graduate courses (not seminars) in related disciplines outside the School of Engineering (requires adviser and computer engineering graduate committee approval) or upper-division undergraduate courses when necessary to strengthen the student's preparation for graduate studies (requires adviser approval).

All remaining credits must be graduate elective courses from computer engineering's list of approved graduate courses (available online or from the department)

In addition, the selection of graduate elective courses must show breadth by including a minimum of five credits in each of two categories from computer engineering's list of approved graduate electives. Computer Science 201 and Computer Engineering 202 cannot be used to satisfy the breadth requirement.

At least half of the credits from the graduate-level courses must be computer engineering graduate courses.

Thesis

Completion of a master's thesis is required for award of the master's degree. To fulfill this requirement, the student must submit a written proposal to a faculty member, usually by the third academic quarter. By accepting the proposal, the faculty member becomes the thesis adviser for the proposed thesis. In consultation with the adviser, the student must form a master's thesis reading committee with at least two additional faculty members, each of whom is provided a copy of the proposal. The student is required to present an expository talk on the thesis research, and the final thesis must be accepted by the review committee before the award of the master of science degree.

Requirements for the Ph.D. Degree

Base Requirement

In their first year, graduate students must show proficiency in three of five fundamental subjects: 1) data structures; 2) computer architecture; and 3) one of the following three subjects—logic design, circuits, and software systems. Proficiency can be demonstrated by either completing one of the associated undergraduate courses, by establishing that an equivalent undergraduate course has been completed elsewhere, or by passing the final examination (or project when deemed appropriate by the faculty responsible) of an associated course. Students should obtain a computer engineering base work sheet for the list of associated courses and instructions on fulfilling this requirement.

The base requirement must be met by all graduate students (both M.S. and Ph.D.) by the end of the spring quarter of the first year in the program.

Course Requirements

A Ph.D. student is required to take a total of 58 credits of graduate courses, which must consist of:

Computer Engineering 200, *Research and Teaching in Computer Science and Engineering*;

Computer Science 201, *Analysis of Algorithms*;

Computer Engineering 202, *Computer Architecture*;

A minimum of 20 credits of graduate computer engineering courses from computer engineering's list of approved graduate courses (available online or from the department);

Up to 10 credits of Computer Engineering 297, *Independent Study or Research*; or Computer Engineering 299, *Thesis Research*;

Up to 10 credits of graduate courses (not seminars) in related disciplines outside the School of Engineering (requires adviser and computer engineering graduate committee approval);

All remaining credits must be graduate elective courses from computer engineering's list of approved graduate courses.

The selection of elective courses must show breadth by including either 10 credits in each of two categories or five credits in each of three separate categories from computer engineering's list of approved graduate courses. Computer Science 201 and Computer Engineering 202 cannot be used to satisfy the breadth requirement.

Course selection should form a coherent plan of study and requires adviser approval. Undergraduate courses may not be used to satisfy Ph.D. course requirements. Ph.D. students who have satisfied the requirements for the master's degree are eligible to receive a master's degree.

Examinations and Dissertation

To continue in the Ph.D. program, students must pass a preliminary examination in their chosen research area by the end of their third year. Preliminary examinations are held during the first three weeks of each spring quarter; students must petition the computer engineering graduate committee for an examination in their chosen area two weeks before the end of winter quarter. Examination committees consist of four faculty members, two chosen by the student and two by the computer engineering graduate committee. The format of this oral examination is up to the examination committee; the examination will typically evaluate both general knowledge of the chosen area and specific understanding of selected technical papers. The preliminary examination requirement is waived for students who advance to candidacy by the end of their third year.

Each student must write a Ph.D. dissertation. The dissertation must show the results of in-depth research, by an original contribution of significant knowledge, and include material worthy of publication. As the first step, a student must submit a written dissertation proposal to a School of Engineering faculty member. By accepting the proposal, the faculty member becomes the student's dissertation supervisor. The student may choose a faculty member outside the Computer Engineering Department within the School of Engineering as adviser only with approval from the computer engineering graduate committee. The dissertation proposal is publicly and formally presented in an oral qualifying examination given by a qualifying examination committee, approved by the computer engineering graduate committee and the graduate council. The

student must submit his or her written dissertation proposal to all members of the qualifying examination committee and the graduate assistant one month in advance of the examination.

Students are advanced to candidacy after they have completed the course requirements, passed both the preliminary and qualifying examinations (or just the qualifying examination if passed prior to the end of the student's third year in the program), cleared all Incomplete grades from their records, have an appointed dissertation reading committee, and paid the filing fee. Students who have not advanced to candidacy by the end of their fourth year will be placed on academic probation.

Each Ph.D. candidate must submit the completed dissertation to a reading committee at least one month prior to the dissertation defense. The appointment of the dissertation reading committee is made immediately after the qualifying examination and is necessary for advancing to candidacy. The candidate must present his or her research results in a public seminar sponsored by the dissertation supervisor. The seminar is followed by a defense of the dissertation to the reading committee and attending faculty who will then decide whether the dissertation is acceptable or requires revision. Successful completion of the dissertation fulfills the final academic requirement for the Ph.D. degree.

Transfer Credit

Up to three School of Engineering courses fulfilling the degree requirements of either the M.S. or Ph.D. degrees may be taken before beginning the graduate program through the concurrent enrollment program.

M.S. students who have previously successfully completed graduate-level classes in a related field at another institution may substitute courses from their previous institution with the approval of the graduate committee. The number of courses that can be substituted is limited so that, in all cases, the students must complete a minimum of 4 graduate-level classes during their matriculation at UCSC. These classes must be graduate-level classes from the list of approved graduate courses (<http://www.ce.ucsc.edu/academics/graduate/approved-courses>).

Petitions for course substitutions should be submitted along with the transcript from the other institution or UCSC extension. For courses taken at other institutions copies of the syllabi, exams, and other course work should accompany the petition. Such petitions are not considered until the completion of at least one quarter at UCSC.

Ph.D. students who have previously earned a master's degree or have successfully completed graduate-level classes as regular students in a graduate program in a related field at another institution may apply for a modified program of course requirements taking into account their previous coursework. Such a modified program should specify the coursework that will be completed at UCSC, which must include no fewer than four courses from the list of approved graduate courses (<http://www.ce.ucsc.edu/academics/graduate/approved-courses>). These four courses must be taken while in the graduate program at UCSC.

Application for a modified program of course requirements must be made within the first year of graduate study at UCSC, and will be reviewed by the graduate director and a committee of three faculty members approved by the graduate director. The application should be accompanied by copies of the syllabi, exams, and other course work, as well as the relevant transcript from the other institution. Interviews with the committee members may be required to properly assess the coursework.

Acceptance of prior work for course transfer and

modified programs of study is at the discretion of the department.

Robotics and Control Designated Emphasis

The graduate designated emphasis (DE) leading to the degree notation "with an emphasis in Robotics and Control" is a collaboration of faculty from several Baskin School of Engineering programs and is administered by the Department of Computer Engineering. Students wishing to complete a master's thesis or doctoral dissertation in this area satisfy the degree requirements of a primary program as well as of the DE. The DE is most suitable for students pursuing degrees in Applied Mathematics and Statistics, Computer Engineering and Electrical Engineering, but students from any area may work in this interdisciplinary field so long as they meet all requirements, including progress, within the primary degree program. A current list of the robotics and control faculty and electives is available at the Computer Engineering web site, ce.ucsc.edu.

Requirements for the Notation

Committee composition. The student's Ph.D. or M.S. committee must include one member of the robotics and control faculty.

Writing. The student's dissertation or thesis must include a significant section (chapter) related to robotics and control, with content suitable for a conference or journal article.

Course requirements. The student must complete four five-credit graduate courses and several two-credit seminar courses. All students must complete CMPE 241/EE 241, *Introduction to Feedback Control Systems*, and three 5-credit robotics and control graduate electives.

Master's students must complete two offerings of MPE 280C, *Seminar in Control* (2 credits). Doctoral students must complete four offerings of CMPE 280C.

Review of Progress

Each year, the computer engineering faculty reviews the progress of every student in the graduate program. Students not making adequate progress towards completion of degree requirements (see the *UCSC Graduate Handbook* for policy on satisfactory academic progress) are subject to dismissal from the program. Students with academic deficiencies may be required to take additional courses. Full-time students with no academic deficiencies are normally expected to complete the degree requirements at the rate of at least two courses per quarter. Full-time students must complete Computer Science 201 and Computer Engineering 202 within two years and normally must complete all course requirements within two years for the M.S. and three years for the Ph.D. program.

Students receiving two or more grades of U (Unsatisfactory) or below B in School of Engineering courses are not making adequate progress and will be placed on academic probation for the following three quarters of registered enrollment. Withdrawing or taking a leave of absence does not count as enrollment. Part-time enrollment is counted as a half of a quarter of enrollment.

Should any computer engineering graduate student fail a School of Engineering course while on probation, the Computer Engineering Department may request the graduate dean to dismiss that student from the graduate program. If, after being removed from probation, the student again fails a School of Engineering course, he or she will return immediately to academic probation.

Graduate students experiencing circumstances or difficulties that impact their academic performance should

contact their adviser and the graduate director immediately. Students may appeal their dismissal.

Lower-Division Courses

1. Hands-On Computer Engineering (2 credits).

Hands-on introduction to computer engineering practice and research, including computer hardware, robotics, and embedded systems. Encourages interaction with UCSC's School of Engineering community. Designed for students without previous background in computer engineering. Enrollment restricted to first-year students and sophomores. Enrollment limited to 20. *T. Larrabee, S. Petersen, R. Hughey*

3. Personal Computer Concepts: Software and Hardware. F,W,S

Provides an introduction to computers. Personal computing is emphasized, and students are introduced to word processing, spreadsheets, database management, graphics, and programming. Covers fundamentals of computing and current and future uses of computer technology, PC hardware, Windows operating system, applications software, networking and the Internet, and developments in the computer industry. Designed for students with little or no experience using computers. Students cannot receive credit for this course and Computer Science 2. (General Education Code(s): IN.) *G. Moulds*

8. Robot Automation: Intelligence through Feedback Control. F

Introduction to dynamical systems, feedback control, and robotics. Fundamental concepts in dynamical systems, modeling, stability analysis, robustness to uncertainty, feedback as it occurs naturally, and the design of feedback-control laws to engineer desirable static and dynamic response. Course includes an introduction to MATLAB and programming in MATLAB. Priority enrollment restricted to first-year students and sophomores. (General Education Code(s): MF, IN, Q.) *W. Dunbar, G. Elkaim*

9. Introduction to Statics, Dynamics, and Biomechanics. W

Theory and application of mathematical models to analyze statics and dynamics of mechanical and biomechanical systems (partials and rigid bodies) using a vector algebra. Covers: Newton's laws; free-body diagrams; structure analysis; friction; virtual work; energy and momentum methods; dynamics of bodies in two and three dimensions. Mathematics 19A, and Physics 5A/L or 6A/L. *G. Elkaim, J. Rosen, W. Dunbar*

12. Computer Systems and Assembly Language. F,W

Introduction to computer systems and assembly language and how computers compute in hardware and software. Topics include digital logic, number systems, data structures, compiling/assembly process, basics of system software, and computer architecture. May include C language. Prerequisite(s): course 3 or 8, or Computer Science 10 or 12A or 5C or 5J or 5P, or Biomolecular Engineering 60, or suitable programming experience; previous or concurrent enrollment in course 12L required. (General Education Code(s): IN, Q.) *T. Larrabee, G. Elkaim, F. Ferguson, R. Hughey*

12L. Computer Systems and Assembly Language Laboratory (2 credits). F,W

Laboratory sequence in assembly language programming. The basics of logic design, both RISC and microcontroller programming. May include C language programming. Two two-hour laboratories per week. Prerequisite(s): course 3 or 8, or Computer Science 10 or 12A or 5C or 5J or 5P, or Biomolecular Engineering 60, or suitable programming experience; previous or concurrent enrollment

in course 12 required. *T. Larrabee, G. Elkaim, F. Ferguson, R. Hughey*

13. Computer Systems and C Programming. S

Introduction to the C programming language as a means for controlling embedded and general computing systems. Continuing the exploration begun in course 12, students move to higher levels of abstraction in the control of complex computer systems. Prerequisite(s): courses 12 and 12L. Concurrent enrollment in course 13L is required. *G. Elkaim, R. Hughey*

13L. Computer Systems and C Programming Lab (2 credits). S

Laboratory sequence in C programming for embedded and general computing systems. Two 2-hour laboratories per week. Concurrent enrollment in course 13 is required. *G. Elkaim, R. Hughey*

16. Applied Discrete Mathematics. F,S

Introduction to applications of discrete mathematical systems. Topics include sets, functions, relations, graphs, trees, switching algebra, first order predicate calculus, mathematical induction, permutations, combinations, summation, and recurrences. Examples drawn from computer science and computer engineering. Prerequisite(s): eligibility to enroll in Mathematics 19A (completion of Mathematics 2B or 3 or Mathematics Placement Exam score of 40 or higher) or completion of Mathematics 19A or 11A, or Applied Mathematics and Statistics 11A, or Economics 11A. (General Education Code(s): MF, Q.) *J. Garcia-Luna-Aceves, H. Tao, L. De Alfaro, M. Schlag, T. Larrabee*

80A. Universal Access: Disability, Technology, and Society. F,S

Overview of human-centered technology and of its potential for increasing the quality of life and independence of disabled individuals. A substantial portion of the course is devoted to studying physical, psychological, and psychosocial aspects of disability. Topics include: diversity and integration, legislation, accessibility, and universal design. (Formerly *Assistive Technology and Universal Access*.) (General Education Code(s): T7-Natural Sciences or Social Sciences.) *S. Kurniawan, R. Manduchi*

80E. Engineering Ethics. S

Ethical theories, analysis, and their application to issues in the practice of engineering, such as safety and liability, professional responsibility to clients and employers, codes of ethics, legal obligations, environmental issues, and social issues. Emphasis on developing independent ethical analysis through the use of case studies. (General Education Code(s): PE-T, T6-Natural Sciences or Humanities and Arts.) *The Staff*

80H. History of Modern Computing.

Presents a history of the development of computing technologies (CPUs and I/O devices, operating systems, and languages) through the latter half of the 20th century in order to build an understanding of how today's computing environment evolved. (General Education Code(s): T2-Natural Sciences.) *D. Pease*

80N. Introduction to Networking and the Internet. F,W,S

Introduction to the evolution, technological basis, and services of the Internet, with descriptions of its underlying communications structure, routing algorithms, peer-to-peer hierarchy, reliability, and packet switching. Network security, mail, multimedia and data compression issues, HTML, and digital images. Students who have completed course 150 cannot receive credit for this course. (General Education Code(s): T2-Natural Sciences.) *T. Larrabee, A. Varma, K. Obraczka, R. Manduchi*

80U. Ubiquitous and Mobile Computing. W

Ubiquitous computing integrates computer and communication technology with day-to-day life. Ubiquitous and mobile technology includes: MP-3 players, camera cell phones, Bluetooth headsets, sensor networks, and new emerging technologies. Course provides an overview of the technology and economics of ubiquitous computing. (General Education Code(s): T2-Natural Sciences.) *R. Manduchi, H. Tao*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

94F. Group Tutorial (2 credits). F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

100. Logic Design. W,S

Boolean algebra, logic minimization, finite-state machine design, sequential circuits, common logic elements, programmable logic devices, and an introduction to system level design. The electrical behavior of circuits including three state outputs, propagation delay, logic levels, and fanout. Prerequisite(s): courses 12 and 12L; previous or concurrent enrollment in course 100L required. Enrollment limited to 60. *T. Larrabee, M. Guthaus, S. Petersen, M. Schlag*

100L. Logic Design Laboratory (2 credits). W,S

Laboratory sequence illustrating topics covered in course 100. One two-hour laboratory session per week. Weekly laboratory assignments which require the use of the oscilloscopes, TTL circuits, computer-aided design and simulation tools, and programmable logic. Students are billed a materials fee. Prerequisite(s): courses 12 and 12L; previous or concurrent enrollment in course 100 required. Enrollment limited to 60. *T. Larrabee, M. Guthaus, S. Petersen, M. Schlag*

107. Probability and Statistics for Engineers. F,S

Introduction to fundamental tools of stochastic analysis. Probability, conditional probability; Bayes Theorem; random variables and transforms; independence; Bernoulli trials. Statistics, inference from limited data; outcomes of repeated experiments; applications to design; assessment of relative frequency and probability; law of large numbers; precision of measurements. Elements of stochastic processes, Poisson processes; Markov chains. Students cannot receive credit for this course and Applied Mathematics and Statistics 131. (Formerly *Mathematical Methods of Systems Analysis: Stochastic*.) Prerequisite(s): course 16 or 16H and Mathematics 22 or 23A. (General Education Code(s): SR.) *A. Brandwajn, R. Manduchi*

108. Data Compression.

Basics of information theory, lossless coding (Huffman coding, arithmetic coding, dictionary coding), lossy coding (PCM, predictive coding, transform coding). Application to the compression of specific data set, which may include biological time series, DNA sequences, and

multimedia streams. Programming experience is required. Prerequisite(s): course 107 or Applied Mathematics and Statistics 131. *R. Manduchi*

110. Computer Architecture. S

Introduction to computer architecture including examples of current approaches and the effect of technology and software. Computer performance evaluation, basic combinatorial and sequential digital components, different instruction set architectures with a focus on the MIPS ISA and RISC paradigm. Evolution of CPU microarchitecture from single-cycle to multi-cycle pipelines, with overview of super-scalar, multiple-issue and VLIW. Memory system, cache, virtual memory and relationship between memory and performance. Evolution of PC system architecture. May include advanced topics, such as parallel processing, MIMD, and SIMD. Prerequisite(s): courses 12/L, and courses 13/L or Computer Science 12A/L or Computer Science 11. Course 16 recommended. *A. Di Blas, R. Hughey, J. Renau, A. Brandwajaj, F. Ferguson*

112. Computer and Game Console Architecture. *

Introduces computer and game console architecture, including examples of current approaches and the effect of technology and software. Computer performance evaluation; instruction-set architectures; RISC CPU and pipelining; cache and memory; multi-core, system-level architecture; video card; special console architectures. Prerequisite(s): course 12. *A. Di Blas*

113. Parallel and Concurrent Programming. *

Introduction to parallel and concurrent programming. Topics include types of parallel computers and programming platforms, basic and advanced programming techniques in C with MPI and OpenMP, performance analysis and load balancing, and selected parallel algorithms. Students perform programming projects using clusters and shared memory platforms. Students must have a discrete working knowledge of the C programming language and a user-level familiarity with the Unix operating system. Prerequisite(s): Computer Science 12B. *A. Di Blas, L. De Alfaro, K. Obraczka, R. Hughey*

118. Introduction to Mechatronics. W

Technologies involved in mechatronics (intelligent electro-mechanical systems) and techniques necessary to integrate these technologies into mechatronic systems. Topics include electronics (A/D, D/A converters, opamps, filters, power devices), software program design (event-driven programming, state machine-based design), DC and stepper motors, basic sensing, and basic mechanical design (machine elements and mechanical CAD). Combines lab component of structured assignments with a large and open-ended team project. Cannot receive credit for this course and course 218. Prerequisite(s): Electrical Engineering 101/L and courses 12/L and 100/L. Concurrent enrollment in course 118L is required. Enrollment limited to 36. *G. Elkaim*

118L. Introduction to Mechatronics Laboratory (2 credits). W

Laboratory sequence illustrating topics covered in course 118. Two 2-hour laboratory sessions per week. Taught in conjunction with course 218L. Students are billed a materials fee. Cannot receive credit for this course and course 218L. Prerequisite(s): Concurrent enrollment in course 118 is required. Enrollment limited to 36. *G. Elkaim*

121. Microprocessor System Design. F,S

The design and use of microprocessor-based systems. Covers microprocessor and microcontroller architecture, programming techniques, bus and memory organization, DMA, timing issues, interrupts, peripheral devices, serial and parallel communication, and interfacing to analog and

digital systems. Prerequisite(s): courses 12/L and 100/L; Electrical Engineering 101/L; previous or concurrent enrollment in course 121L required. Enrollment limited to 40. *P. Chan, S. Petersen, R. Hughey*

121L. Microprocessor System Design Laboratory (2 credits). F,S

Laboratory sequence illustrating topics covered in course 121. One two-hour laboratory session per week. Students design, build, program, debug, document, and demonstrate a microprocessor-based system. Students are billed a materials fee. Prerequisite(s): courses 12/L and 100/L, or Electrical Engineering 101/L. Previous or concurrent enrollment in course 121 required. Enrollment limited to 40. *P. Chan, S. Petersen, R. Hughey*

123A. Engineering Design Project I. F,W

First of a two-course sequence that is the culmination of the engineering program. Students apply knowledge and skills gained in elective track to complete a major design project. Students complete research, specification, planning, and procurement for a substantial project. Includes technical discussions, design reviews, and formal presentations; engineering design cycle, engineering teams, and professional practices. Formal technical specification of the approved project is presented to faculty. Prerequisite(s): Computer Engineering 121; previous or concurrent enrollment in Computer Engineering 185; permission of department and instructor. Students are billed a materials fee. (General Education Code(s): PR-E.) *J. Vesecky, S. Petersen, P. Mantey, K. Karplus*

123B. Engineering Design Project II (7 credits). W,S

Second of two-course sequence in engineering system design. Students fully implement and test system designed and specified in course 123A. Formal written report, oral presentation, and demonstration of successful project to review panel of engineering faculty required. Students are billed a materials fee. Prerequisite(s): courses 123A and 185. Enrollment limited to 35. *J. Vesecky, S. Petersen, P. Mantey*

125. Logic Design with Verilog. F

Verilog digital logic design with emphasis on ASIC and FPGA design. Students design and verify large-scale systems. Assignments and project use the Verilog Hardware Description Language with emphasis on verification and high-frequency ASIC/FPGA targets. Prerequisite(s): courses 100 and 100L. Concurrent enrollment in course 125L required. Enrollment limited to 40. *P. Chan, A. Varma, M. Guthaus, J. Renau, M. Schlag*

125L. Logic Design with Verilog Laboratory (2 credits). F

Laboratory sequence illustrating topics covered in course 125. One two-hour laboratory session per week. Students are billed a materials fee. Prerequisite(s): courses 100 and 100L. Concurrent enrollment in course 125 is required. Enrollment limited to 40. *P. Chan, A. Varma, M. Guthaus, J. Renau, M. Schlag*

131. Human-Computer Interaction. W

Theory and hands-on practice to understand what makes user interfaces usable and accessible to diverse individuals. Covers human senses and memory and their design implications, requirement solicitation, user-centered design and prototyping techniques, and expert and user evaluations. Interdisciplinary course for social science and engineering majors. Students cannot receive credit for this course and Computer Engineering 231 or Psychology 223. (Also offered as Psychology 131. Students cannot receive credit for both courses.) Prerequisite(s): Computer Science 12B or Psychology 3 or Psychology 100. *S. Kurniawan*

150. Introduction to Computer Networks. F

Addresses issues arising in organizing communications among autonomous computers. Network models and conceptual layers; Internet-working; characteristics of transmission media; switching techniques (packet switching, circuit switching, cell switching); medium access control (MAC) protocols and local area networks; error-control strategies and link-level protocols; routing algorithms for bridges and routers; congestion control mechanisms; transport protocols; application of concepts to practical wireless and wireline networks and standard protocol architectures. Students who have completed course 80N can take this course for credit. Students are billed for a materials fee. Prerequisite(s): course 16, and either courses 12 and 12L or Computer Science 12B and Computer Science 12M. *B. Smith, J. Garcia-Luna-Aceves, P. Mantey, A. Varma, K. Obraczka*

150L. Introduction to Computer Networks Laboratory (2 credits). F

Illustrates the concepts covered in course 150 and provides students with hands-on experience in computer networks. Prerequisite(s): courses 12, 12L, and 16. Concurrent enrollment in course 150 is required. *B. Smith, J. Garcia-Luna-Aceves, P. Mantey, A. Varma, K. Obraczka*

151. Advanced Computer Networks. S

Provides an in-depth coverage of fundamental topics introduced in course 150 including routing, transport, and internetworking. Also introduces advanced concepts not covered in course 150 including wireless, application-layer services, security, etc. (Formerly *Network Administration*.) Prerequisite(s): course 150. Concurrent enrollment in course 151L is required. Enrollment limited to 60. *K. Obraczka, B. Smith*

151L. Advanced Computer Networking Laboratory (2 credits). S

Laboratory illustrating the concepts covered in course 151: provides students with hands-on experience in computer networks. Prerequisite(s): course 150/L. Concurrent enrollment in course 151 is required. Enrollment limited to 30. *K. Obraczka, B. Smith*

153. Digital Signal Processing. S

Introduction to the principles of signal processing, including discrete-time signals and systems, the *z*-transform, sampling of continuous-time signals, transform analysis of linear time-invariant systems, structures for discrete-time systems, the discrete Fourier transform, computation of the discrete Fourier transform, and filter design techniques. Taught in conjunction with Electrical Engineering 250. Students cannot receive credit for this course and Electrical Engineering 250. (Also offered as Electrical Engineering 153. Students cannot receive credit for both courses.) Prerequisite(s): Electrical Engineering 103. *P. Mantey*

156. Network Programming.

Methods and tools used for network programming. Topics include inter-process communication (IPC), facilities such as pipes, shared memory, semaphores, sockets, and remote procedure call (RPC); design of client and server sides of network applications; CGI programming; and programming projects. Prerequisites: course 150 and Computer Science 111. Concurrent enrollment in course 156L required. *A. Varma, K. Obraczka*

156L. Network Programming Laboratory (2 credits).

Laboratory sequence illustrating concepts taught in course 156. Learn use of network programming tools and methods via programming exercises. Students are billed a materials fee. Prerequisites: course 150 and Computer Sci-

ence 111. Concurrent enrollment in course 156 required. *A. Varma, K. Obraczka*

167. Sensing and Sensor Technologies. W

Introduces the fundamental issues in sensing and various sensor technologies including motion sensors, velocity sensors, GPS sensors, acoustic sensors, light and image sensors, and range sensors. Also demonstrates sensor technologies using a system approach to show how they can be integrated into a complete digital system. Prerequisite(s): course 100 and Electrical Engineering 101/L. Concurrent enrollment in course 167L is required. *H. Tao, G. Elkaim, R. Manduchi*

167L. Sensing and Sensor Technologies Lab (2 credits). W

Lab assignments reinforce the concepts and techniques learned in course 167. Assignments include measurement and estimation techniques, experiments with various sensors, and a course project in which students build digital sensing systems. Students are billed a materials fee. Prerequisite(s): course 100 and Electrical Engineering 101/L. Concurrent enrollment in course 167 is required. *H. Tao, G. Elkaim, R. Manduchi*

173. High-Speed Digital Design. W

Studies of analog circuit principles relevant to high-speed digital design: signal propagation, crosstalk, and electromagnetic interference. Topics include electrical characteristics of digital circuits, interfacing different logic families, measurement techniques, transmission lines, ground planes and grounding, terminations, power systems, connectors/ribbon cables, clock distribution, shielding, electromagnetic compatibility and noise suppression, and bus architectures. Prerequisite(s): Electrical Engineering 101/L and course 174. Electrical Engineering 171 and course 121 recommended. Previous or concurrent enrollment in course 173L required. Enrollment limited to 30. *S. Petersen, P. Chan*

173L. High-Speed Digital Design Laboratory (2 credits). W

Laboratory sequence illustrating topics covered in course 173. One two-hour laboratory session per week. Students are billed a materials fee. Prerequisite(s): Electrical Engineering 101/L and course 174. Electrical Engineering 171 and course 121 recommended. Previous or concurrent enrollment in course 173 required. Enrollment limited to 30. *S. Petersen, P. Chan*

174. Introduction to EDA Tools for PCB Design (3 credits). F

Focus on EDA tools for design of printed-circuit boards. Elements of design flow covered: schematic capture and simulation to final PCB layout. Final project is required. Students are billed a materials fee. Prerequisite(s): Electrical Engineering 101/L or consent of instructor. *S. Petersen*

177. Applied Graph Theory and Algorithms.

Basic concepts and algorithms are reviewed including trees, Eulerian and Hamiltonian graphs, and graph transversal. Algorithms are explored to solve problems in connectivity, routing, matching, and embedding of graphs. Graph theory and algorithms are developed around applications in computer engineering. Prerequisite(s): Computer Science 101. *M. Schlag*

185. Technical Writing for Computer Engineers. F,W

Writing by engineers and computer scientists, not to general audiences, but to engineers, engineering managers, and technical writers. Exercises include job application and resume, in-code documentation, algorithm description, naive-user documentation, library puzzle, survey article, proposal, progress report, formal technical re-

port, and oral presentation. Offered in alternate quarters. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; Computer Science 12B or Computer Engineering 12 or junior standing in a School of Engineering major. Enrollment limited to 60. (General Education Code(s): W.) *T. Larrabee, G. Moulds*

193. Field Study. F,W,S

Provides for individual programs of study with specific academic objectives carried out under the direction of a faculty member of the Computer Engineering Department and a willing sponsor at the field site using resources not normally available on campus. Credit is based on the presentation of evidence of achieving the objectives by submitting a written and oral presentation. May not normally be repeated for credit. Students submit petition to sponsoring agency. *The Staff*

193F. Field Study (2 credits). F,W,S

Provides for individual programs of study with specific academic objectives carried out under the direction of a faculty member of the Computer Engineering Department and a willing sponsor at the field site using resources not normally available on campus. Credit is based on the presentation of evidence of achieving the objectives by submitting a written and oral presentation. May not normally be repeated for credit. Students submit petition to sponsoring agency. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195. Senior Thesis Research. F,W,S

Students submit petition to sponsoring agency. Prerequisite: course 123A. *The Staff*

195F. Senior Thesis Research (2 credits). F,W,S

Students submit petition to sponsoring agency. Consent of instructor required. Prerequisite: course 123A. *The Staff*

198. Individual Study or Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Individual Study or Research (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

For fourth-year students majoring in computer engineering. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

For fourth-year students majoring in computer engineering. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Research and Teaching in Computer Science and Engineering (3 credits). F

Basic teaching techniques for teaching assistants including responsibilities and rights of teaching assistants, resource materials, computer security, leading discussion or lab sessions, presentation techniques, maintaining class records,

electronic handling of homework, and grading. Examines research and professional training, including use of the library and online databases, technical typesetting, writing journal and conference papers, publishing in computer science and computer engineering, giving talks in seminars and conferences, and ethical issues in science and engineering. Required for all T.A.s. Enrollment restricted to graduate students. *T. Larrabee, S. Brandt, J. Renau, M. Schlag, A. Brandwajn*

202. Computer Architecture. F

Provides a thorough and fundamental treatment of the art of computer architecture. Topics include concepts of von Neumann architectures, methods of evaluating CPU performance, instruction-set design and examples, compiler issues, instruction pipelining, superscalar processors, methods for reduction of branch penalty, memory hierarchies, I/O systems, floating-point arithmetic, and current issues in parallel processing. Prerequisite(s): course 110 or 112. Enrollment restricted to graduate students; undergraduates may enroll if they have completed course 110 or 112 and with consent of instructor. Enrollment limited to 30. *P. Chan, J. Renau, A. Varma, R. Hughey*

215. Models of Robotic Manipulation. S

Theory and application of mathematical models to analyze, design, and program serial kinematic chains (robot arms). Covers models of arbitrary articulated robotic or biological arms and their application to realistic arms and tasks, including the homogeneous coordinate model of positioning tasks; the forward and inverse kinematic models; the Jacobian matrix; trajectory generation; and dynamic models, including Newton-Euler and Lagrangian formulations. Enrollment restricted to graduate students; and to seniors who have taken electrical engineering 154, and applied mathematics and statistics 10 or 10A or mathematics 21; or by permission of instructor. *J. Rosen*

218. Mechatronics. W

Introduction to intelligent electro-mechanical systems, combining aspects of computer, electrical, mechanical, and software engineering. Students become proficient in all aspects of mechanical, electrical, computer system design, analysis, prototyping, presentation and team mentorship. Cannot receive credit for this course and course 118. Prerequisite(s): concurrent enrollment in course 218L. Enrollment restricted to graduate students. Enrollment limited to 36. *G. Elkaim*

218L. Mechatronics Lab (2 credits). W

Laboratory sequence illustrating topics covered in course 218. Two 2-hour laboratory sessions per week. Cannot receive credit for this course and course 118L. Students are billed a materials fee. Prerequisite(s): concurrent enrollment in course 218. Enrollment restricted to graduate students. Enrollment limited to 36. *G. Elkaim*

220. Advanced Parallel Processing.*

Introduction to programming advanced parallel computer architecture. Topics may include: SIMD massively parallel processor arrays; streaming parallel coprocessors, such as graphics cards used for general-purpose processing (GPGPU); or other hybrid MIMD/SIMD architectures. Course has programming lab component, a project, and student presentation on related topics. (Formerly *Parallel Processing*.) Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. *R. Hughey, A. Di Blas*

221. Advanced Microprocessor Design. S

Introduction to latest advances in computer architecture. Focuses on processor core design. Topics include simultaneous multithreading, thread level speculation, trace caches, novel out-of-order mechanisms, and energy-

*Not offered in 2010–11

efficient processor core designs. Final project is modification/enhancement of an out-of-order processor on an FPGA development system. Prerequisite(s): course 202; and course 125, 225, or equivalent Verilog experience. Concurrent enrollment in course 221L required. Enrollment restricted to graduate students. Enrollment limited to 20. *J. Renau*

221L. Advanced Microprocessor Design Laboratory (3 credits). S

Laboratory sequence illustrating topics covered in course 221. Prerequisite(s): course 202; and course 125, 225, or equivalent Verilog experience. Concurrent enrollment in course 221 required. Enrollment restricted to graduate students. Enrollment limited to 20. *J. Renau*

222. VLSI Digital System Design. W

Introduction to Very Large Scale Integrated (VLSI) design, focusing on custom integrated circuits. Topics include logic families, FETs, interconnect models, simulation, and RC timing. Course covers the design flow from logic design to layout, with a focus on high performance and low power. Students should be familiar with RC circuit analysis. Enrollment restricted to seniors and graduate students. Undergraduates may enroll with permission of instructor. *M. Gutbaus, The Staff*

223. VLSI System-on-a-Chip Design.

Design methodologies for Application Specific Integrated Circuits (ASICs). Topics include: behavioral specification; logic synthesis; standard-cell libraries; advanced timing analysis; and physical design automation tools. Familiarizes students with real-world tools during the design of a small system-on-a-chip project. Students are encouraged to fabricate and test their chips in an independent study. Prerequisite(s): course 222 or permission of instructor. Enrollment restricted to graduate students. *M. Gutbaus, The Staff*

224. Testing Digital Circuits. *

An introduction to the theory and practice of testing. Topics are chosen from fault and defect models, test generation for combinational and sequential circuits, fault simulation, scan-design and built-in self-test. Enrollment restricted to graduate students; undergraduates may enroll if they have completed Computer Science 101. *F. Ferguson, T. Larrabee*

225. Introduction to ASIC Systems Design. F

Introduction to system prototyping using field-programmable gate arrays (FPGAs). Topics include architectures of FPGAs, behavioral design specification, system partitioning, synthesis tools, design verification, and studies of novel systems implemented with FPGAs. Intended to familiarize students with the techniques and tools in ASIC designs. Final project is the complete design of a small system using FPGAs. Students are billed a materials fee. Enrollment restricted to graduate students; undergraduates may enroll if they have completed courses 100/L and 202. Enrollment limited to 10. Offered in alternate academic years. *P. Chan*

229. Field-Programmable Gate Arrays Computer-Assisted Design. S

Design methods for Field-Programmable Gate Arrays (FPGAs), including algorithms for technology mapping, routability estimation, placement, and routing. The relationship between FPGA architectures and their computer-aided design tools. Course project involves the modification and analysis of an FPGA tool. Enrollment restricted to graduate students or by consent of instructor. Courses 100, 125, 126, 222, 225, or other digital design experience recommended. Enrollment limited to 20. *M. Schlag*

230. Computer Performance Evaluation. *

Introduction to methods of analysis of computer system performance. Predictive performance models with emphasis on queuing models; exact and appropriate solution methods, discrete-event simulation, and numeric iterative approaches; analytical solutions and their computation; separable queuing networks, decomposition approaches; examples of practical application; and performance measurement, model validation, robustness of models, and operational analysis. Enrollment restricted to graduate students. Enrollment limited to 20. Offered in alternate academic years. *A. Brandwajn*

231. Human-Computer Interaction. W

Theory and hands-on practice to understand what makes user interfaces usable and accessible to diverse individuals. Covers human senses and memory and their design implications, requirement solicitation, user-centered design and prototyping techniques, and expert and user evaluations. Individual research project. Interdisciplinary course for art, social science and engineering graduate students. Students cannot receive credit for this course and course 131. (Also offered as Digital Arts and New Media 231 and Psychology 223. Students cannot receive credit for three courses.) Enrollment restricted to graduate students. *S. Kurniawan*

232. Arithmetic Processors.

Concept of number systems: binary additions, multiplications, divisions; elementary function evaluations; algorithm acceleration; floating-point and significant arithmetics; IEEE standards; technology related issues; algorithm evaluation by implementation with gate arrays. Prerequisite(s): course 202. Enrollment restricted to graduate students. Enrollment limited to 15. *P. Chan*

233. Human Factors.

Course focuses on theories, practices, and design of systems to optimize human well-being and system performance through consideration of psychological, social, physical, and biological factors. Covers human sensory systems and memory, workload management, error and reliability, performance measurement, and ergonomic design. Interdisciplinary course for social science and engineering graduate students. Enrollment restricted to graduate students; undergraduates may enroll if they have completed course 131. *S. Kurniawan*

235. User Evaluation of Technology. F

Presents a variety of evaluation methodologies to assess usability, acceptance, and effectiveness of technology with the intended users. Combines lectures and exercises for students to gain firsthand experiences of these methodologies with real users. Enrollment restricted to graduate students. Seniors may enroll with completion of course 131. *S. Kurniawan*

240. Introduction to Linear Dynamical Systems. W

Introduction to applied linear algebra and linear dynamical systems with applications to circuits, signal processing, communications, and control systems. Topics include the following: Least-squares approximations of over-determined equations and least-norm solutions of underdetermined equations. Symmetric matrices, matrix norm and singular value decomposition. Eigenvalues, left and right eigenvectors, and dynamical interpretation. Matrix exponential, stability, and asymptotic behavior. Multi-input multi-output systems, impulse and step matrices; convolution and transfer matrix descriptions. Control, reachability, state transfer, and least-norm inputs. Observability and least-squares state estimation. Enrollment restricted to graduate students; undergraduates may enroll if they have completed Electrical Engineering 103 and Applied Math and Statistics 147. *G. Elkaim, W. Dunbar, K. Ross*

241. Introduction to Feedback Control Systems. F

Graduate-level introduction to control of continuous linear systems using classical feedback techniques. Design of feedback controllers for command-following error, disturbance rejection, stability, and dynamic response specifications. Root locus and frequency response design techniques. Extensive use of Matlab for computer-aided controller design. Course has concurrent lectures with Electrical Engineering 154. (Also offered as Electrical Engineering 241. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *P. Milanfar, P. Mantey, J. Rosen, W. Dunbar, G. Elkaim*

242. Applied Feedback Control. F

Sequel to Electrical Engineering 154. After reviewing control design techniques examined in EE 154, this course explores state space control, discrete time control, and two case studies in control design. Students design and implement feedback controllers on an inverted pendulum experiment. Prerequisite(s): Electrical Engineering 154 or course 241. Enrollment restricted to juniors, seniors, and graduate students. *P. Mantey, W. Dunbar, G. Elkaim*

243. System Identification. *

Course provides introduction to the construction of linear dynamical models from experimental data using parametric and non-parametric identification techniques. Theoretical and practical aspects of these techniques addressed. Prerequisite(s): course 240, or by permission of instructor. *W. Dunbar, G. Elkaim*

248. Games in Design and Control.

Graduate-level introduction to game theory and its applications to system design, verification, analysis, and optimal control. Enrollment restricted to graduate students. Computer Science 101, 201, or equivalent recommended. *L. De Alfaro*

250. Multimedia Systems.

Study of state-of-the-art technology for networked multimedia systems. Topics include audio, image, and video acquisition and compression standards (JPEG, MPEG, and ITU families); networking for multimedia; and digital television. Proficiency in C or C++ required. Prerequisite(s): Enrollment restricted to graduate students. *R. Manduchi*

251. Error-Control Coding.

Overview of coding to protect messages against error during transmission or storage. Topics include channel models, linear algebra over finite fields, linear block codes and bounds, cyclic codes (BCH and RS), decoding algorithms, spectral analysis, codes on graphs, and low-complexity algorithms. Enrollment restricted to graduate students or consent of instructor. *H. Sadjadpour*

252A. Computer Networks. W

Issues resulting from organizing communication among autonomous computers. Includes network models and switching techniques; medium access control protocols and local area networks; error control and retransmission strategies; routing algorithms and protocols; congestion control mechanisms and end-to-end protocols; application-level protocols; and application of concepts to wireless and wireline networks, with emphasis on the Internet. Enrollment restricted to graduate students. *A. Varma, J. Garcia-Luna-Aceves*

252B. Modeling of Communications Protocols.

Theory and practice of computer communication networks. Emphasis is on verification and performance analysis of network control processes. Topics include protocols for channel access, point-to-point and multipoint reliable transmission, routing, congestion control, network management, multicasting, and ATM networks. Prerequisite(s): courses 107 and 252A. *A. Varma, J. Garcia-Luna-Aceves*

253. Network Security.

Fundamental mechanisms for network security and their application in widely deployed protocols. In-depth treatment of security mechanism at the data-link, network, and transport layers for both wired and wireless networks. Covers mechanisms for privacy and integrity, and methods for intrusion detection. Prerequisite(s): course 252A and Computer Science 201. Enrollment restricted to graduate students. *A. Varma*

254. High Speed Computer Networks. *

Fiber-optic technology; fiber-optic link design; network protocol concepts; coding and error control; high-speed local area and metropolitan area networks; gigabit networks; error and congestion control; photonic networks; research topics. Prerequisite(s): course 252B. *A. Varma*

256. Design Project in Computer Networks. S

Students develop a working implementation of a network protocol with the goal of obtaining hands-on experience in implementing real-world network protocols. Prerequisite(s): course 252A; enrollment restricted to graduate students. *A. Varma*

257. Wireless and Mobile Networks. W

An interdisciplinary course on wireless communication and mobile computing. Covers the physical aspects of wireless communication but emphasizes higher protocol layers. Topics include cellular networks, packet radio and ad hoc networks, wireless transport protocols, security, and application-level issues. Prerequisite(s): course 252A or permission of instructor. Enrollment limited to 20. *K. Obraczka, J. Garcia-Luna-Aceves*

258. Unix Networking Internals. *

In-depth treatment of the implementation of network protocols in typical open-source Unix systems. Topics include implementation of send and receive functions, buffer management, interrupt handling, locking, scheduling and timer management. Major implementation project required. Prerequisite(s): course 252A. Computer Science 111 recommended. Enrollment restricted to graduate students. *A. Varma*

259. Sensor Networks.

Focus is on the networking aspects of sensor networks: protocols at the various layers and how they answer the specific requirements posed by these networks (e.g., data driven, energy efficient, etc.) and their applications (monitoring, tracking, etc.). Explore how physical layer and hardware issues may influence protocol design. Courses 252A and 257 recommended. *K. Obraczka*

263. Data Compression.

Introduction to information theory and data compression. Lossless coding (Huffman, arithmetic, dictionary codes). Lossy coding (scalar and vector quantization, differential coding, transform coding). Applications to the compression of real data sets (DNA sequences, biological time series, multimedia streams). Concurrent lectures with course 108. Students cannot receive credit for both this course and course 108. Students must have basic knowledge of probability theory. Enrollment restricted to graduate students. *R. Manduchi*

264. Image Analysis and Computer Vision. S

Brief review of image processing. Binary images, thresholding, morphological operations; edge detection and segmentation; contours: digital curves and curve fitting; statistical texture analysis, shape from texture; depth cues, stereo matching, depth from stereo; color perception and segmentation; and shading and image radiance, surface orientation, and shape from shading. Electrical Engineering 264 encouraged, but not required. Undergraduate students who are interested in enrolling should meet with the instructor first. *H. Tao*

276. Software Engineering.

Introduction to the general principles of software engineering. Covers current and classical topics from both practical and theoretical viewpoints. Topics include software evolution, project management, software inspections, design methods, requirements analysis and specification, software testing, maintenance, software implementation, human interfaces, and software engineering experimentation. Enrollment restricted to graduate students; undergraduates may enroll in this course if they have completed Computer Science 115. *L. De Alfaro, The Staff*

277. Graph Algorithms.

Explores graph theory and algorithms for solving problems in engineering. A review of basic graph concepts and algorithms is followed by topics in network flow, partitioning, spectral analysis of graphs, graph isomorphism, and intractability. Prerequisite(s): Computer Science 101 and 102; or course 177; or Computer Science 201; or equivalent. Enrollment restricted to graduate students. Enrollment limited to 20. *M. Schlag*

278. Introduction to the Theory of Discrete Systems. *

Introduction to methods for modeling, analyzing, and reasoning about discrete systems, such as hardware and software designs. First part of course presents basic models for hardware and software systems and introduces methods for system specification, verification, abstraction, and stepwise refinement of a design into an implementation. Second part discusses role of structure: hierarchy, system composition, and interface specification. Prerequisite(s): some mathematical background is assumed. Enrollment restricted to graduate students or by permission of instructor. *L. De Alfaro*

280C. Seminar on Control (2 credits). F,W,S

Weekly seminar series covering topics of current research in theory and application of control to engineering systems. Current research work and literature in these areas discussed. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. May be repeated for credit. *G. Elkaim, J. Rosen, W. Dunbar, K. Ross*

280G. VLSI/CAD Seminar (2 credits). F,W,S

Weekly seminar on advanced topics in VLSI and computer-aided design (CAD). Students present and discuss modern issues in semiconductor design, fabrication, and CAD. Frequent guest speakers present pertinent results from industry and academia. Enrollment limited to 20. May be repeated for credit. *M. Guthaus*

280N. Seminar on Networks (2 credits). F,W,S

Weekly seminar series covering topics of current research in networks and networked systems. Current research work and literature in these areas are discussed. Prerequisite(s): permission of instructor. Enrollment restricted to graduate students. May be repeated for credit. *K. Obraczka, J. Garcia-Luna-Aceves*

280P. Seminar on Parallel Processing (2 credits). F,W,S

Weekly seminar series covering topics of current research in parallel systems, architectures, and algorithms. Current research work and literature in these areas are discussed. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *R. Hughey, M. Guthaus, J. Renau*

280T. Seminar on New Technologies (2 credits).

Weekly seminar series in which distinguished speakers from industry, universities, and government discuss current developments in networking and computer technology. The emphasis is on open research questions that may

lead to collaborative work with faculty and graduate students. *The Staff*

280V. Seminar on Computer Vision (2 credits). F,W,S

Weekly graduate-level seminar series discussing advanced topics in computer vision and image analysis. Current research and literature presented during each meeting. Enrollment limited to 20. May be repeated for credit. *R. Manduchi, H. Tao*

285. Technical Writing for Engineering Graduates.

Writing skills development for graduate engineers. Students produce a major writing project with many subtasks. Exercises include fellowship application; mathematical and algorithmic description; use of tables and graphs; experiment description; and producing technical web sites, presentations, and posters. Enrollment restricted to graduate biomolecular engineering, computer engineering, computer science, and electrical engineering majors. (Open to all School of Engineering graduate students.) Enrollment limited to 20. *T. Larrabee, The Staff*

290L. Advanced Topics in VLSI Computer-Aided Design. *

A graduate course on a research topic in VLSI computer-aided design. Topic varies according to instructor. Possible topics include, but are not limited to specification languages and formal verification, logic minimization, testing and verification, electrical simulation, layout synthesis, and behavioral synthesis. Course 100, 125, 126, 222, or 225 recommended. *P. Chan, M. Schlag, F. Ferguson, T. Larrabee*

290M. Topics in Parallel Computation.

Investigates selected topics in applied parallel computation. Topics may include numerical methods, artificial intelligence and machine learning algorithms, graphics and image processing, systolic algorithms, and the interplay between hardware and algorithms. Students are encouraged to investigate and discuss the parallelization of their own research. Enrollment restricted to graduate students. *R. Hughey*

290N. Topics in Computer Performance. *

Selected topics of current interest in the area of computer system performance. Subjects may include aspects of large systems, performance, computer networks, storage subsystems, and nontraditional approaches and are subject to periodic revision. Enrollment restricted to graduate students. *A. Brandwajn*

290V. Advanced Topics in Visual Computing.

Advanced course in image analysis and computer vision. Topics include motion analysis, multiple view geometry, 3D reconstruction, image-based rendering, vision-based graphics, face detection and recognition, tracking, image and video retrieval, and human-computer interface. Enrollment restricted to seniors and graduate students. Enrollment limited to 20. *S. Lodha, H. Tao*

293. Advanced Topics in Computer Engineering.

A graduate seminar on a research topic in computer engineering which varies according to instructor. Possible topics include, but are not limited to, communication networks, data compression, special-purpose architectures, computer arithmetic, software reliability and reusability, systolic arrays. *J. Rosen*

297. Independent Study or Research. F,W,S

Independent study or research under faculty supervision. Students submit petition to sponsoring agency. *The Staff*

299. Thesis Research. F,W,S

Thesis research conducted under faculty supervision. Students submit petition to sponsoring agency. *The Staff*

299F. Thesis Research (2 credits). F,W,S

Independent study or research under faculty supervision. Enrollment restricted to graduate students. Recommended for part-time students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Computer Science

Baskin School of Engineering
(831) 459-2158
<http://www.soe.ucsc.edu>

Faculty and Professional Interests

Professor

MARTÍN ABADI

Computer and network security, principles of programming languages, specification and verification methods

SCOTT A. BRANDT

Operating systems, storage systems, real-time systems

CORMAC FLANAGAN

Programming languages, type systems, specification and verification methods, software engineering, concurrency

DAVID P. HELMBOLD

Machine learning, computational learning theory, analysis of algorithms

HARRY D. HUSKEY, Emeritus

PHOKION G. KOLAITIS

Principles of database systems, logic in computer science, and computational complexity

ROBERT A. LEVINSON

Artificial intelligence, machine learning, heuristic search, associative pattern retrieval, hierarchical reinforcement learning, semantic networks

SURESH K. LODHA

Visualization, vision, innovation, entrepreneurship

DARRELL D. E. LONG

Storage systems, distributed computing systems, operating systems, mobile computing, performance evaluation, fault tolerance, computer security, multimedia, and video-on-demand systems

CHARLES E. McDOWELL

Programming languages, parallel computing, and computer science education

ETHAN L. MILLER

Archival storage systems, metadata management and information retrieval, non-volatile memory file systems, scalable file systems, reliable and secure storage, distributed systems, computer security

ALEX T. PANG

Uncertainty visualization, tensor visualization, scientific visualization, comparative visualization, collaboration software, virtual reality interfaces

IRA POHL

Artificial intelligence, programming languages, heuristic methods, educational and social issues, combinatorial algorithms

R. MICHAEL TANNER, Emeritus

ALLEN VAN GELDER

Logic programming algorithms, parallel algorithms, complexity, programming languages, automated theorem proving, scientific visualization

MARILYN WALKER

Dialogue systems, natural language processing, computer

games, human-computer interaction, machine learning, artificial intelligence

MANFRED K. WARMUTH

Online learning, machine learning, statistical decision theory, game theory, analysis of algorithms

Associate Professor

DIMITRIS ACHLIOPTAS

Analysis of algorithms, machine learning, random structures

LUCA DE ALFARO

Formal methods, game theory, embedded systems, software engineering

JAMES E. DAVIS

ICTD, technology for global social issues, computational photography, computer vision, computer graphics

MICHAEL MATEAS

Artificial Intelligence (AI) for art and entertainment, game AI, AI and creativity, AI-based interactive storytelling, autonomous characters

NEOKLIS POLYZOTIS

Online index tuning, P2P database systems, ranked queries, skyline queries

WANG-CHIEW TAN

Database systems: data provenance, information integration

NOAH WARDRIE-FRUIIN

Digital media, computer games, electronic literature, software studies

E. JAMES WHITEHEAD JR.

Software engineering, software evolution, software bug prediction, automated software construction, video game level design

Assistant Professor

ARNAV JHALA

Artificial Intelligence: storytelling in games, intelligent machinima generation, smart graphics, and intelligent user interfaces

Adjunct Professor

DON CHAMBERLIN

Database languages and systems, document processing

MARTIN GRISS

Software Engineering

JAMES KING

Adobe technology, digital publishing, program verification

Associate Adjunct Professor

CARLOS MALTZAHN

Scalable file system data and metadata management; very long-term data preservation; network intermediaries; machine learning; information retrieval; cooperation dynamics

THOMAS SCHWARZ

Reliability and security in storage systems

Assistant Adjunct Professor

JOHN D. FUNGE

Artificial intelligence (AI), game AI; computer games, machine learning, knowledge representation and democratic methods

REINER KRAFT

Data mining, contextual analysis, contextual/semantic search

Lecturer

DELBERT BAILEY

Artificial intelligence, pattern recognition, computational complexity, analysis of algorithms

PAULO FRANCA

Computer programming teaching methodology; web-based development techniques, office automation, and paperless document management

WESLEY MACKAY

Compiler construction, programming languages

PATRICK TANTALO

Graph theory, combinatorics, optimization, algorithms

LINDA WERNER

Software engineering, testing, educational and societal issues of computer science



ALEXANDRE BRANDWAJN (Computer Engineering)

Computer architecture, performance modeling, queuing network models of computer systems, operating systems

PAK K. CHAN (Computer Engineering)

Placement and routing algorithms, field-programmable gate arrays, spectral-based partitioning, circuit theory, computer arithmetic

GABRIEL ELKAIM (Computer Engineering)

Embedded systems; robust software architectures for real-time reactive systems; sensor fusion; guidance, navigation, and control (GNC) system identification; robust and advanced control schemes; feedback control systems; robotics; unmanned autonomous vehicles (UAVs); and cooperative control

F. JOEL FERGUSON (Computer Engineering)

Fault diagnosis, failure analysis, logic fault modeling, digital test pattern generation, design-for-test of digital circuits and systems

J. J. GARCÍA-LUNA-ACEVES (Computer Engineering)

*Chair of Computer Engineering
Baskin Professor of Computer Engineering and Director of Networking Sciences Institute
Computer communication, wireless networks, Internet, network science*

JORGE HANKAMER (Linguistics)

Syntax, semantics, morphology, computational linguistics, Turkish

DAVID HAUSSLER (Biomolecular Engineering)

*Distinguished Professor of Biomolecular Engineering, Investigator, Howard Hughes Medical Institute; Director, Center for Biomolecular Science and Engineering; Scientific Co-Director, California Institute for Quantitative Biosciences [QB3]
Molecular evolution, neurodevelopment, genomics, bioinformatics, computational molecular biology, statistical models, machine learning, neural networks*

RICHARD HUGHEY (Biomolecular Engineering and Computer Engineering)

Computer architecture, parallel processing, computational biology

KEVIN KARPLUS (Biomolecular Engineering)

Protein structure prediction, protein design, genome assembly from next-generation sequence data

TRACY LARRABEE (Computer Engineering)

Test-pattern simulation and generation, fault modeling, fault diagnosis, design verification, technical writing, logic simulation

PATRICK E. MANTEY (Computer Engineering)

*(Baskin Professor of Computer Engineering)
Multimedia systems, digital signal processing, sensor systems and networks, real-time monitoring and control, image systems, image processing, visualization, geographic information systems, decision support systems*

KATIA OBRACZKA (Computer Engineering)
Computer networks, distributed systems, operating systems, Internet information systems, mobile computing, wireless networks

WARREN SACK (Film and Digital Media)
Software design and media theory

MARTINE D. F. SCHLAG (Computer Engineering)
VLSI design tools and algorithms, VLSI theory, field-programmable gate arrays, FPGA-based computing engines

BARRY SINERVO (Ecology and Evolutionary Biology)
Animal behavior, evolution, physiological ecology

HAI TAO (Computer Engineering)
Image and video processing, computer vision, vision-based graphics, and human-computer interaction

ANUJAN VARMA (Computer Engineering)
Computer networking, computer architecture, optical networks

W. TODD WIPKE, Emeritus (Chemistry and Biochemistry)

Program Description

Computer science is the study of the theoretical and practical aspects of computer technology and computer usage. The Computer Science Department offers courses on a wide range of topics, many of which include a mathematical component, and offers undergraduate bachelor of arts and bachelor of science degrees in computer science, a bachelor of science in computer science: computer game design, as well as the master of science and doctor of philosophy degrees. Besides offering instructional courses, the department engages in a substantial research program in which both advanced undergraduates and graduate students participate.

The bachelor of arts (B.A.) program at UCSC is designed to give students a solid grounding in both theoretical and practical topics in computer science, computer engineering, and mathematics while leaving flexibility for a broad program of study, including many courses outside of science and engineering, or even for a double major in another discipline. The bachelor of science program is appropriate for students desiring a somewhat stronger concentration in the sciences, with more courses in computer science and computer engineering, as well as courses in physics or chemistry; this program also allows for electives outside of science and engineering.

The bachelor of science (B.S.) in computer game design builds on a rigorous core program of study in computer science, adding interdisciplinary study on the artistic, dramatic, and narrative elements of computer game design; a year-long game design project acts as a capstone learning experience. Because many courses in all three programs have prerequisites, students leaning toward any of these programs will enjoy greater scheduling flexibility if they begin some preparatory courses in their first year. The specific course requirements for each undergraduate degree are given below.

Applications of computer science are found in many other areas of study, from art and music to business and science. Thus, interdisciplinary activities are encouraged. For those students whose primary interest is in another area, a minor in computer science is offered.

Courses for Nonmajors

The Computer Science Department offers a wide range of courses intended for nonmajors as well as majors. These include course 2, *Computer Literacy*; course 10, *Introduction to Computer Science*; course

80B, *Systems and Simulation*; course 80C, *Computer Arts and Graphics*; course 80J, *Technology Targeted at Social Issues*; course 80S, *From Software Innovation to Social Entrepreneurship*; and course 80K, *Foundations of Interactive Game Design*. Course 10, *Introduction to Computer Science*, may be beneficial to students who are considering the major but have a limited background in computer science. There are also introductory programming classes intended for nonmajors: courses 5C, 5J, 5P, *Beginning Programming*.

Computer Science Policies

Admissions Policy

Admission to the computer science majors is selective. First-year applications may receive direct admission at the time they apply to UCSC based on their high school record and test scores. Admission to the major after a student has entered UCSC is based on the School of Engineering grade point average (SoE GPA) (performance in all School of Engineering and Physical and Biological Sciences courses attempted at UCSC, see the School of Engineering section of the catalog). An SoE GPA of at least 2.8 is expected for admission to the major. After the first three quarters, students must have completed the foundation courses for their major (listed below) and be able to complete the major within campus limits. Denials of admission to the major may be appealed by submitting a letter to the School of Engineering Undergraduate Office, addressed to the Computer Science Undergraduate Director, describing why the SoE GPA is not an accurate reflection of the student's potential.

Foundation Courses

The foundation courses for each computer science major are as follows:

Computer Science B.S. and B.A.: Computer Science 12A (or CMPS 5J and CMPS 11) and 12B; Computer Engineering 16; and Mathematics 19AB, or 20AB

Computer Game Design: Computer Science 12A (or CMPS 5J and CMPS 11) and 12B, Computer Engineering 16; and Mathematics 19AB, or 20AB.

UCSC students that have completed three or more quarters at UCSC must complete the foundation courses before they can declare a computer science major.

Disqualification and Satisfactory Progress in the Major

Students who do not make adequate progress in the computer science major may be disqualified from the major. Adequate progress normally means passing a minimum of three courses required for the major over every three consecutive quarters. (For part-time students, 15 credits attempted equals one full term.) Students who do not expect to meet this requirement should consult their faculty adviser and/or the undergraduate director for their major beforehand.

Students who receive a total of three grades of D, F, or No Pass in the key courses, Computer Science 12A, 12B, 13H, 101; and Computer Engineering 12 and 16, may, at the discretion of the department, be disqualified from the major.

The department may, at its sole discretion, disqualify from the major any student making two unsuccessful attempts in any one of the following principal courses commonly used to satisfy degree requirements:

Computer Science 12A, 12B, 13H, 101, 102, 104A, 104B, 105, 111, 112, 115, 116, 130, 132, 140, 160, 161, 180, 181, and 183;

Computer Engineering 12, 16, 100, 107, and 110; Applied Mathematics and Statistics 10, 131, and 147; Physics 5A, 5B, 5C, 6A, 6B, and 6C; Chemistry 1B and 1C; Mathematics 19A-B or Mathematics 20A-B, and 23A.

Each grade of D, F, or No Pass counts as one unsuccessful attempt; each grade of W counts as one-half of an unsuccessful attempt.

The School of Engineering section contains additional disqualification policies, such as maintaining a 2.0 School of Engineering GPA and the ethics requirement, that apply to computer science majors.

Students at risk of disqualification must meet with an undergraduate advisor to discuss their options for continuing in the major.

Letter Grade Policy

The Computer Science Department requires letter grades for all courses applied toward the B.A., B.S., Computer Game Design B.S., and minor in computer science with the exception of two lower-division courses which students may elect to take Pass/No Pass. This policy includes courses required for the computer science majors but sponsored by other departments.

Transfer Students

Most courses in the computer science program at UCSC have a strong theoretical component to prepare the student for designing, as opposed to simply using, computer systems. Often, courses taken at other institutions which emphasize applications of current languages and computers do not count toward the computer science major at UCSC.

At UCSC, students are first introduced to programming using the programming language Java. The core programming sequence, courses 12A/L and 12B/M (or 13H/L, which covers both 12A/L and 12B/M), exposes students to both Java and C. Many upper-division courses that involve programming use the C and C++ programming languages. Transfer students who are not familiar with both Java and C may need to take a remedial course. Students familiar with C++ and Unix should find the transition to Java and C relatively simple.

Please refer to the School of Engineering section of the catalog for the policy regarding transfer students.

School of Engineering Policies

Please refer to the School of Engineering section of the catalog for additional policies that apply to all School of Engineering programs. These policies include admission to the major, limits on the number of times courses can be attempted, and the need for computer science students to obtain preapproval before taking courses elsewhere.

Preparation for the Major

It is recommended that high school students intending to apply to the computer science major have completed four years of mathematics (through advanced algebra and trigonometry) and three years of science in high school. Comparable college mathematics and science courses completed at other institutions also serve to properly prepare a student for the computer science major.

B.A. Major Requirements

The aim of this program is to expose students to a rigorous curriculum in computer science while maintaining

sufficient flexibility so that students can take courses outside computer science, pursue a minor in another discipline, or complete a double major. Every student must complete a minimum of 17 courses, eight lower-division and nine upper-division. Out of these, the eight lower-division courses and the first upper-division course are required preparatory courses for every student. Once these preparatory courses are completed, students tailor their own program by choosing eight additional upper-division elective courses. To provide an adequate balance in subject matter, these additional courses must be divided between those that emphasize the theoretical aspects of the field and those that have a more practical focus. To provide a depth of study in one aspect of computer science, students must complete one of the approved depth sequences.

Lower-Division Requirements

Each student must successfully complete the following nine required preparatory courses:

Computer Science

12A/L, *Introduction to Programming(Accelerated)/Laboratory* (or 5J), *Introduction to Programming in Java* and 11, *Intermediate Programming*)

12B/M, *Introduction to Data Structures/Laboratory*

Computer Engineering

12/L, *Computer Systems and Assembly Language/Laboratory*

16, *Applied Discrete Mathematics*

Mathematics

19A-B, *Calculus for Science, Engineering, and Mathematics* (credit for one or both may be granted with adequate performance on the CEEB calculus AB or BC Advanced Placement examination), or Mathematics 20A-B, *Honors Calculus*

23A, *Multivariable Calculus*

Applied Mathematics and Statistics

10, *Mathematical Methods for Engineers I* or Mathematics 21, *Linear Algebra*

Upper-Division Requirements

101, *Algorithms and Abstract Data Types*

In addition to the above nine required courses, students must complete eight upper division electives, by completing the requirements for one depth sequence. At least 50 percent of these upper-division courses must be completed at UCSC.

Depth Sequence Requirements

For the following depth sequences, students must take at least seven courses from the theory and practice course lists, as follows:

- a minimum of three courses from the theory course list and a minimum of three courses from the practice course list;
- the seven courses from the theory and practice course lists must include all of the courses of one of the depth sequences;
- the eighth upper-division elective must be selected from any upper-division (5-credit) School of Engineering course.

The depth sequence courses are:

Compilers and language theory: Computer Science 104A, 112, and 104B or 130.

Operating systems and hardware: Computer Engineering 100/L, Computer Science 111, and Computer Engineering 110 or 121/L.

Theory: Computer Science 102, 130, and 132.

Software methodology: Computer Science 115 and two of the following: Computer Science 104A, 112, and 116.

Graphics: Computer Science 160/L, 161/L, and Applied Mathematics and Statistics 147.

Databases: Computer Science 180, 181, and 183

For the interactive game design depth sequence only, students must satisfy the following requirements:

Core courses: students must take Computer Science 130, 105, 140, 160/L, and 115.

Game design electives: students must take two courses from the game design electives list.

Free elective: any course from the theory and practice course lists.

Theory Course List

Applied Mathematics and Statistics

131 *Introduction to Probability Theory*

114 *Introduction to Dynamical Systems*

147 *Computational Methods and Applications*

Computer Science

102 *Introduction to Analysis of Algorithms*

130 *Computational Models*

132 *Computability and Computational Complexity*

142 *Machine Learning and Data Mining*

166A *Game Theory and Applications I*

Computer Engineering

107 *Mathematical Methods of Systems Analysis: Stochastic*

108 *Data Compression*

154 *Data Communications*

177 *Applied Graph Theory and Algorithms*

Electrical Engineering

103 *Signals and Systems*

153 *Digital Signal Processing* (formerly Computer Engineering 153)

Mathematics

115 *Graph Theory*

117 *Advanced Linear Algebra*

Practice Course List

Computer Science

104A *Fundamentals of Compiler Design I*

104B *Fundamentals of Compiler Design II*

105 *Systems Programming*

109 *Advanced Programming*

111 *Introduction to Operating Systems*

112 *Comparative Programming Languages*

115 *Software Methodology*

116 *Software Design Project*

122 *Computer Security*

128 *Distributed Systems: File Sharing, Online Gaming, and More*

129 *Data Storage Systems*

140 *Artificial Intelligence*

146 *Game Artificial Intelligence*

148 *Interactive Storytelling*

160/L *Introduction to Computer Graphics/Laboratory*

161/L *Visualization and Computer Animation/Laboratory*

164/L *Game Engines/Laboratory*

180 *Database Systems I*

181 *Database Systems II*

183 *Hypermedia and the Web*

204 *Compiler Design*

Computer Engineering

100/L *Logic Design/Laboratory*

110 *Computer Architecture*

112 *Computer and Game Console Architecture*

113 *Parallel and Concurrent Programming*

117/L *Embedded Software/Laboratory*

118/L *Introduction to Mechatronics/Laboratory*

121/L *Microprocessor System Design/Laboratory*

123A *Computer Engineering Design Project I*

123B *Computer Engineering Design Project II*

125/L *Logic Design with Verilog/Laboratory*

126/L *Advanced Logic Design/Laboratory*

150/L *Introduction to Computer Networks/Laboratory*

155/L *Computer Networks Project/Laboratory*

167/L *Sensing and Sensor Technologies/Laboratory*

Electrical Engineering

130/L *Introduction to Optoelectronics and Photonics/Laboratory*

Game Design Electives

Computer Science

102 *Introduction to Analysis of Algorithms*

116 *Software Design Project*

128 *Distributed Systems: File Sharing, Online Gaming, and More*

146 *Game Artificial Intelligence*

148 *Interactive Storytelling*

161/L *Visualization and Computer Animation/Laboratory*

164/L *Game Engines/Laboratory*

180 *Database Systems I*

Computer Engineering

112 *Computer and Game Console Architecture*

150/L *Introduction to Computer Networks/Laboratory*

167/L *Sensing and Sensor Technologies/Laboratory*

Film and Digital Media

170A *Introduction to Digital Media Production*

171D *Social Information Spaces*

177 *Digital Media Workshop: Computer as Medium*

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in computer science (B.A.) is satisfied by completing CMPS 115, CMPS 195, or Computer Engineering 185. Please refer to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

B.S. Major Requirements

This program is designed for students who wish to maximize exposure to computer science concepts and methods by taking a larger selection of upper-division computer science courses, as well as additional courses in the sciences and mathematics. A minimum of 22 courses must be completed for the B.S. in computer science, whereas a minimum of 17 courses must be completed for the B.A. in computer science. Out of the 22 courses, 10 are lower-division courses (including two science courses), and 12 are upper-division courses. The B.S. is more structured than the B.A.; 18 specific courses are required, and the remaining four are elective upper-division computer science or computer engineering courses.

Lower- and Upper-Division Requirements

Students are required to take the following 18 courses:
Computer Science

- 12A/L *Introduction to Programming(Accelerated)/Laboratory* (or 5J, *Introduction to Programming in Java* and 11, *Intermediate Programming*)
12B/M *Introduction to Data Structures/Laboratory*
101 *Algorithms and Abstract Data Types*
102 *Introduction to Analysis of Algorithms*
104A *Fundamentals of Compiler Design I*
111 *Introduction to Operating Systems*
112 *Comparative Programming Languages*
130 *Computational Models*

Computer Engineering

- 12/L *Computer Systems and Assembly Language/Laboratory*
16 *Applied Discrete Mathematics*
107 *Mathematical Methods of Systems Analysis: Stochastic, or AMS 131, Introduction to Probability Theory*
110 *Computer Architecture, or 112, Computer and Game Console Architecture*

Mathematics

- 19A-B *Calculus for Science, Engineering, and Mathematics, or Mathematics 20AB, Honors Calculus*

- 23A *Multivariable Calculus*

Applied Mathematics and Statistics

- 10 *Mathematical Methods for Engineers I, or Mathematics 21, Linear Algebra*
131 *Introduction to Probability Theory; or Computer Engineering 107, Mathematical Methods of Systems Analysis: Stochastic*

Physics or Chemistry

Either two physics or two chemistry courses, with their associated laboratories, from the following:

- Physics 5A/L, *Introduction to Physics II/Laboratory* (or 6A/L);

- and either Physics 5B/M, *Introduction to Physics III/Laboratory* (or 6B/M);

- or Physics 5C/N, *Introduction to Physics III/Laboratory* (or 6C/N)

- Chemistry 1B/M, *General Chemistry/Laboratory*

- Chemistry 1C/N, *General Chemistry/Laboratory*

The remaining four courses must be upper-division computer science or computer engineering electives selected from the theory and practice course lists (see B.A. Major Requirements reference above). One of these courses may be replaced by an upper-division mathematics course from the theory course list.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in computer science (B.S.) is satisfied by completing CMPS 115, CMPS 195, or Computer Engineering 185. Please refer to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

Comprehensive Requirement

In addition to the above B.A. or B.S. requirements, students in the computer science majors must satisfy one of the following three exit requirements: pass one of the capstone courses (see Capstone Courses below); obtain

a scaled score of 600 or above on the graduate record examination (GRE) advanced computer science subject test; or successfully complete a senior thesis.

Capstone Courses

Students may choose from one of the following capstone courses to satisfy their exit requirement:

- 104B *Fundamentals of Compiler Design II*
116 *Software Design Project*
140 *Artificial Intelligence*
161/L *Visualization and Computer Animation/Laboratory*
181 *Database Systems II*
183 *Hypermedia and the Web*

Students taking one of the capstone courses will enroll normally. Students need to pass the capstone course to pass the exit requirement. No course may be attempted more than twice without prior approval from the chair of the department offering the course. W's count as an attempted class for this purpose. If a student fails to receive a passing score during these two attempts, he or she may still take the GRE Advanced Computer Science Subject Test and achieve a scaled score of 600 or above to satisfy the exit requirement.

The senior thesis consists of a self-contained project within the broad scope of computer science, but one that is not available in the regular course offerings. A student wishing to complete a senior thesis must successfully complete a minimum of 5 credits in course 195, *Senior Thesis Research*; submit a written thesis proposal; and have it accepted by a faculty supervisor. The supervision of a senior thesis student is always at the discretion of the faculty member. A written report and an oral presentation to a faculty examining committee are required.

Students who elect to use the GRE advanced computer science subject test as their senior exit requirement must arrange to take the GRE test and have scores submitted to the department before graduation deadlines. Contact the UCSC Career Center for GRE information and application forms.

Honors in the Major

Students must obtain a GPA of 3.8 or higher in the courses in the major to be considered for the distinction of "Highest Honors in the Major." Students must obtain a GPA of 3.5 or higher in the courses in the major to be considered for the distinction of "Honors in the Major." The School of Engineering reserves the right to withhold honors based on other criteria, such as an incident of academic dishonesty.

Computer Science Major Planners

The following are four sample academic plans for first-year students as preparation for the computer science major. Plans One A and Two A are suggested guidelines for students who have some prior experience with programming. Plans One B and Two B are for students who are considering the major and have no prior programming experience. Students who plan carefully can still have several openings free to take other breadth courses they find interesting.

Plan One A, B.A. Degree

| Year | Fall | Winter | Spring |
|------------|-----------------------|-----------------------|------------------------|
| 1st (frsh) | CMPS 10 MATH 19A | MATH 19B CMPS 10 | CMPS 12A/L MATH 23A |
| 2nd (soph) | CMPS 12B/M CMPE 16 | CMPS 101 CMPE 12/L | AMS 10 |

Plan One B, B.A. Degree

| Year | Fall | Winter | Spring |
|------------|-----------------------|-------------------------------------|---------------------|
| 1st (frsh) | AMS 3 CMPS 10 | MATH 19A CMPS 5J | MATH 19B CMPS 11 |
| 2nd (soph) | CMPS 12B/M CMPE 16 | MATH 23A CMPE 12/L CMPE 100/L | AMS 10 CMPE 80E |

Plan Two A, B.S. Degree

| Year | Fall | Winter | Spring |
|------------|------------------------|------------------------|-------------------------|
| 1st (frsh) | CMPS 12A/L MATH 19A | CMPS 12B/M MATH 19B | CMPE 16 MATH 23A |
| 2nd (soph) | CMPS 101 AMS 10 | CMPE 12/L PHYS 6A/L | CMPE 100/L PHYS 6C/N |

Plan Two B, B.S. Degree

| Year | Fall | Winter | Spring |
|------------|-----------------------|-----------------------|---------------------|
| 1st (frsh) | CMPS 10 | MATH 19A CMPS 5J | CMPS 11 MATH 19B |
| 2nd (soph) | CMPS 12B/M CMPE 16 | MATH 23A CMPE 12/L | AMS 10 |

B.S. Computer Science: Computer Game Design Major Requirements

The goal of this degree is to provide students a deep understanding of the technical aspects of computer game engineering, and a broad background in the artistic, narrative, and dramatic elements of game design. The core of the degree program is a strong grounding in computer science and computer engineering, preceded by a foundation in math and physics. Classes in ethics, as well as courses in art, film, music, theater arts, and economics provide breadth in topics of special relevance to computer game design. In their upper division courses, students gain depth by taking upper division electives in computer science and computer engineering. Two advanced courses in digital media give students the ability to view computer software from an artistic framework. A year-long capstone game design studio class allows students to develop substantial computer games, and integrate materials from the rest of the program.

The curriculum has 124-141 credits in 24-25 courses (depending on whether a student enters as a transfer student). 12 of the courses are upper division. Students interested in the major should pay special attention to the overlap between general education requirements and major requirements, as the major covers up to six general education requirements.

Lower- and Upper-Division Requirements

Course requirements are divided into six conceptual areas:

Mathematics and Physics

Complete all of the following courses:

Mathematics 19A-B, *Calculus for Science, Engineering, and Mathematics* (students can alternately take Mathematics 20A-B, *Honors Calculus*. Credit for one or both Mathematics 19A-B may be granted with adequate performance on the CEEB calculus AB or BC advanced placement exams).

Mathematics 21, *Linear Algebra*, or Applied Mathematics and Statistics 10, *Mathematical Methods for Engineers I*

Computer Engineering 16, *Applied Discrete Mathematics*
Physics 5A/L, *Introduction to Physics II/Laboratory* (or 6A/L)

Computational Foundations

Complete all of the following courses:

- Computer Science 12A/L, *Introduction to Programming(Accelerated)/Laboratory* (or 5J *Introduction to Programming in Java*, and 11 *Intermediate Programming*)
- Computer Science 12B/M, *Introduction to Data Structures/Laboratory*
- Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*
- Computer Science 109, *Advanced Programming*
- Computer Science 101, *Algorithms and Abstract Data Types*

Game Design

Complete all of the following courses.

- Course 80K, *Foundations of Interactive Game Design* (this course waived for transfer students)
- Computer Science 20, *Game Design Experience*
- Computer Science 170, *Game Design Studio I*
- Computer Science 171, *Game Design Studio II*
- Computer Science 172, *Game Design Studio III*

Computer Game Engineering

Complete five courses from the following list:

- Applied Mathematics and Statistics 131, *Introduction to Probability Theory*
- Applied Mathematics and Statistics 147, *Computational Methods and Applications*
- Computer Science 102, *Introduction to Analysis of Algorithms*
- Computer Science 104A, *Fundamentals of Compiler Design I*
- Computer Science 104B, *Fundamentals of Compiler Design II*
- Computer Science 105, *Systems Programming*
- Computer Science 111, *Introduction to Operating Systems*
- Computer Science 112, *Comparative Programming Languages*
- Computer Science 115, *Software Methodology*
- Computer Science 116, *Software Design Project*
- Computer Science 122, *Computer Security*
- Computer Science 128, *Distributed Systems, File Sharing, Online Gaming, and More*
- Computer Science 129, *Data Storage Systems*
- Computer Science 130, *Computational Models*
- Computer Science 132, *Computability and Computational Complexity*
- Computer Science 142, *Machine Learning and Data Mining*
- Computer Science 160/L, *Introduction to Computer Graphics/Laboratory*
- Computer Science 161/L, *Visualization and Computer Animation/Laboratory*
- Computer Science 164/L, *Game Engines/Laboratory*
- Computer Science 140, *Artificial Intelligence*
- Computer Science 146, *Game Artificial Intelligence*
- Computer Science 148, *Interactive Storytelling*
- Computer Science 166A, *Game Theory and Applications I*
- Computer Science 180, *Database Systems I*
- Computer Science 181, *Database Systems II*
- Computer Science 183, *Hypermedia and the Web*
- Computer Engineering 110, *Computer Architecture*

Computer Engineering 112, *Computer and Game Console Architecture*

Computer Engineering 150/L, *Introduction to Computer Networks/Laboratory*

Computer Engineering 113, *Parallel and Concurrent Programming*

Computer Engineering 117/L, *Embedded Software/Laboratory*

Computer Engineering 118/L, *Introduction to Mechatronics/Laboratory*

Computer Engineering 131, *Human-Computer Interaction*

Digital Media

Complete two courses from the following list:

- Film and Digital Media 130, *Silent Cinema*
- Film and Digital Media 136C, *Visual Culture and Technology: History of New Media*
- Film and Digital Media 150, *Screenwriting*
- Film and Digital Media 170A, *Introduction to Digital Media Production*
- Film and Digital Media 173, *Narrative Workshop: Reconfiguring Narrative within the Digital Realm*
- Film and Digital Media 177, *Digital Media Workshop, Computer as Medium*
- Film and Digital Media 171D, *Social Information Spaces*
- Film and Digital Media 189, *Advanced Topics in Digital and Electronic Media Spaces*
- Art 118, *Computer Art: Theories, Methods, and Practices* (may require approval of instructor)
- Theatre 105, *Introduction to Digital Media Design*
- Theatre 114, *Design Studio: Sound*
- Theater Arts 157, *Playwriting*
- Music 123, *Electronic Sound Synthesis*
- Music 124, *Intermediate Electronic Sound Synthesis*
- Music 125, *Advanced Electronic Sound Synthesis*
- Any 5-credit, upper-division course offered in the digital arts new media (DANM) curriculum (requires approval of professor)

Art and Social Foundations

Complete the ethics requirement and three of the following electives.

Ethics Requirement

One of:

- Computer Engineering 80E, *Engineering Ethics*
- Philosophy 22, *Introduction to Ethical Theory*
- Philosophy 24, *Introduction to Ethics, Contemporary Moral Issues*
- Philosophy 28, *Environmental Ethics*
- Biomolecular Engineering 80G, *Bioethics in the 21st Century: Science, Business, and Society* (crosslisted as Philosophy 80G)

Art Elective

One of:

- Art 10G, *2D Foundation*
- Art 10H, *3D Foundation*
- Art 80A, *Introduction to Drawing*
- Art 80F, *Introduction to Issues in Digital Media*

Film Elective

One of:

- Film and Digital Media 20A, *The Film Experience*
- Film and Digital Media 20C, *Introduction to Digital Media*

Film and Digital Media 20P, *Introduction to Production Technique*

Theater Elective

One of:

- Theater Arts 10, *Introduction to Theater Design and Technology*
- Theater Arts 18, *Drafting for Theatrical Production*
- Theater Arts 19, *Design Studio, Lighting Studio*
- Theater Arts 20, *Introductory Studies in Acting*
- Theater Arts 30, *Introduction to Modern Dance Theory and Technique*
- Theater Arts 40, *Introduction to Directing*
- Theater Arts 80E, *Stand-Up Comedy*
- Theater Arts 80L, *Muppet Magic: Jim Henson's Art*

Music Elective

One of:

- Music 11A, *Introduction to Western Art Music*
- Music 11B, *Introduction to Jazz*
- Music 11C, *Introduction to American Popular Music*
- Music 11D, *Introduction to World Music*
- Music 80C, *History, Literature, and Technology of Electronic Music*
- Music 80L, *Artificial Intelligence and Music*
- Music 80M, *Film Music*
- Music 80R, *Music and the World Wide Web*

Economics Elective

One of:

- Economics 1, *Introductory Microeconomics, Resource Allocation and Market Structure*
- Economics 2, *Introductory Macroeconomics, Aggregate Economic Activity*
- Economics 80H, *Wall Street and the Money Game*

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in computer science: game design is satisfied by completing CMPS 170, 171, and 172.

Comprehensive Requirement

Students satisfy the senior comprehensive requirement by either receiving a passing grade in all three courses of the game design studio sequence or performing a senior thesis.

Computer Science: Computer Game Design Major Planners

The following are three sample academic plans that students can use to plan their sequence of courses in the major. Plans one and two are suggested guidelines for students who begin their studies in their freshman year. Such students, if they plan carefully will have several openings free to take other breadth courses they find interesting. Plan one is for a student entering UCSC in their freshman year who is prepared to go directly into Mathematics 19A/20A and Computer Science 12A. Plan two is for a student entering UCSC their freshman year who needs to take preparatory courses prior to Mathematics 19A or Computer Science 12A to ensure a successful outcome in those courses. Plan three is for students that transfer to campus at the beginning of their junior year.

Plan One—Enter UCSC Freshman Year

| Year | Fall | Winter | Spring |
|---------------|--|--|---|
| 1st (frsh) | Core | CMPS 80K (<i>Foundations of Interactive Game Design</i>) | Art/Social elective I |
| | MATH 19A or 20A CMPS 12A/L | MATH 19B or 20B CMPS 12B/M | CMPE 16 Composition (C or gen ed) |
| 2nd (soph) | PHYS 5A/L or 6A/L gen ed | Art/Social elective II CMPS 101 | Art/Social elective III Ethics requirement |
| | MATH 21 or AMS 10 | CMPS 20 (<i>Game Design Experience</i>) | Game engineering elective I |
| 3rd (jr) | CMPE 12/L Game engineering elective II gen ed | gen ed Game engineering elective III CMPS 109 | gen ed Game engineering elective IV |
| | Digital Media elective I CMPS 170 (<i>Game Design Studio I</i>) gen ed | gen ed Game engineering elective V CMPS 171 (<i>Game Design Studio II</i>) | gen ed CMPS 172 (<i>Game Design Studio III</i>) Digital Media elective II |

Plan Two—Enter UCSC Freshman Year, Need Math and Computer Science Preparation Classes (Mathematics 3, Computer Science 5P)

| Year | Fall | Winter | Spring |
|---------------|--|--|---|
| 1st (frsh) | Core MATH 3 CMPS 5P | Writing (C, or gen ed) MATH 19A CMPS 80K (<i>Foundations of Interactive Game Design</i>) | MATH 19B CMPS 12A/L Art/Social elective I |
| | Art/Social elective II CMPS 12B/M PHYS 6A/L | CMPS 30 (<i>Game Design Experience</i>) Ethics requirement CMPE 12/L | MATH 21 or AMS 10 CMPE 16 Art/Social elective III |
| 3rd (jr) | CMPS 101 Digital Media elective I gen ed | Game engineering elective I CMPS 109 gen ed | gen ed Game engineering elective II Game engineering elective III |
| | gen ed CMPS 170 (<i>Game Design Studio I</i>) Game engineering elective IV | gen ed CMPS 171 (<i>Game Design Studio II</i>) Game engineering elective V | gen ed Digital Media elective II CMPS 172 (<i>Game Design Studio III</i>) |

Plan Three—Transfer Student

| Year | Fall | Winter | Spring |
|---------------|--|--|--|
| 1st (frsh) | CMPS 101 CMPS 12/L Art/Social elective I | CMPS 109 Game engineering elective I CMPS 20 (<i>Game Design Experience</i>) | Ethics requirement Game engineering elective II Digital Media elective I |
| | Digital Media elective II CMPS 170 (<i>Game Design Studio I</i>) Game engineering elective III | Art/Social elective II CMPS 171 (<i>Game Design Studio II</i>) Game engineering elective V | Art/Social elective III CMPS 172 (<i>Game Design Studio III</i>) Game engineering elective V |

Minor Requirements

Courses required for the computer science minor are Mathematics 19A-B or 20A-B, and 23A; Applied Mathematics and Statistics 10; Computer Science courses 12A/L (or CMPS 5J and CMPS 11) and 12B/M and course 101; Computer Engineering 12/L

and 16; and four additional upper-division computer science courses from a list of approved electives (see the department's curriculum chart for the computer science minor at <http://ua.soe.ucsc.edu/>). In selecting the four upper-division courses, students may elect to focus on one subdiscipline of computer science by completing the courses in a B.A. depth sequence. Upper-division computer engineering and mathematics courses that generally apply toward the computer science major may not be applied toward the computer science minor. In addition, some upper-division computer science courses may not be applied toward the computer science minor. There is no comprehensive examination or senior thesis requirement for the minor.

Graduate Programs**Program Description**

The Computer Science Department at UCSC offers both a master's program and a doctoral program. The goal of these programs is to help students develop into independent scholars who are prepared for productive careers in research, teaching, and industry. The master of science (M.S.) degree may be used as a terminal degree or as the first step toward the doctor of philosophy degree (Ph.D.). The student-faculty ratio is five to one, making it possible for students to receive individual attention and to pursue programs that fit their individual needs. The intellectual atmosphere is enriched by regular colloquia and seminars presented by eminent contributors to the field, many of whom are associated with other major universities and industrial research centers in the San Francisco Bay Area.

The Computer Science Department enjoys a close relationship with the Computer Engineering and Electrical Engineering Departments, the Bioinformatics Department, and the new Applied Mathematics and Statistics Department.

Most computer science graduate students are hired as teaching assistants helping with undergraduate courses, hired as research assistants working for computer science and other School of Engineering faculty, or awarded fellowships to pursue their research.

Additional information on the computer science graduate programs can be found on the department's web pages at www.soe.ucsc.edu.

Requirements for the Master's Degree:**Project Track****Course Requirements**

Each student is required to take 50 credits as follows:

Computer Science 200, *Research and Teaching in Computer Science and Engineering*, 3 credits;
Computer Science 201, *Analysis of Algorithms*, 5 credits;
Computer Science 203, *Programming Languages*, 5 credits;

Computer Science 296, *Master's Project*, 2 credits;

a base requirement in computer architecture must be met by taking Computer Engineering 110 or Computer Engineering 202 or equivalent elsewhere (approval required);

one course each from three different breadth categories for a total of three courses (15 credits)—see www.cs.ucsc.edu/graduates/breadth/;

all remaining courses must be regular, 5-credit graduate courses from: computer science, within the School of Engineering (with adviser's approval); or outside the School of Engineering (with adviser's and grad director's approval); courses

that do not count include all courses numbered 200, 280, 296, 297, and 299;

at least 30 credits must be in computer science;

two upper-division undergraduate computer science courses (other than course 101) or a graduate course (not seminar) in related disciplines outside the list of approved graduate courses may be substituted for one graduate course, when necessary to strengthen a student's preparation for graduate studies, with prior approval from the adviser and the graduate director.

Project

Completion of a master's project is required for the master's degree. In consultation with the adviser, the student forms a master's project reading committee of at least two faculty members, each of whom is provided a copy of the project report. The final project must be accepted by the review committee before the award of the master of science degree.

Requirements for the Master's Degree:**Thesis Track****Course Requirements**

Each student is required to take 48 credits as follows:

Computer Science 200, *Research and Teaching in Computer Science and Engineering*, 3 credits;
Computer Science 201, *Analysis of Algorithms*, 5 credits;
Computer Science 203, *Programming Languages*, 5 credits;

a base requirement in computer architecture must be met by taking Computer Engineering 110 or Computer Engineering 202 or equivalent elsewhere (approval required);

one course each from three different breadth categories for a total of three courses (15 credits)—see www.cs.ucsc.edu/graduates/breadth/;

up to 10 credits of course 297, *Independent Study or Research*; or course 299, *Thesis Research*;

all remaining courses must be regular, 5-credit graduate courses from: computer science, within the School of Engineering (with adviser's approval); or outside the School of Engineering (with adviser's and grad director's approval); courses that do not count include all courses numbered 200, 280, 296, 297, and 299;

at least 28 credits must be in computer science;

two upper-division undergraduate computer science courses (other than course 101) or a graduate course (not seminar) in related disciplines outside the list of approved graduate courses may be substituted for one graduate course, when necessary to strengthen a student's preparation for graduate studies, with prior approval from the adviser and the graduate director.

Thesis

Completion of a master's thesis is required for the master's degree. To fulfill this requirement, the student submits a written proposal to a faculty member, usually by the third academic quarter. By accepting the proposal, the faculty member becomes the thesis adviser. In consultation with the adviser, the student forms a master's thesis reading committee with at least two additional faculty members, each of whom is provided a copy of the proposal. The student presents an expository talk on the thesis research, and the final thesis must be accepted by the review committee before the award of the master of science degree.

Requirements for the Ph.D. Degree

Course Requirements

Each student is required to take 58 credits as follows:

- Computer Science 200, *Research and Teaching in Computer Science and Engineering*, 3 credits;
- Computer Science 201, *Analysis of Algorithms*, 5 credits;
- Computer Science 203, *Programming Languages*, 5 credits;
- a base requirement in computer architecture must be met by taking Computer Engineering 110 or Computer Engineering 202 or equivalent elsewhere (approval required);
- one course each from three different breadth categories for a total of three courses (15 credits)—see www.cs.ucsc.edu/graduates/breadth/;
- up to 10 credits of course 297, *Independent Study or Research*; or course 299, *Thesis Research*;
- all remaining courses must be regular, 5-credit graduate courses from: computer science, within the School of Engineering (with adviser's approval); or outside the School of Engineering (with adviser's and grad director's approval); courses that do not count include all courses numbered 200, 280, 296, 297, and 299;

at least 33 credits must be in computer science;

graduate courses (not seminars) in related disciplines outside the list of approved graduate courses may be substituted, when necessary to strengthen a student's preparation for graduate studies, with prior approval from the adviser and the graduate director. Course selection should form a coherent plan of study and requires adviser approval. Undergraduate courses may not be used to satisfy Ph.D. course requirements;

each student is required to complete at least one quarter of teaching assistantship. This requirement can be met after advancement to candidacy. Certain exceptions may be permitted for those with extensive prior teaching experience or those who are not allowed to be employed due to visa regulations.

Ph.D. students who have satisfied the requirements for the master's degree are eligible to receive a master's degree.

Dissertation

Each student writes a Ph.D. dissertation. The dissertation must show the results of in-depth research, be an original contribution of significant knowledge, and include material worthy of publication. Where appropriate, research internships with companies, government labs, or elsewhere are recognized (and may be required) as an integral part of the research leading to the dissertation. As the first step, a student submits a written dissertation proposal to a School of Engineering faculty member. By accepting the proposal, the faculty member becomes the dissertation supervisor. The dissertation proposal is publicly and formally presented in an oral qualifying examination given by a qualifying examination committee, approved by the graduate committee and the Graduate Council. The student must submit his or her written dissertation proposal to all members of the committee and the graduate assistant one month in advance of the examination.

Students are advanced to candidacy after they have completed the course requirements, passed the qualifying examination, cleared all Incompletes from their records, have an appointed dissertation reading committee, and paid the filing fee. Students who have not

advanced to candidacy by the end of their fourth year will be placed on academic probation.

Each Ph.D. candidate submits the completed dissertation to a reading committee at least one month prior to the dissertation defense. The appointment of the dissertation reading committee is made immediately after the qualifying examination and is necessary for advancing to candidacy. The candidate presents his or her research results in a public seminar sponsored by the dissertation supervisor. The seminar is followed by a defense of the dissertation to the reading committee and attending faculty, who will then decide whether the dissertation is acceptable or requires revision. Successful completion of the dissertation fulfills the final academic requirement for the Ph.D. degree.

Transfer Credit

Up to three School of Engineering courses fulfilling the degree requirements of either the M.S. or Ph.D. degrees may be taken before beginning the graduate program through the concurrent enrollment program.

Ph.D. students who have previously earned a master's degree in a related field at another institution may substitute courses from their previous university with approval of the adviser and the graduate committee.

Courses from other institutions may not be applied to the M.S. degree course requirements.

Petitions should be submitted along with the transcript from the other institution or UCSC extension. For courses taken at other institutions, copies of the syllabi, exams, and other coursework should accompany the petition. Such petitions are not considered until the completion of at least one quarter at UCSC.

At most, a total of three courses may be transferred from concurrent enrollment and other institutions.

Review of Progress

Each year, the faculty reviews the progress of every student. Students not making adequate progress toward completion of degree requirements (see the *Graduate Handbook* for policy on satisfactory academic progress) are subject to dismissal from the program. Students with academic deficiencies may be required to take additional courses. Full-time students with no academic deficiencies are normally expected to complete the degree requirements at the rate of at least two courses per quarter. Full-time students must complete course 201, Computer Engineering 202, and course 203 within two years and normally must complete all course requirements within two years for the M.S. and three years for the Ph.D.

Students receiving two or more grades of below B or U (fail) in the School of Engineering (SoE) courses are not making adequate progress and will be placed on academic probation for the following three quarters of registered enrollment. Withdrawing or taking a leave of absence does not count as enrollment. Part-time enrollment is counted as a half quarter of enrollment.

Should any computer science graduate student fail a School of Engineering course while on probation, the Computer Science Department may request the graduate dean to dismiss that student from the graduate program. If after being removed from probation, the student again fails a School of Engineering course, he or she will return immediately to academic probation.

Graduate students experiencing circumstances or difficulties that impact their academic performance should contact their adviser and the graduate director immediately. Students may appeal their dismissal.

Lower-Division Courses

2. Computer Literacy. S

Introduction to how computers work and how to use them. Topics covered include network information systems, text editors, formatting, file and directory system, spreadsheets and databases. Computers as symbol manipulation devices. Introduction to programming concepts and computer languages. Impact of computers on society. Designed for students with little or no experience using computers. Preference is given to students who have not taken other computer engineering or computer science courses. Students cannot receive credit for this course and Computer Engineering 3. (General Education Code(s): PE-T, IN.) *N. Polyzotis, The Staff*

5C. Introduction to Programming in C/C++. F,W

Introductory programming for students who have no prior programming experience. Students learn programming and documentation skills as well as algorithmic problem-solving and programming methodologies. Introduces computers, compilers, and editors. Students write medium-sized programs. This course and courses 5J and 5P cover the same material, but use different programming languages. (Formerly course 60N.) (General Education Code(s): MF, IN.) *I. Pohl, C. McDowell, D. Long, S. Brandt*

5J. Introduction to Programming in Java. W

Introductory programming for School of Engineering majors who have no prior programming experience. Students learn programming and documentation skills, as well as algorithmic problem-solving and programming methodologies. Introduces computers, compilers, and editors. Students write medium-sized programs. The two-quarter sequence courses 5J and 11 cover in two quarters the same material as the accelerated introductory course and lab 12A/L cover in one quarter. (Formerly course 60G.) (General Education Code(s): MF, IN.) *D. Helmbold, C. McDowell*

5P. Introduction to Programming in Python. S

Introduction to programming for engineering or science students who have no prior programming experience. Students learn programming and documentation skills, as well as algorithmic problem-solving and programming methodologies. Introduces students to computers, programming tools, and editors. Students write medium-sized programs to solve web-based and scientific problems. This course and courses 5C and 5J cover largely the same material, but use different programming languages. (General Education Code(s): MF, IN.) *D. Long, E. Miller*

10. Introduction to Computer Science. F,W,S

An overview of the theory, foundations, and practice of computer science with emphasis on what computers can and cannot do, now and in the future. Topics include algorithms and data, correctness and efficiency of algorithms, hardware, programming languages, limitations of computation, applications, and social issues. No programming skills are required as a prerequisite. Major concepts and open problems in computer science are presented without reliance on sophisticated mathematical tools. (General Education Code(s): MF, IN.) *The Staff, M. Walker, S. Lodha, P. Tantalio*

11. Intermediate Programming. S

Continuation of course 5J. Covers basic object-oriented programming, event-driven programming, graphical user interface (GUI) creation, recursion, two-dimensional arrays, and introduces programming in C and Java. The two-quarter sequence courses 5J and 11 cover in two quarters the same material as the accelerated introductory course and lab 12A/L cover in one quarter. Students cannot re-

ceive credit this course and course 12A. Prerequisite(s): course 5J and one of the following: eligibility to enroll in Mathematics 19A (Mathematics 2B or 3, or 40 or higher on mathematics placement exam), or Mathematics 19A or 11A, or Economics 11A, or Applied Mathematics and Statistics 11A. (General Education Code(s): MF.) *C. McDowell*

12A. Introduction to Programming (Accelerated). F,W

Accelerated introduction to programming. Students write medium-sized programs. Topics include: functions; conditionals and loops; classes; event-driven programming and graphic user interfaces (GUIs); recursion; and arrays. Students who have no or very limited programming experience should consider courses 5J and 11 which cover the same material in two quarters. Students may not receive credit for both this course and course 11. Some prior programming experience in a language such as C, C++, Java, or C# strongly recommended. Prerequisite(s): eligibility to enroll in Mathematics 19A (Mathematics 2B or 3 or 40 or higher on mathematics placement exam) or completion of Mathematics 11A or 19A or Economics 11A or AMS 11A. Concurrent enrollment in 12L required. (General Education Code(s): IN.) *W. Mackey, D. Long, D. Helmbold, A. Pang, C. McDowell, C. Flanagan*

12B. Introduction to Data Structures. F,W,S

Teaches students to implement common data structures and the algorithms associated with each data structure, through progressively difficult exercises. Topics include big "O" notation; pointers, recursion (induction), and dynamic allocation; linked lists and list processing; stacks, queues, binary trees and binary search trees; simple sorting techniques and simple search techniques. Students will gain a working knowledge of the elements of the Java and C programming languages. Prior experience with Unix is assumed. Prerequisite(s): course 11 or 12A or Computer Engineering 13. Concurrent enrollment in course 12M required. (General Education Code(s): MF, IN.) *W. Mackey*

12L. Computer Programming Laboratory (2 credits). F,W

Laboratory sequence complementing topics taught in course 12A by providing training and exposure to several software development tools and practices not covered in course 12A. In addition, the lab provides an initial exposure to a second programming language to reinforce concepts from course 12A. Prerequisite(s): eligibility to enroll in Mathematics 19A (Mathematics 2B or 3 or 40 or higher on mathematics placement exam) or completion of Mathematics 11A or 19A or Economics 11A or AMS 3 or 11A. Previous or concurrent enrollment in 12A required. *W. Mackey, D. Long, D. Helmbold, A. Pang, C. McDowell, C. Flanagan*

12M. Data Structures Laboratory (2 credits). F,W,S

Complements course 12B, gaining additional competence with a number of important software development tools, languages, and techniques. Included are advanced Unix features and utilities such as grep, find, diff, the shell, and pipes; C programs utilizing I/O, arrays, pointers, and structures; a scripting language to perform simple text and file manipulation; and the make utility. Prerequisite(s): course 11 or 12A or Computer Engineering 13. Concurrent enrollment in course 12B required. *W. Mackey*

13H. Introduction to Programming and Data Structures (Honors). *

Provides an accelerated introduction to programming and data structures. Includes a review of basic programming, including loop and conditional control structures,

procedures and parameter passing, and arrays. Course goes on to cover same material as course 12B. Students cannot receive credit for this course and course 12A or 12B. Prerequisite(s): interview only; students must have completed a high school or college level programming course in Java, C, or C++. A short oral examination given to ascertain programming level. Concurrent enrollment in course 13L required. (General Education Code(s): IN.) *D. Long, S. Brandt*

13L. Introduction to Programming and Data Structures Laboratory (2 credits). *

Provides accelerated introduction to practical aspects of programming and data structures. Covers three areas: 1) common programming tools, including Unix commands, compilers and linkers, editors, debuggers, and Makefiles; 2) basic programming techniques, including design, testing, and debugging; and 3) C programming, focusing on the major differences between C and Java. Previous or concurrent enrollment in course 13H required. Prerequisite(s): interview only; students must have completed a high school or college level programming course in Java, C, or C++. A short oral examination given to ascertain programming level. *D. Long, S. Brandt*

20. Game Design Experience. W

Introduction to computer game development. Topics covered include: animating sprites; use of game development frameworks; collision detection; game audio; scrolling game worlds; basic artificial intelligence for games; and basic 3-D graphics. Also covers basic object-oriented design and software design patterns. Course 80K recommended. Prerequisite(s): course 12B. (General Education Code(s): PR-E, IN.) *J. Whitehead, A. Jhala, M. Mateas*

60M. Scientific Computation with Matlab and Maple. *

Basic concepts from calculus visualized using Matlab and Maple; plotting data and functions, integration, differentiation, limits; solving systems of equation; linear regression; and example applications from science and engineering. Prerequisite(s): Mathematics 19B, or 20B, or by consent of instructor. *M. Warmuth*

80B. Systems and Simulation. *

An introduction to systems analysis as an approach to understanding and solving complex problems. The use of simulation as an aid in this problem solving. Examples are taken from ecology, economics, physics, computer science, and other fields. Intended as a generally accessible undergraduate course in which students can develop and explore computer simulation models matched to their individual interests. (General Education Code(s): T2-Natural Sciences, Q.) *The Staff*

80G. Introduction to Unix. *

Introduction to computing, the Internet, and the World Wide Web through the language of the Unix operating system. Oriented to the beginner, the course presupposes no previous acquaintance with any particular sort of computer. It covers the basic concepts of text editing and formatting, writing Web pages in basic HTML, and promotes a rigorous understanding of Unix commands and shell scripts. Views communication with a computer as a matter of learning a few simple though powerful languages. (Also offered as Linguistics 80G. Students cannot receive credit for both courses.) (General Education Code(s): T2-Natural Sciences.) *The Staff*

80J. Technology Targeted at Social Issues. *

Introduces the idea that engineering can be a means for addressing social issues. Case studies and guest speakers. Issues might include: economic development, privacy, activism, safe drinking water, inexpensive shelters, sustainable

energy, education, and waste disposal. (General Education Code(s): PE-T, T7-Natural Sciences or Social Sciences.) *J. Davis, S. Lodha*

80K. Foundations of Interactive Game Design. S

Surveys history, technology, narrative, ethics, and design of interactive computer games. Work in teams to develop novel game-design storyboards. Intended as a generally accessible undergraduate course in which students can explore the interplay of narrative, graphics, rule systems, and artificial intelligence in the creation of interactive games. Programming experience not required. (General Education Code(s): IM, T2-Natural Sciences.) *N. Wardrip-Fruin, J. Whitehead*

80S. From Software Innovation to Social Entrepreneurship. S

Emerging software innovations with emphasis on social software. Web 2.0 companies and services. Software that has social impact in a global context. Entrepreneurial plan including social, economic, and innovation value. Final group project on innovative software design and entrepreneurship plan. (General Education Code(s): PE-T, T7-Natural Sciences or Social Sciences, E.) *S. Lodha*

80V. Creating Virtual Worlds on the Web. *

Project-oriented course about creating and publishing interactive 3D content on the web. Focuses on the creation of static and dynamic objects, such as characters, terrain, accessories, and works of art. Also covers inclusion of animation and sound effects with these objects. The objects created can be used in a stand-alone setting (e.g., a 3D document) or incorporated into existing virtual worlds (e.g., as part of a level design in a computer game or assets in massively multiplayer online games). Uses 3D authoring tools (pending availability of resources) like VRML, Second Life, Alice, and/or Acrobat 3D. (Formerly *VRML 3D Worlds on the Web*.) (General Education Code(s): PR-C, T2-Natural Sciences.) *A. Pang*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

94F. Group Tutorial (2 credits). F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

101. Algorithms and Abstract Data Types. F,S

Studies basic algorithms and their relationships to common abstract data types. Covers the notions of abstract data types and the distinction between an abstract data type and an implementation of that data type. The complexity analysis of common algorithms using asymptotic (big "O") notation is emphasized. Topics include sorting and searching techniques, basic graph algorithms, and algorithm design techniques. Abstract data types covered include priority queues, dictionaries, disjoint sets, heaps, balanced trees, and hashing. Familiarity with C, Java, and Unix is assumed. Prerequisite(s): course 12B or 13H; CMPE 16 or 16H; MATH 19B; and one course from the

following: MATH 21, 22, 23A, or AMS 10. *P. Tantalo, D. Helmbold, A. Van Gelder, M. Warmuth*

102. Introduction to Analysis of Algorithms. S

Methods for the systematic construction and mathematical analysis of algorithms. Order notation, the RAM model of computation, lower bounds, and recurrence relations are covered. The algorithm design techniques include divide-and-conquer, branch and bound, and dynamic programming. Applications to combinatorial, graph, string, and geometric algorithms. Prerequisite(s): course 101. *M. Warmuth, A. Van Gelder, D. Achlioptas, D. Helmbold, S. Lodha*

104A. Fundamentals of Compiler Design I. F

An introduction to the basic techniques used in compiler design. Topics include compiler structure, symbol tables, regular expressions and languages, finite automata, lexical analysis, context-free languages, LL(1), recursive descent, LALR(1), and LR(1) parsing; and attribute grammars as a model of syntax-directed translation. Students use compiler building tools to construct a working compiler. Prerequisite(s): course 101 and Computer Engineering 12 and 12L. *W. Mackey*

104B. Fundamentals of Compiler Design II. *

Advanced study of compiler implementation. Topics include compiler structure back end, run-time environments, storage management, garbage collection, register allocation, code generation, basic blocks, control flow, data flow, local and global optimization, interpretation, and machine-code generation. Students may not receive credit for this course and course 204. Taught in conjunction with course 204. Prerequisite(s): course 104A. *W. Mackey*

105. Systems Programming. *

Covers fundamentals of systems programming including standard tools, shell programming, file I/O, files and directories, system data files and information, Unix processes, process control, synchronization, signals, event-driven programming, terminal I/O, daemons, interprocess communication, basic network programming, and basic user-interface programming. Prerequisite(s): course 101 and Computer Engineering 12 and 12L. Enrollment restricted to School of Engineering majors. *E. Miller, D. Long, S. Brandt*

109. Advanced Programming. W

An introduction to object-oriented techniques of software development including data abstraction, inheritance, polymorphism, and object-oriented design. Extensive practice using a computer to solve problems, including construction of graphical user interfaces and a multithreaded client/server applications. Prerequisite(s): course 12B/M. *I. Pohl, C. McDowell, W. Mackey*

111. Introduction to Operating Systems. S

Fundamental principles of operating systems: process synchronization, deadlocks, memory management, resource allocation, scheduling, storage systems, and study of several operating systems. A major programming project will be required. Prerequisite(s): course 101, and Computer Engineering 110 or Computer Engineering 112. *E. Miller, D. Long, S. Brandt, W. Mackey*

112. Comparative Programming Languages. S

Covers several programming languages and compares styles, philosophy, and design principles. Principles underlying declarative, functional, and object-oriented programming styles are studied. Students write programs emphasizing each of these techniques. Prerequisite(s): course 101 or 109. *W. Mackey, M. Abadi, W. Tan, C. McDowell, C. Flanagan, A. Van Gelder, D. Long*

115. Software Methodology. F

Emphasizes the characteristics of well-engineered software systems. Topics include requirements analysis and specification, design, programming, verification and validation, maintenance, and project management. Practical and research methods are studied. Imparts an understanding of the steps used to effectively develop computer software. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 101. Enrollment restricted to computer science, computer engineering, and information systems management majors. *J. Whitehead, L. Werner, C. Flanagan*

116. Software Design Project. *

Students in teams specify, design, construct, test, and document a complete software system in a specialized application domain. Class time is spent in technical discussions and ongoing design reviews. A formal presentation and demonstration of each project is required. An organizational meeting will be held during the preceding quarter. Projects may be drawn from industry and campus research groups. Prerequisite(s): course 115. *L. De Alfaro, J. Whitehead*

122. Computer Security. W

Introduction to computer security (including selected topics in network security). Access control. Security in programming languages. Basic cryptography. Security protocols. Prerequisite(s): course 111 or permission of instructor. Enrollment restricted to School of Engineering majors. *M. Abadi, E. Miller*

128. Distributed Systems: File Sharing, Online Gaming, and More. *

Covers topics in distributed computing including communication, naming, synchronization, consistency and replication, fault tolerance, and security. Examples drawn from peer-to-peer systems, online gaming, the World Wide Web; other systems also used to illustrate approaches to these topics. Students implement simple distributed systems over the course of the quarter. Prerequisite(s): course 101 or Computer Engineering 150. Course 111 or 105 recommended. *E. Miller, D. Long, S. Brandt*

129. Data Storage Systems. *

Covers all aspects of storage systems technology from magnetic media up through system software, including principles of magnetic recording, hard drive technology and evolution, performance measurement, file systems, storage networking, disk arrays, network-attached storage, and alternative storage technologies. Prerequisite(s): course 101, 111, and Physics 5A or 6A. *E. Miller, D. Long, S. Brandt*

130. Computational Models. F

Various representations for regular languages, context-free grammars, normal forms, parsing, pushdown automata, pumping lemmas, Turing machines, the Church-Turing thesis. Prerequisite(s): course 101. *M. Warmuth, D. Helmbold, P. Kolaitis, R. Levinson*

132. Computability and Computational Complexity. S

Turing machines, general phase-structure grammars, the Chomsky hierarchy, recursive functions, diagonalization, the Halting problem, computability and unsolvability, computational complexity, time and space bounds, NP-completeness with emphasis on reductions between problems from various areas. Prerequisite(s): course 130. *M. Warmuth, D. Helmbold, P. Kolaitis, A. Van Gelder*

140. Artificial Intelligence. W

Introduction to the contemporary concepts and techniques of artificial intelligence, including any or all of: machine perception and inference, machine learning, op-

timization problems, computational methods and models of search, game playing and theorem proving. Emphasis may be on any formal method of perceiving, learning, reasoning, and problem solving which proves to be effective. This includes both symbolic and neural network approaches to artificial intelligence. Issues discussed include symbolic versus nonsymbolic methods, local versus global methods, hierarchical organization and control, and brain modeling versus engineering approaches. Lisp or Prolog may be introduced. Involves one major project or regular programming assignments. Students cannot receive credit for this course and course 240. Prerequisite(s): course 101. *I. Pohl, M. Walker, R. Levinson*

142. Machine Learning and Data Mining. S

Introduction to machine learning algorithms and their applications. Topics include classification learning, density estimation and Bayesian learning regression, and on-line learning. Provides introduction to standard learning methods such as neural networks, decision trees, boosting, and nearest neighbor techniques. Prerequisite(s): course 101 and one of Applied Mathematics and Statistics 5, 7, 113, 131, or Computer Engineering 107. *D. Helmbold, M. Warmuth*

146. Game AI. *

Course provides a comprehensive introduction to the use of artificial intelligence (AI) in computer games. Building on fundamental principles of AI, course explains how to create non-player characters (NPCs) with progressively more sophisticated capabilities. Prerequisite(s): course 101; familiarity with C++. Enrollment restricted to sophomores, juniors, seniors, and graduate students. *I. Pohl, M. Mateas, J. Funge*

148. Interactive Storytelling. W

Covers a range of design approaches and technologies including storytelling in games, interactive fiction, interactive drama, and artificial intelligence-based story generation. Through a mixture of readings, assignments, and project work, students explore the theoretical positions, debates, and technical and design issues arising from these approaches. Students may not receive credit for this course and course 248. Prerequisite(s): course 101. Enrollment restricted to juniors and seniors. *M. Mateas*

160. Introduction to Computer Graphics. F

Introduces techniques of modeling, transformation, and rendering for computer-generated imagery. Topics: 2D/3D primitives, projections, matrix composition, and shading algorithms. Programming assignments and a major project are required. Students cannot receive credit for both this course and course 260. Prerequisite(s): course 101 and Mathematics 21 or Applied Mathematics and Statistics 10. Concurrent enrollment in course 160L required. *J. Davis, S. Lodha, A. Pang*

160L. Introduction to Computer Graphics Laboratory (2 credits). F

Complements course 160, gaining additional competence with a number of important software development tools, graphics libraries, and graphical user interfaces. Included are OpenGL program, utilizing rubberbanding, picking, trackballing, display lists, double buffering, lighting, shading, materials and textures; and FLTK program, utilizing sliders, buttons, and dialog boxes. Prerequisite(s): course 101 and Mathematics 21 or Applied Math 10. Concurrent enrollment in course 160 required. Enrollment restricted to all engineering majors. *A. Pang, J. Davis, S. Lodha*

161. Visualization and Computer Animation. W

Introduction to standard techniques of computer animation and data visualization. Topics include mathematical

foundations; creature and behavioral animation; scalar, vector and tensor visualization methods. Involves programming exercises, instruction in available software, and a project. Prerequisite(s): course 160 and 160L or equivalent. Enrollment restricted to students majoring in computer sciences, computer engineering, or electrical engineering. Concurrent enrollment in course 161L required. *S. Lodha, A. Pang*

161L. Visualization and Computer Animation Laboratory (2 credits). W

Complements course 161, gaining additional competence with a number of important software development tools and techniques. Included are Visualization Toolkit (vtk) and Insight Toolkit (ITK); C, OpenGL, and FLTK programs utilizing visualization techniques of isosurfacing, transfer function, volumetric rendering, streamlines visualization; video capture for facial animation and pose estimation, group and behavioral animations. Prerequisite(s): courses 160 and 160L; concurrent enrollment in course 161 required. Enrollment restricted to all engineering majors. *S. Lodha, A. Pang*

164. Game Engines. S

Covers the graphic elements in computer games. Topics include modifying, optimizing, adding components, and building a game engine. Course evaluation based on exams and several programming projects, including a game built using the student's game engine. Prerequisite(s): courses 160 and 160L. Concurrent enrollment in course 164L required. *A. Jhala, A. Pang*

164L. Game Engines Lab (2 credits). S

Provides hands-on experience in using, designing, and building game engines. Students also explore different special effects, such as particle systems, spring systems, and game physics. Prerequisite(s): courses 160 and 160L. Concurrent enrollment in course 164 required. *A. Jhala, A. Pang*

166A. Game Theory and Applications I. F

Introduces modern game theory, including applications in social science, biology, and engineering. Topics include extensive form, strategic form, mixed strategies, incomplete information, repeated games, evolutionary games, and simulation techniques. (Also offered as Economics 166A. Students cannot receive credit for both courses.) Prerequisite(s): Applied Math and Statistics 5 or 7 or Economics 113; and Economics 11B, Applied Mathematics and Statistics 11B, or Mathematics 11B or 19B. Enrollment restricted to juniors and seniors. Enrollment limited to 100. *The Staff*

166B. Game Theory and Applications II. *

Explores research frontiers in game theory, emphasizing applications in social science, biology, and engineering. Each interdisciplinary team develops a topic, and presents it to the class in oral and written reports and demonstrations. Students must have shown a strong performance in course 166A or equivalent. Students cannot receive credit for this course and Economics 272, Computer Science 272, or Biology: Ecology and Evolutionary 274. (Also offered as Economics 166B. Students cannot receive credit for both courses.) Prerequisite(s): course 166A, Economics 166A, or Biology: Ecology and Evolutionary 166A; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. Enrollment limited to 40. (General Education Code(s): W.) *The Staff*

170. Game Design Studio I. F

First of a three-course capstone sequence for the computer game design program. Students work in teams to develop a comprehensive game design for a substantial

computer game, including detailed storyline, level design, artistic approach, implementation technologies, and art-asset pipeline. Emphasis placed on creating novel, artistic game design concepts. Includes design reviews and formal presentations. Companion lectures cover advanced topics in game design, game programming, and software project management. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Courses 20 and 109, and any two of: courses 102, 105, 111, 128, 130, 140, 146, 148, 160/L, 161/L, 164/L, 180, 181, 183; Computer Engineering 110, 112, 113, 117/L, 118/L, 150. *J. Whitehead, N. Wardrip-Fruin, M. Mateas*

171. Games Design Studio II. W

Second of a three-course capstone sequence for the computer game design program. Students work in teams on the software design, implementation, and testing of the computer game designed in course 170. Includes design reviews, progress reviews, and formal presentations. Companion lectures cover topics in software engineering, including design, testing, and project management. Game design and game programming also covered. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior computer game design majors. *J. Whitehead, N. Wardrip-Fruin, M. Mateas*

172. Game Design Studio III. S

Third of a three-course capstone sequence for the computer game design program. Students work in teams on the software design, implementation and testing of the computer game designed in courses 170 and 171. Includes progress reviews and formal presentations. Companion lectures cover topics in software engineering, including user and software testing, release engineering and project management; also covered are game design and game programming. Students are billed a materials fee. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 171. Enrollment restricted to senior computer game design majors. *J. Whitehead, N. Wardrip-Fruin, M. Mateas*

180. Database Systems I. W

Introduction to the concepts, approaches, tools, and methodology of database design. Covers the entity-relationship model, the relational model, relational algebra, relational calculus, commercial languages (such as SQL and QBE), functional dependencies, normal forms, and design theory. Other topics may include knowledge-bases, constraint databases, and alternative database models. Prerequisite(s): course 101. *W. Tan, P. Kolaitis, N. Polyzotis*

181. Database Systems II. *

Introduction to the architecture and implementation of database systems. Topics covered include data storage, tree and hash indexes, storage management, query evaluation and optimization, transaction management, concurrency control, recovery, and XML data management. Prerequisite(s): course 180. *N. Polyzotis, W. Tan*

182. Introduction to Database Management Systems. F

Concepts, approaches, tools, and methodology of database design. Topics include the entity-relationship model; the relational data model; normal forms; commercial languages such as SQL (SQL constraints, SQL triggers, and update languages); query-by-example (QBE); XML data model, and XML query language (XQuery); as well as relational database-management support for XML and object-relational features in database-management systems. Involves a database-application development project. Prerequisite(s): course 12B. Course intended for

non-majors; computer science majors should enroll in course 180. *N. Polyzotis, W. Tan*

183. Hypermedia and the Web. S

An introduction to the construction of hypermedia systems and large-scale web applications. Topics covered include pre-web hypertext systems, hypermedia data models, namespaces, system architecture of the web, design of large linked information spaces, design and development of database-backed web applications, web site load testing, and web collaboration technologies. Students work in teams over the term to develop a significant web application. Prerequisite(s): course 180 or 182. *J. Whitehead*

191. Computer Science and Technology Seminar (2 credits). *

Weekly talks by industry experts, university researchers, field practitioners, and video presentations provide an in-depth exposure to a specific or a broad area of computer science and technology. Topics include emerging ideas, opportunities, challenges, and future of the industry. May be repeated for credit. *The Staff*

192. Supervised Student Teaching/Tutoring. F,W,S

Students hold tutoring hours, run a lab, or lead discussion section in conjunction with a regularly offered course and under close supervision by the course's instructor. Weekly meetings with a regular faculty member to discuss teaching techniques, pedagogy, sensitivity to students' needs, maintaining a comfortable learning environment, and strategies for handling difficult situations. Students submit a report on their teaching experience. Enrollment by permission of instructor and restricted to sophomores, juniors, and seniors. *D. Helmbold*

192F. Supervised Student Teaching/Tutoring (2 credits). F,W,S

Students hold tutoring hours, run a lab, or lead discussion section in conjunction with a regularly offered course and under close supervision by the course's instructor. Weekly meetings with a regular faculty member to discuss teaching techniques, pedagogy, sensitivity to students' needs, maintaining a comfortable learning environment, and strategies for handling difficult situations. Students submit a report on their teaching experience. Enrollment by permission of instructor and restricted to sophomores, juniors, and seniors. *D. Helmbold*

193. Field Study. F,W,S

Provides for individual programs of study with specific academic objectives carried out under the direction of a member of the Computer Science Department and using resources not normally available on campus. Credit is based on the presentation of evidence of achieving the objectives, usually a term paper or project. Cannot normally be repeated for credit. Students submit petition to sponsoring agency. *The Staff*

193E. Field Study (2 credits). F,W,S

Provides for individual programs of study with specific academic objectives carried out under the direction of a faculty member of the Computer Science Department and a willing sponsor at the field site. Uses resources not normally available on campus. Credit is based on the presentation of evidence of achieving the objectives by submitting a written and oral presentation. Cannot normally be repeated for credit. Intended for students majoring in computer science. Students submit petition to sponsoring agency. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty member. Intended for students majoring in computer science. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195. Senior Thesis Research. F,W,S

Students submit petition to sponsoring agency. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. *The Staff*

195F. Senior Thesis Research (2 credits). F,W,S

Intended for majors. Students submit petition to sponsoring agency. *The Staff*

198. Individual Study or Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Individual Study or Research (2 credits). F,W,S

Intended for majors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

For fourth-year students majoring in computer science. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

For fourth-year students majoring in computer science. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**200. Research and Teaching in Computer Science and Engineering (3 credits). F**

Basic teaching techniques for teaching assistants, including responsibilities and rights of teaching assistants, resource materials, computer security, leading discussion or lab sessions, presentation techniques, maintaining class records, electronic handling of homework, and grading. The course examines research and professional training, including use of the library and online databases, technical typesetting, writing journal and conference papers, publishing in computer science and computer engineering, giving talks in seminars and conferences, and ethical issues in science and engineering. Required for all teaching assistants. Enrollment restricted to graduate students. *C. Flanagan*

201. Analysis of Algorithms. F

Rigorous analysis of the time and space requirements of important algorithms, including worst case, average case, and amortized analysis. Techniques include order-notation, recurrence relations, information-theoretic lower bounds, adversary arguments. Analysis of the key data structures: trees, hash tables, balanced tree schemes, priority queues, Fibonacci and binomial heaps. Algorithmic paradigms such as divide and conquer, dynamic programming, union-find with path compression, augmenting paths. Selected advanced algorithms. Introduction to NP-completeness. Enrollment restricted to graduate students; undergraduate students may enroll in this course if they have completed either course 102 or Computer Engineering 177 and have the consent of the instructor. *A. Van Gelder, D. Achlioptas, D. Helmbold*

203. Programming Languages. W

Covers current issues in programming languages. Language topics include object oriented, concurrent, functional, and logic programming, and other programmable applications such as symbolic manipulators and simula-

tion. Enrollment restricted to graduate students; undergraduate students may enroll for this course if they have completed course 112 and have the consent of the instructor. *C. Flanagan, C. McDowell, A. Van Gelder*

204. Compiler Design. *

Advanced study of compiler implementation. Topics include compiler structure back end, run-time environments, storage management, garbage collection, register allocation, code generation, basic blocks, control flow, data flow, local and global optimization, interpretation, machine code generation. Students may not receive credit for this course and course 104B. Taught in conjunction with 104B. Prerequisite(s): course 104A or equivalent. Enrollment restricted to graduate students. Offered in alternate academic years. *W. Mackey*

210. Computational Models and Complexity. W

Finite automata and regular expressions, universal models of computation, computability and unsolvability, relations between complexity classes, hierarchy theorems, reductions, complete problems for the major complexity classes (L, NL, P, NP, PSPACE). Other topics may include complexity of counting and enumeration problems, complexity of approximation, randomized complexity classes. Prerequisite(s): course 201. *M. Warmuth, D. Helmbold, P. Kolaitis*

211. Combinatorial Algorithms. *

Fundamental combinatorial algorithms, graph algorithms, flow problems, matching problems, linear programming, integer programming, NP-completeness, approximation algorithms for optimization problems. Prerequisite(s): course 201. Offered in alternate academic years. *D. Achlioptas, P. Kolaitis*

217. Logic in Computer Science. S

The applications and uses of formal systems to computer science. Covers the syntax and semantics of propositional logic and first-order logic, normal forms, soundness and completeness theorems, Herbrand's theorem, unification and resolution, foundations of logic programming, automated theorem proving. Other topics may include deductive databases, database query languages, non-monotonic reasoning. Enrollment restricted to graduate students. Offered in alternate academic years. *P. Kolaitis, A. Van Gelder*

221. Advanced Operating Systems. *

A detailed study of the issues involved in operating systems design and implementation. Readings cover current research topics and systems of historical significance. Topics include (but are not restricted to) process and memory management, protection, security, synchronization, performance evaluation, file systems, distributed systems. Enrollment restricted to graduate students; undergraduates by interview only. *E. Miller, D. Long, S. Brandt*

223. Advanced Computer Security. W

Overview of research topics in computer and network security. Topics may include cryptographic operations, security properties and policies, authentication and access control, attacks on computer systems and defenses against them, security in programming languages, and network protocols for security. Enrollment restricted to graduate students or consent of instructor. *E. Miller, D. Long, M. Abadi*

229. Storage Systems. *

Topics include storage devices, storage architectures, local file systems, high-performance file systems, and next-generation storage devices and architectures; covers issues of performance, reliability, scalability, robustness, and security. Enrollment restricted to graduate students. *E. Miller, D. Long, S. Brandt*

232. Distributed Systems. *

Overview of research topics in distributed computer systems. Topics may include communication paradigms, process management, naming, synchronization and coordination, consistency and replication, fault tolerance, and security. Examples include distributed operating systems, distributed file and object systems, distributed document systems, and peer-to-peer systems. Enrollment restricted to graduate students. *D. Long, E. Miller*

240. Artificial Intelligence. W

Prepares students for doing research in artificial intelligence. Major topics covered are search and heuristics, knowledge representation, planning, deduction and inference, reinforcement learning, associative pattern retrieval, and adaptive search. Discussion includes current research issues in AI problem-solving methods. Individualized projects. Students cannot receive credit for this course and course 140. Enrollment limited to 30. *I. Pohl, M. Walker, R. Levinson*

241. Knowledge Engineering. S

Introduction to the acquisition, representation, and application of knowledge in expert systems. Topics include production systems, backward and forward chaining, dependency-directed backtracking, reasoning with uncertainty, certainty factors, fuzzy systems, knowledge representation (rules, frames, and semantic nets), inference engines, and metaknowledge. Discussion includes current research issues in adaptive expert systems. Involves one major project. Undergraduates may enroll in this course if they have completed course 140. Offered in alternate academic years. *R. Levinson*

242. Machine Learning. S

Introduction to machine learning algorithms. Covers learning models from fields of statistical decision theory and pattern recognition, artificial intelligence, and theoretical computer science. Topics include classification learning and the Probably Approximately Correct (PAC) learning framework, density estimation and Bayesian learning, EM, regression, and online learning. Provides an introduction to standard learning methods such as neural networks, decision trees, boosting, nearest neighbor, and support vector machines. Requirements include one major experimental learning project or theoretical paper. Enrollment restricted to graduate students. Enrollment limited to 30. *D. Helmbold, M. Warmuth*

244. Artificial Intelligence in Games. F

Artificial intelligence has long used game-playing as a metric for progress. Key algorithms such as alpha-beta and HPA search studied. Computer algorithms for backgammon, poker, and chess examined. There will be individualized projects. Prerequisite(s): course 201; and course 211 or 240 or 242. Enrollment limited to 20. *I. Pohl, A. Jhala, M. Mateas*

245. Computational Models of Discourse and Dialogue. S

Focuses on classic and current theories and research topics in the computational modeling of discourse and dialogue, with applications to human-computer dialogue interactions; dialogue interaction in computer games and interactive story systems; and processing of human-to-human conversational and dialogue-like language such as e-mails. Topics vary depending on the current research of the instructor(s) and the interests of the students. Students read theoretical and technical papers from journals and conference proceedings and present class lectures. A research project is required. (Also offered as Psychology 245. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. May be repeated for credit. *M. Walker*

248. Interactive Storytelling. W

Covers wide range of practices including hypertext, interactive fiction, embedded narratives in games, interactive drama, and artificial intelligence-based story generation. Through a mixture of readings, assignments, and project work, explores the theoretical positions, debates, and technical and design issues arising from these different approaches. Students may not receive credit for this course and course 148. (Formerly *Interactive Narrative*.) Enrollment restricted to graduate students. Enrollment limited to 20. *M. Mateas*

250. Introduction to Information Theory. F

An introduction to information theory including topics such as entropy, relative entropy, mutual information, asymptotic equipartition property, channel capacity, differential entropy, rate distortion theory, and universal source coding. (Also offered as Electrical Engineering 253. Students cannot receive credit for both courses.) Prerequisite(s): Computer Engineering 107, or Applied Mathematics and Statistics 131 or equivalent course, or permission of instructor. Enrollment restricted to graduate students. *H. Sadjadpour*

253. Advanced Programming Languages. *

Covers issues in the design, implementation, analysis, and specification of programming languages. Topics include formal semantics (including operational, axiomatic, and denotational semantics), advanced type systems, program analysis (including abstract interpretation and model checking), specification, and verification. Prerequisite(s): course 203 or equivalent. *C. Flanagan*

260. Computer Graphics. F

Introduces current research and techniques of modeling, 2D/3D transformation, matrix composition, shading algorithms, and rendering to obtain computer-generated imagery. Programming assignments and major project required. Students cannot receive credit for both this course and course 160. Enrollment restricted to graduate students; undergraduates by interview only. Enrollment limited to 20. *A. Pang, J. Davis, S. Lodha*

261. Advanced Visualization. *

Covers advanced topics in visualization, e.g., tensor-field visualization, uncertainty visualization, information visualization. Topics vary with differing offerings of the course. Course includes lectures, exam, research paper reading/presentation, and projects. Final project is expected to be at a sufficiently advanced level for submission to a conference. Students work individually or in pairs. Enrollment by permission of instructor. Enrollment restricted to graduate students. *A. Pang*

262. Computer Animation. S

An in-depth treatment of computer animation, including its origins in conventional animation, 2-D animation, in-betweening, motion control, morphing, graphical motion editors, animation languages, motion blur, simulation of articulated body motion, realtime animation, and special-purpose animation hardware. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Davis, A. Pang*

272. Evolutionary Game Theory. *

Reviews static equilibrium concepts, games of incomplete information, and the traditional theory of dynamic games in discrete time. Develops recent evolutionary game models, including replicator and best reply dynamics, and applications to economics, computer science, and biology. Prerequisite(s): upper-division math courses in probability theory are strongly recommended. Cannot receive credit for this course and Economics 166B or Computer Science 166B. (Also offered as Biology:Ecology and Evolution-

ary 274. Students cannot receive credit for both courses.) *The Staff*

277. Principles of Database Systems. *

Advanced course on principles of database systems. Main topics include overview of the relational data model and relational query languages; recursive queries, datalog, and fixed-points; query processing and optimization; database design, dependencies, normal forms, and the chase procedure. Additional topics may include information integration, complex objects, semistructured data, and XML. (Formerly *Database Systems I*.) Prerequisite(s): course 180 (or equivalent) or consent of instructor. Enrollment restricted to graduate students. Enrollment limited to 20. Offered in alternate academic years. *W. Tan, P. Kolaitis, N. Polyzotis*

278. Design and Implementation of Database Systems. F

Advanced course in implementation techniques for database systems. For students who wish to do research in databases or to learn more about large-scale data processing. Topics include: indexing of complex data; techniques for high-volume concurrency control; query processing and optimization; database recovery; parallel database system architectures; database systems for streaming data; approximate query answering. Additional topics may include: self-managing database systems; advanced query optimization techniques; and query processing techniques for semi-structured data. (Formerly *Database Systems II*.) Prerequisite(s): course 277 or 181 (or equivalent) or consent of instructor. Enrollment restricted to graduate students. Enrollment limited to 20. *N. Polyzotis, W. Tan*

279. Software Reuse and Component-Based Software Engineering. *

Detailed study of interlocking business, organizational, and technical issues in large-scale software reuse and component-based software engineering. Topics include architecture, design for reuse, domain engineering, model-driven development, domain-specific kits, components, frameworks, software agents, generators, problem-oriented languages, library design, reuse tools, patterns, and aspects. Assumes prior exposure to software engineering topics. Prerequisite(s): computer engineering 276 or consent of instructor. Enrollment restricted to graduate students. Enrollment limited to 20. *C. McDowell*

280A. Seminar in Computer Science Research (2 credits). *

Weekly seminar covering topics of current research in computer science. Enrollment by permission of instructor. Enrollment limited to 30. May be repeated for credit. *The Staff*

280D. Seminar in Database Systems (2 credits). F,W,S

Covers advanced research topics from the recent literature in database systems and related fields. Involves presentations from UCSC students and faculty, and guest talks from researchers in industry and other academic institutions. Enrollment by permission of instructor. Enrollment by permission of instructor. Enrollment limited to 30. May be repeated for credit. *W. Tan, P. Kolaitis, N. Polyzotis*

280G. Seminar on Software Engineering (2 credits). F

Weekly seminar covering topics of current research in software engineering. Prerequisite(s): permission of instructor. Enrollment restricted to graduate students. Enrollment limited to 30. May be repeated for credit. *J. Whitehead, C. McDowell, C. Flanagan*

280J. Seminar on Computer Graphics (2 credits).

* Weekly seminar covering topics of current research in computer graphics. Enrollment restricted to graduate students and by permission of instructor. Enrollment limited to 30. May be repeated for credit. *J. Davis*

280S. Seminar on Computer Systems (2 credits). F,W,S

Weekly seminar series covering topics of current research in computer systems. Enrollment by permission of instructor. Enrollment limited to 30. May be repeated for credit. *E. Miller, C. Maltzahn, D. Long, S. Brandt*

280W. Seminar in Digital Media (2 credits). *

Covers advanced topics and current research in digital media—the interdisciplinary field at the intersection of computer science, media authoring, and models of interpretation from the humanities and social sciences. Focuses on student presentations and seminar participation. Enrollment restricted to graduate students. May be repeated for credit. *N. Wardrip-Fruin*

280X. Expressive AI (2 credits). F,W,S

Weekly seminar covering topics of current research in artificial intelligence applied to interactive art and entertainment, including computer games. Enrollment by permission of instructor. Enrollment restricted to graduate students. Enrollment limited to 30. May be repeated for credit. *M. Mateas*

290A. Topics in Algorithms and Complexity Theory: Probabilistic Algorithms and Average Case Analysis. *

Examines the use of probability theory both in the design and analysis of algorithms. Uses probability theory to analyze the average performance of deterministic algorithms on randomly chosen or "typical" inputs, rather than on worst case inputs. Also a look at algorithms that use randomization, such as random walk and simulated annealing techniques. Examples of specific topics include martingales, random graphs, and rapidly mixing Markov Chains. Enrollment restricted to graduate students. Enrollment limited to 15. Offered in alternate academic years. May be repeated for credit. *D. Achlioptas*

290B. Advanced Topics in Computer Graphics. *

A graduate seminar in computer graphics on topics from recently published research journal articles and conference proceedings. Topics vary from year to year depending on interests of students. Primary areas of interest are likely to be scientific visualization, modeling, rendering, scattered data techniques, wavelets, and color and vision models. Students read technical papers and present class lectures. Guest lecturers supplement the student presentations. A research project is required. Enrollment limited to 15. May be repeated for credit. *A. Pang, J. Davis, S. Lodha*

290C. Advanced Topics in Machine Learning. *

In-depth study of current research topics in machine learning. Topics vary from year to year but include multi-class learning with boosting and SUM algorithms, belief nets, independent component analysis, MCMC sampling, and advanced clustering methods. Students read and present research papers; theoretical homework in addition to a research project. Prerequisite(s): course 242. May be repeated for credit. *D. Helmbold, M. Warmuth*

290D. Neural Computation. *

An introduction to the design and analysis of neural network algorithms. Concentrates on large artificial neural networks and their applications in pattern recognition, signal processing, and forecasting and control. Topics include Hopfield and Boltzmann machines, perceptions, multilayer feed forward nets, and multilayer recurrent

networks. Enrollment restricted to graduate students. Offered in alternate academic years. May be repeated for credit. *M. Warmuth*

290E. Object-Oriented Programming Methodology. *

Object-oriented programming methodology is the application of abstract-data types and polymorphism to coding solution. Topics geared to beginning thesis research in this field. Prerequisite(s): courses 201 and 203. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *C. McDowell, I. Pohl*

290F. Applications of Combinatorics. *

Combinatorial mathematics, including summation methods, working with binomial coefficients, combinatorial sequences (Fibonacci, Stirling, Eulerian, Harmonic, Bernoulli numbers), generating functions and their uses, Bernoulli processes, and other topics in discrete probability. Oriented toward problem solving, applications mainly to computer science, but also physics. Prerequisite(s): Computer Engineering 16 and Applied Mathematics and Statistics 10. Enrollment restricted to graduate students and upper-division undergraduates. Offered in alternate academic years. May be repeated for credit. *I. Pohl*

290G. Topics in Software Engineering. *

Research seminar on current topics in software engineering. Topics vary from year to year depending on the current research of the instructor(s) and interests of students. Students read technical papers from relevant journals and conference proceedings. Synthesis and understanding of materials is demonstrated by a required research project. Prerequisite(s): Computer Engineering 276 recommended. Enrollment restricted to graduate students; undergraduates may enroll with permission of instructor. Enrollment limited to 35. May be repeated for credit. *J. Whitehead, C. McDowell, C. Flanagan*

290H. Topics in Database Systems. *

Focuses on current research topics in database systems. Different offerings cover different topics depending on current research of instructor(s) and the interests of students. Students read technical papers from journals and conference proceedings and present class lectures. A research project is required. Prerequisite(s): course 180 (or equivalent) or 277 or consent of instructor. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *W. Tan, P. Kolaitis, N. Polyzotis*

290J. Playable Media. W

Focuses on media, such as computer games, that invite and structure play. Work includes building and critiquing a series of prototypes; studying major examples in the field; and discussing both theoretical and practice-oriented texts. (Also offered as Digital Arts and New Media 250D. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. May be repeated for credit. *N. Wardrip-Fruin, M. Mateas*

290P. Topics in Computational Cinematography. *

Focuses on discussion of recent advances in visual storytelling in graphical environments. Major topics covered are: intelligent camera control, shot-compositions, lighting design, interactive storytelling, and computational techniques associated with these applications. Class consists of in-class discussions and student presentations of research papers and a final student project. Enrollment restricted to graduate students. *A. Jhala*

290S. Advanced Topics in Computer Systems. F

Focuses on current research topics in computer systems. Topics vary from year to year depending on the cur-

rent research of the instructor(s) and the interests of the students. Students read technical papers from current journals and conference proceedings, and present class lectures. A research project is required. Prerequisite(s): course 221 recommended. Enrollment restricted to graduate students; qualified undergraduates may enroll with instructor's consent. May be repeated for credit. *E. Miller, C. Maltzahn, D. Long, S. Brandt*

290T. Topics in Computing for Society. *

Current research topics on computer technology that is intentionally targeted to benefiting society. Topics vary year to year. Students read papers from current conferences and journals, and present class lectures. A research project is required. Enrollment restricted to graduate students. May be repeated for credit. *J. Davis*

290X. Cryptography and Computer Security. *

Research seminar on encryption and related technologies. Topics include theory of codes, random sequences and generators, public key cryptosystems, private key cyphers, key exchange protocols, quantum computing and cryptography. Major project required. Prerequisite: interview with instructor. Enrollment limited to 12. May be repeated for credit. *The Staff*

296. Masters Project (2 credits). F,W,S

Independent completion of a masters project under faculty supervision. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study or Research. F,W,S

Independent study or research under faculty supervision. Although this course may be repeated for credit, not every degree program will accept a repeated course towards degree requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297F. Independent Study or Research (2 credits). F,W,S

Independent study or research under faculty supervision. Although this course may be repeated for credit, not every degree program will accept a repeated course towards degree requirements. (Formerly offered as *Directed Readings in Machine Learning*.) May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Thesis research conducted under faculty supervision. Although the course may be repeated for credit, not every degree program will accept a repeated course towards degree requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Electrical Engineering

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Faculty and Professional Interests

Professor

BENJAMIN FRIEDLANDER
Digital communications, wireless communication system, array processing, adaptive signal processing

CLAIRE GU

Fiber sensors for bio-applications, optical fiber communications, volume holographic data storage, liquid crystal displays, nonlinear optics, optical information processing

MICHAEL ISAACSON

Nano- and microfabrication technology and applications to biomedical and diagnostic devices, nanocharacterization of materials with emphasis on the development of microscopy tools, novel modes of imaging, electron and light optics

GRETCHEN KALONJI

Symmetry constraints on the structure and properties of crystalline defects; phase transformations and microstructural evolution; atomistic computer simulation techniques applied to materials; innovations in science and engineering education; new models for multinational collaboration in research and education

WENTAI LIU

Retinal prosthesis, biomimetic systems, integrated neuro-electronics, molecular electronics, CMOS and SOI transceiver design, current mode band limited signaling, microelectronic sensor, timing/clock recovery and optimization, noise characterization and modeling, and computer vision/image processing

PEYMAN MILANFAR

Statistical signal, image, and video processing; computer vision; modeling and inverse problems in imaging; detection and estimation theory

KENNETH PEDROTTI (Department Chair)

Integrated circuit design for communications, analog electronics, radio frequency integrated circuits, low-phase-noise oscillators, frequency synthesis, VLSI clock distribution, optical communications, high-speed electronics for lightwave systems, devices for all optical networking and imaging

ARTHUR P. RAMIREZ (Divisional Dean)

Experimental materials physics encompassing a broad range of systems including semiconductors, superconductors, magnets, thermoelectrics, and dielectrics. Research that connects materials and devices, with a focus on oxides and organics. Many-body physics that arises from geometrical frustration of low energy degrees of freedom. Techniques include ultra-low temperatures and high magnetic fields, thermodynamic and transport measurements, defect spectroscopy, and device characterization.

HAMID SADJADPOUR

Wireless communication systems, network information theory and scaling laws, performance analysis of wireless ad hoc and sensor networks, routing and MAC protocol design for wireless networks

HOLGER SCHMIDT

Optofluidics, hollow-core photonics for biomedicine and quantum optics, nanomagneto-optics, single-particle spectroscopy, ultrafast optics

ALI SHAKOURI

Quantum electronics; nano- and microscale heat and current transport in semiconductor devices; thermoelectric/thermionic energy conversion; renewable energy sources; thermal imaging; micro-refrigerators on a chip; and optoelectronic integrated circuits

JOHN F. VESECKY

HF radar design and construction and observation of ocean surface winds, waves and currents with applications to coastal and deep water ocean processes; project MEDSAT

DONALD WIBERG, Emeritus (UCLA)

Control systems, Kalman filtering, system parameter estimation, adaptive optics for large telescopes, and biomedical system modeling

Associate Professor

NOBUHIKO P. KOBAYASHI

Physics and chemistry of complex functional materials

(e.g., coupled organic-inorganic materials, hybrid crystalline-amorphous materials); Group III-V compound semiconductor nanometer-scale structures and related solid-state devices; mixed oxide nanometer-scale structures and related solid-state devices; tailored nanometer-scale semiconductor structures for energy conversion applications at NECTAR: Nanostructured Energy Conversion Technology and Research (Co-director of Advanced studies Laboratories, UCSC and NASA Ames Research Center)

JOEL KUBBY

Micro-Electro-Mechanical-Systems (MEMS), adaptive optics (AO), optical-MEMS, bio-MEMS, bio-imaging, AO microscopy

Adjunct Professor

JOHN BALACHANDRA

Electric power systems control and stability, microgrid generation and controls, sustainable energy and power generation

BIN CHEN

Synthesis and characterizations of semiconductor and metal nanostructure materials and hybrid composites; novel materials applications and multifunctional devices for energy harvesting, conversions and storage, and ultra-sensitive imaging and detection techniques

FARID DOWLA

Signal and image processing

HEINZ ERZBERGER

Air traffic control

SUNG-MO (STEVE) KANG

Low-power, High-speed VLSI circuit design and synthesis, RF circuits, biological circuits, mixed technology, mixed signal CAD

EPHRAIM SUHIR

Physical design, reliability and packaging of micro- and optoelectronic systems, materials engineering, applied probability, predictive modeling, nanoengineering

Associate Adjunct Professor

NATALIO MINGO

Thermal and electronic transport, nanomaterials, nanotechnology, surface science, computational physics

TOSHISHIGE YAMADA

Modeling, micro/nanoscale electronic material and device experiments phenomenology, using energy band and equivalent circuit methods

Assistant Adjunct Professor

ZHIXI BIAN

Semiconductor materials and devices for optoelectronics and thermoelectrics, thermal management of microelectronics, renewable energy

KENNETH LAWS

HF radar sensing of ocean surface phenomena, autonomous ocean surface vehicles and passive microwave measurements of ocean surface vehicles

DOMINIK RABUS

Photonic Integrated Circuits (PICs), both in semiconductors and polymer materials



SUE CARTER (Physics)

Experimental condensed matter physics, polymer physics, molecular electronics, phase transitions, electronic and optical properties of materials

DAVID W. DEAMER (joint with Chemistry and Biochemistry and Biomolecular Engineering, UC

Davis Emeritus)

Membrane biophysics, nanopore analysis, DNA sequencing, biomolecular self-assembly

WILLIAM DUNBAR (Computer Engineering)

Theory and application of feedback control, single-molecule biophysics, nanopore sensors, dynamics and control of biomolecules

GABRIEL ELKAIM (Computer Engineering)

Embedded systems, robust software architectures for real-time reactive systems; sensor fusion; guidance, navigation, and control (GNC) system identification; robust and advanced control schemes; feedback control systems, robotics, unmanned autonomous vehicles (UAVs); and cooperative control

J.J. GARCIA-LUNA-ACEVES

Chair of Computer Engineering
Baskin Professor of Computer Engineering and Director of Networking Sciences Institute
Computer communication, wireless networks, Internet, network science

MATTHEW R. GUTHAUS (Computer Engineering)

VLSI, CAD, design for reliability and variability, system-on-chip, 3D IC, system-in-package

RONNIE D. LIPSCHUTZ (Politics)

International relations; global political economy; globalization; foreign policy; resource/environmental politics; global political networks; global civil society and social movements; popular culture and politics; technology and society; risk society

DARRELL D. E. Long (Computer Science)

Storage systems, distributed computing systems, operating systems, mobile computing, performance evaluation, fault tolerance, computer security, multimedia, and video-on-demand systems

ROBERTO MANDUCHI (Computer Engineering)

Computer vision and sensor processing, with application to assistive technology for the visually impaired

PATRICK E. MANTEY (Computer Engineering)

(Baskin Professor of Computer Engineering)
CITRIS Campus Director
Multimedia systems, digital signal processing, sensor systems and networks, real-time monitoring and control, image systems, image processing, visualization, geographic information systems, decision support systems

CLAIRE MAX (Astronomy/Astrophysics and UCO/

Lick Observatory)
Adaptive optics, planetary science

JERRY NELSON (Astronomy/Astrophysics and

UCO/Lick Observatory)
Design and construction of large telescopes; project scientist for the Keck telescope and Thirty Meter telescope

JOSE RENAU (Computer Engineering)

Computer architecture, including design effort metrics and models, infrared thermal measurements, thermal modeling, process variability, energy efficient data-centers, thread level speculation, and FPGA/ASIC design

B. SHASTRY (Physics)

Condensed matter physics, strongly correlated matter, Moti-Hubbard physics, high T_c superconductivity, quantum magnetism, exactly integrable systems, exactly solvable models of many-body systems and in statistical mechanics, quantum chaos, geometric frustration

WILLIAM T. SULLIVAN (Biology)

Genetics, cell biology, development of the *Drosophila* embryo

HAI TAO (COMPUTER ENGINEERING)

Image and video processing, computer vision, vision-based graphics, and human-computer interaction

JIN Z. ZHANG (Chemistry)

Design, synthesis, characterization, and application of nanomaterials, including semiconductor and metal nanoparticles; femtosecond laser spectroscopy; ultrafast dynamics on surfaces and at interfaces; cancer biomarker detection; surface-enhanced Raman spectroscopy

Program Description

Mission Statement

The mission of the Electrical Engineering (EE) Department is to build and sustain a teaching and research program to provide undergraduate and graduate students with inspiring and quality education in the theory and practice of hardware- and information-processing-oriented electrical engineering; serving industry, science, and government; and bringing faculty and staff a rewarding career in teaching, research, and service. The electrical engineering program is accredited by the Engineering Accreditation Committee of the Accreditation Board for Engineering and Technology (ABET).

Summary of Objectives

The educational objectives that the Electrical Engineering Department strives to provide for students are focused in five areas: fundamental prerequisites in theory, design, and basic science for a career based on electrical engineering; a scope of application that provides theory and practical knowledge as well as specialized training in hardware- and information-oriented electrical engineering; a professional approach to engineering in terms of high quality work skills in communication, teamwork, responsibility, high ethical standards, and participation in lifelong learning and the professional engineering community; encouragement and motivation based on a milieu of readily available opportunities, mentoring, and advising; and the basis for a successful transition to an engineering career, including an ability to apply research to engineering and opportunities for experience in an industry setting.

Engineering is a profession that emphasizes analysis and design, and electrical engineers apply their knowledge to an expanding array of technical, scientific, and mathematical questions. A good engineering education has three parts: a sound foundation in mathematics and science, substantial design experience to develop skills and engineering aesthetics, and a focus in the humanities and social sciences to learn how and where to apply the skills developed. Electrical engineering is a very broad discipline; the program at UCSC complements existing campus programs, emphasizing three general areas: electronics/optics (including digital and analog circuits and devices); communications (including signal and image processing and control); and VLSI design, micro-technology, nanotechnology, and biomedical devices.

The undergraduate curriculum provides a balance of engineering science and design. For the first two years, all electrical engineering students are expected to take a basic set of lower-division mathematics, physical science, and engineering courses. After the first two years, electrical engineering students focus on topics within the discipline and specialize in one of two options: electronics/optics, including digital and analog circuits and devices, VLSI design, optoelectronics, electromagnetics, and biomedical device engineering; or communications, signals, systems, and control, including optical, wireless communication, signal and image processing, networks signal processing, instrumentation, and control. Students interested in admission to the electrical engineering major should contact the Baskin School of

Engineering Undergraduate Advising office, (831) 459-5840 or advising@soe.ucsc.edu.

Electrical Engineering Policies

Admissions Policy

Admission to the electrical engineering major is selective. First-year applicants may receive direct admission at the time they apply to UCSC based on their high school record and test scores. Students not directly admitted may still apply during their first year and their acceptance will be based upon their School of Engineering grade point average (GPA), their high school grade point average, courses completed in mathematics and sciences, and scores on standardized tests. After the first year, students can apply to declare an electrical engineering major upon successful completion of all the following foundation courses with a School of Engineering GPA of 2.8 or better: Mathematics 19A-B, Applied Mathematics and Statistics 10 and 20, Physics 5A, 5B, and 5C.

Students who have not met this GPA requirement are required to meet with the Electrical Engineering Undergraduate Director. Please refer to the School of Engineering section of the catalog for the full admissions policy.

Course Substitution

Please refer to the School of Engineering section of the catalog for the policy regarding course substitution.

Disqualification Policy

Please refer to the School of Engineering section of the catalog for the Major Disqualification Policy.

Letter Grade Policy

The Electrical Engineering Department requires letter grading for all courses applied toward the bachelor of science (B.S.) degree, with the exception of two lower-division courses, which students may elect to take Pass/No Pass.

Honors in the Major

Electrical engineering majors are considered for "Honors in the Major" and "Highest Honors in the Major" based on the School of Engineering GPA and on results of undergraduate research and other significant contributions to the School of Engineering. Students with an SoE GPA of 3.7, in most cases, receive highest honors. Students with an SoE GPA of 3.3, in most cases, receive honors. Students with particularly significant accomplishments in undergraduate research or contributions to the School of Engineering may be considered with a lower SoE GPA. Electrical engineering juniors and seniors may also be eligible for election to the UCSC chapter of Tau Beta Pi, the national engineering honor society founded in 1885.

Transfer Students

Please refer to the School of Engineering section of the catalog for the policy regarding transfer students and admission of transfer students to the electrical engineering major.

School of Engineering Policies

Please refer to the School of Engineering section of the catalog for additional policies that apply to all School of Engineering programs.

Major Requirements

In addition to completing UCSC's general education requirements, students must complete 15 lower-division science and engineering courses, plus associated laboratories; nine upper-division engineering courses, plus associated laboratories; four engineering electives; and a two-quarter comprehensive senior design project course. To plan for completion of these requirements within the normative time, students should consult with an adviser at the Baskin School of Engineering Undergraduate Advising office as early as possible.

Students gain a solid foundation in calculus, engineering mathematics, physics, computer science, and computer engineering during their first two years. Majors must complete the following 15 lower-division courses (including corresponding laboratories). These courses form part of the prerequisite sequence and should be completed during the first two years at UCSC. The requirements are rigorous; students must be prepared to begin these courses early in their studies.

Lower-Division Requirements

Students gain a solid foundation in calculus, engineering mathematics, physics, computer science, and computer engineering during their first two years. Majors must complete the following 15 lower-division courses (including corresponding laboratories). These courses form part of the prerequisite sequence and should be completed during the first two years at UCSC. The requirements are rigorous; students must be prepared to begin these courses early in their studies.

Electrical Engineering

80T, *Modern Electronic Technology and How It Works*

Computer Engineering/Computer Science

Computer Engineering 12/L, *Computer Systems and Assembly Language/Laboratory*

Computer Engineering 13/L, *Computer Systems and C Programming/Laboratory* or Computer Science 12A/L, *Introduction to Programming (Accelerated)/Laboratory*

Computer Engineering 16, *Applied Discrete Mathematics*

Computer Engineering 80E, *Engineering Ethics*

Mathematics

19A-B, *Calculus for Science, Engineering, and Mathematics*

23A-B, *Multivariable Calculus*

Applied Mathematics and Statistics

10, *Mathematical Methods for Engineers I*

20, *Mathematical Methods for Engineers II*

Physics

5A/L, 5B/M, 5C/N, *Introduction to Physics/Laboratories*

5D, *Heat, Thermodynamics, and Kinetics*

Ethics

Students must take one of the following courses (required even for transfer students who have had their general education requirements waived):

Computer Engineering 80E, *Engineering Ethics*

Philosophy 22, *Introduction to Ethical Theory*

Philosophy 24, *Introduction to Ethics: Contemporary Moral Issues*

Philosophy 28, *Environmental Ethics*

Biomolecular Engineering 80G/Philosophy 80G, *Bioethics in the 21st Century: Science, Business, and Society*

Upper-Division Requirements

Fifteen upper-division courses along with associated 1- or 2-credit laboratories are required for the major. The course requirements include both depth and breadth, technical writing, and a comprehensive capstone design project.

All students are required to take the following nine upper-division courses, with associated laboratories:

Electrical Engineering

101/L, *Introduction to Electronic Circuits/Laboratory*

103, *Signals and Systems*

135/L, *Electromagnetic Fields and Waves/Laboratory*

145/L, *Properties of Materials/Laboratory*

151, *Communications Systems*

171/L, *Analog Electronics/Laboratory*

Computer Engineering

100/L, *Logic Design/Laboratory*

107, *Mathematical Methods of Systems Analysis: Stochastic*

185, *Technical Writing for Computer Engineers*

Required Electives. In addition to completing the above required courses, electrical engineering majors must complete four elective courses chosen from the list below. At least three must be from one of the depth-sequence concentrations listed. Certain graduate-level courses as well as those courses taught in conjunction with graduate courses may also be used to fulfill an elective requirement as listed below. No course may be counted twice. See the electrical engineering web site for course descriptions: www.ee.ucsc.edu/academics.htm.

Electronics/Optics Concentration

Electrical Engineering

115, *Introduction to Micro-Electro-Mechanical-Systems Design*

130/L/230, *Introduction to Optoelectronics and Photonics and Laboratory/Optical Fiber Communication*

136, *Engineering Electromagnetics* (strongly recommended)

154/241, *Feedback Control Systems, and Introduction to Feedback Control Systems*

172/221, *Advanced Analog Circuits/Advanced Analog Integrated Circuits*

178, *Device Electronics*

211, *Introduction to Nanotechnology*

231, *Optical Electronics*

Computer Engineering

118/L, *Introduction to Mechatronics/Laboratory*

121/L, *Microprocessor System Design/Laboratory* (strongly recommended)

173/L, *High Speed Digital Design/Laboratory*

Applied Mathematics and Statistics

147, *Computational Methods and Applications*

Communications, Signals, Systems, and Controls Concentration

Electrical Engineering

130/L/230, *Introduction to Optoelectronics, and Photonics and Laboratory/Optical Fiber Communication*

136, *Engineering Electromagnetics* (strongly recommended)

152/252, *Introduction to Wireless Communications and Wireless Communications*

153/250, *Digital Signal Processing*

154/241, *Feedback Control Systems and Introduction to Feedback Control Systems*

251, *Principles of Digital Communications*

253, *Information Theory*

261, *Error Control Coding*

262, *Statistical Signal Processing I*

264, *Image Processing and Reconstruction*

Computer Engineering

118/L, *Introduction to Mechatronics/Laboratory*

150/L, *Introduction to Computer Networks/Laboratory*

251, *Error Control Coding* (taught in conjunction with EE 261)

Applied Mathematics and Statistics

147, *Computational Methods and Applications*

The senior-year curriculum enables students to pur-

sue independent study with a faculty member. Electrical engineering students are encouraged to take advantage of the opportunity to work within a faculty member's research group as part of their educational experience. Internship programs with local industry are available.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in electrical engineering is satisfied by completing Computer Engineering 185.

Comprehensive Requirement

The senior comprehensive requirement for electrical engineering majors is in two parts: a project course and assessment options.

Project Course

Students must complete one capstone design course that spans two quarters, Electrical Engineering 123A and 123B, or complete a senior thesis. These senior-level courses encompass an in-depth project, including analysis, design, testing, and documentation, requiring students to call upon knowledge acquired throughout their undergraduate studies. Current course choices include the following:

Electrical Engineering

123A and 123B, *Engineering Design Project I* (5 credits) and *Engineering Design Project II* (7 credits)

195, *Senior Thesis Project* (10 credits over two quarters)

Outcomes Assessment Options

The Electrical Engineering Department requires an outcomes assessment. All students are required to complete an exit survey and meet with a faculty member for an exit interview. The specifics of the outcomes assessment may change from year to year; for this catalog year, students must complete one of the following options:

1. maintenance of a 2.5 grade point average in all required and elective courses for the major; or
2. senior thesis submission; or
3. portfolio review.

Portfolios must include the following:

- project report(s);
- a one- or two-page overview of the student's contribution to the project(s);
- a two-page essay concerning the relationship of engineering to society (specific topics will be provided by the Electrical Engineering Department).

The portfolios must be submitted electronically at least seven days before the end of the instruction in the quarter of graduation. Portfolios will not be returned.

Electrical Engineering Major Planners

The following are two sample academic plans for students to complete during their first two years as preparation for the electrical engineering major.

Plan One

| Year | Fall | Winter | Spring |
|---------------|---------------------------------------|---------------------------------|------------------------------------|
| 1st (frsh) | MATH 19A PHYS 5A/L college core | MATH 19B PHYS 5B/M EE 80T | AMS 10 PHYS 5C/N gen ed (C2) |

Plan One

| Year | Fall | Winter | Spring |
|---------------|----------------------------------|--------------------------------|---------------------------------|
| 2nd (soph) | PHYS 5D MATH 23A CMPE 12/L | EE 101/L AMS 20 MATH 23B | EE 171/L CMPS 13/L gen ed |

Plan Two

| Year | Fall | Winter | Spring |
|---------------|---------------------------------|-----------------------------------|--------------------------------------|
| 1st (frsh) | AMS 3 CMPE 8 college core | MATH 19A CMPE 12/L EE 80T | MATH 19B CMPE 13/L gen ed (C2) |
| 2nd (soph) | PHYS 5A/L AMS 10 | PHYS 5B/M AMS 20 CMPE 100/L | PHYS 5C/N MATH 23A CMPE 80E |

Additional information about this program can be found on the department's web site at <http://www.ee.ucsc.edu/undergraduates>.

Electrical Engineering Minor

The electrical engineering minor provides a solid foundation in the core areas of electronic circuits and signals and systems, as well as the prerequisite material in mathematics and physics. Concentration of upper division electives in either of the major tracks constitutes substantial and focused work in the discipline of electrical engineering. This minor is particularly suitable for students with majors in Applied Physics or any School of Engineering major.

Electrical Engineering Minor Requirements

Requirements for the minor in electrical engineering are the following:

Mathematics

Mathematics 19A-B, *Calculus for Science, Engineering, and Mathematics*

Mathematics 23A, *Multivariable Calculus*

Applied Mathematics and Statistics 10, *Mathematical Methods for Engineers I*, and 20, *Mathematical Methods for Engineers II*; or Mathematics 21, *Linear Algebra* and Mathematics 24, *Ordinary Differential Equations*

Science

Physics 5A/L or 6A/L, *Mechanics* and 5C/N or 6C/N, *Electricity and Magnetism*

Core Requirements

Electrical Engineering

Electrical Engineering 101/L, *Introduction to Electronic Circuits/Laboratory*; and

Electrical Engineering 103, *Signals and Systems*; and

Electrical Engineering 171/L, *Analog Electronics/Laboratory*

Upper-Division Electives

At least 15 credits of upper-division or graduate electrical engineering courses, all chosen from one of the existing electrical engineering major tracks. All of the upper-division electives must come from the same track.

Graduate Programs

The Department of Electrical Engineering (EE) at the University of California, Santa Cruz (UCSC) offers master of science (M.S.) and doctor of philosophy (Ph.D.) degree programs and conducts research in:

- Photonics and electronics focusing on VLSI, elec-

tronic and optoelectronic materials, devices, circuits and systems for information transmission, storage, processing, and display, especially for optical-fiber communications and lower-power, high-performance systems, biomedical device instrumentation and MEMS;

- Signal processing and communications, including wireless and optical communications, coding, digital signal processing, image and video processing;
- Remote sensing including wave propagation and scattering radar oceanography, and microwave remote sensing.
- Nanotechnology including applications to biomedicine, integrated optics for biomedical imaging, opto-thermo-electric energy conversion, near-field scanning optical microscopy, nano-magneto-optics, micro-mechanics and micro-fluidics.

Electrical Engineering enjoys a close relationship with the Departments of Applied Mathematics and Statistics, Computer Science, Computer Engineering, Biomolecular Engineering, Chemistry, Physics, Astronomy, and Molecular, Cell and Developmental Biology faculty. The Electrical Engineering faculty are affiliated with: 1) several federally funded and nationally recognized centers such as the Center for Biomimetic MicroElectronic Systems, the Center for Adaptive Optics, and the Center for Biomolecular Science and Engineering; 2) state-funded centers such as the Institute for Quantitative Biology (QB3), the Center for Information Technology Research in the Interest of Society (CITRIS), and the Institute for Regenerative Medicine (CIRM); and 3) many EE faculty participate in the University Affiliated Research Center (UARC) at NASA-Ames, which is managed by UCSC. The department also has ties to nearby industry, employing electrical engineering professionals as visiting and adjunct faculty and arranging for students to gain practical research experience through work in industrial labs. Indeed, the department strongly encourages students of all nationalities to seek practical training as part of their graduate education.

Students begin the program with the completion of courses in a core area of interest and then proceed to do research in their area of specialization. The M.S. degree can be completed in two years. M.S. students must complete a master's thesis. A Ph.D. degree is usually completed in four to six years. Ph.D. students are required to take a preliminary exam within their first two years of study. After completing the course requirements, students must pass an oral qualifying exam and write a dissertation. Part-time study is possible for students working in industry while attending school.

Requirements for the Master's Degree

Course Requirements

Each student is required to take 45 credits which must consist of:

- At least 15 credits in one of the four core areas of emphasis defined above.
- At least 25 of the total 45 credits must be satisfied through EE graduate courses.
- At most 10 credits of independent study (EE 297, EE 299) are counted toward the EE course requirements.

Total credits required for the M.S. degree = 45.

Note that each graduate course satisfying the above requirements typically covers 5 credits.

Thesis

Completion of a master's thesis is required for the master's degree. To fulfill this requirement, the student submits a written proposal to a faculty member, usually by the third academic quarter. By accepting the proposal, the faculty member becomes the thesis adviser. In consultation with the adviser, the student forms a master's thesis reading committee with at least two additional faculty members, each of whom is provided a copy of the proposal. Upon completion of the thesis work, the student presents an expository talk on the thesis research, and the final thesis must be accepted by the review committee before the award of the master of science degree.

M.S. students admitted to continue to the Ph.D. program must pass a preliminary exam covering fundamental undergraduate course work (see below).

Requirements for the Ph.D. Degree

Course Requirements*

Each student is required to take 50 credits which must consist of:

- At least 20 credits in one of the four core areas of emphasis defined above.
- At least 30 of the total 50 credits must be satisfied through EE graduate courses.
- At most 10 credits of independent study (EE297, EE299) will be counted toward EE course requirements.

Total credits required for the Ph.D. degree = 50

* For students already holding a master of science in electrical engineering (M.S.E.E.) or equivalent degree, at most 20 credits of transfer credit may be granted for equivalent coursework performed at the students' M.S. granting institution. Credit transfer is subject to approval by the adviser and the electrical engineering graduate director.

Preliminary Examination

At the end of the first year, i.e., no later than the fall quarter in the following year after their entry, students admitted to the Ph.D. program must take a written examination covering basic knowledge in electrical engineering. This examination will cover material from the following technical areas:

- Circuits at the level of Electrical Engineering 101
- Electromagnetics at the level of Electrical Engineering 135
- Systems and signals at the level of Electrical Engineering 103
- Materials at the level of Electrical Engineering 145
- Applied Mathematics and Statistics at the level of Computer Engineering 107, and Applied Mathematics and Statistics 10 and 20.

The student will choose three areas from the above list in which to be examined. If the student does not pass the preliminary examination, the electrical engineering graduate committee may allow the student to repeat the preliminary examination once. If the student is to leave the Ph.D. program, and the student wishes to obtain a master's degree prior to departure, all requirements for the master's degree must still be satisfied.

After the student passes the preliminary examination, the student begins work on a thesis prospectus in

preparation for the qualifying examination. During this period the student finds an adviser willing to supervise the student's thesis research, works with the adviser to prepare for the qualifying examination, and assembles a dissertation reading committee, consisting of the student's research supervisor (chair of the committee) and three or four appropriate faculty members in electrical engineering and other relevant departments. The committee must consist of at least two ladder-rank, electrical-engineering, faculty members in addition to the student's supervisor.

Qualifying Examination

This oral examination is a defense of the student's thesis prospectus and a test of the student's knowledge in advanced technical areas of relevance to the dissertation topic. This oral examination consists of a seminar-style talk before the examining committee, where the student describes the thesis prospectus, followed by questions from the committee on the substance of the talk and the areas of presumed expertise of the student. The examination, taken typically in the third year of Ph.D. study, is administered by a Ph.D. qualifying examination committee, consisting of at least four examiners. The composition of the committee must be approved by the graduate director and the dean of graduate studies whereupon the student and the committee are notified.

If the student does not pass the qualifying examination, the student may be asked to complete additional coursework, or other research-related work, before retaking the examination. The student may be allowed to retake the qualifying examination once, and the composition of the examining committee will remain the same for the second try. Students who fail the qualifying examination twice may be dismissed from the Ph.D. program.

Ph.D. students who have not advanced to candidacy by the end of the fourth year may be recommended for academic probation.

Dissertation and Advancement to Ph.D. Degree Candidacy

Advancement to candidacy requires that the student:

- pass the preliminary examination;
- complete all course requirements prior to taking the qualifying examination;
- clear all Incompletes from the student's record;
- pass the qualifying examination; and
- have an appointed Ph.D. dissertation reading committee.

After advancement to candidacy, work on the thesis research progresses until the dissertation is completed. The Ph.D. dissertation must show the results of in-depth research, be an original contribution of significant knowledge to the student's field of study, and include material worthy of publication. The student is strongly advised to submit research work for publication in advance of completing the thesis so that the latter requirement is clearly satisfied. The Ph.D. thesis results are presented in both oral and written forms, the oral form being a dissertation defense (see below) and the written form being the Ph.D. dissertation. The student must submit his or her written Ph.D. dissertation to the dissertation reading committee at least one month before the defense.

Dissertation Defense

Each Ph.D. candidate submits the completed dissertation to a Ph.D. thesis reading committee at least one

month prior to the dissertation defense. The appointment of the dissertation reading committee is made immediately after the qualifying examination and is necessary for advancing to candidacy. The candidate presents his or her research results in a public seminar sponsored by the dissertation supervisor. The seminar is followed by a defense of the dissertation to the reading committee (only), who will then decide whether the dissertation is acceptable or requires revision. Successful completion of the dissertation fulfills the final academic requirement for the Ph.D. degree.

Transfer Credit

For students already holding an M.S.E.E. or equivalent degree, at most 20 credits of transfer credit may be granted for equivalent course work performed at the student's M.S. granting institution. Credit transfer is subject to approval by the electrical engineering graduate director.

Students not already holding an M.S.E.E. degree, who are studying for the Ph.D. degree, may apply to be granted a M.S. degree when they have fulfilled all the M.S. degree requirements (including an M.S. thesis).

Review of Progress

Each year, the faculty reviews the progress of every student. Students not making adequate progress toward completion of degree requirements (see the *Graduate Student Handbook* for the policy on satisfactory academic progress) are subject to dismissal from the program. Students with academic deficiencies may be required to take additional courses. Full-time students with no academic deficiencies are normally expected to complete the degree course requirements at the rate of at least two courses each quarter. Full-time students must complete all course requirements within two years for the M.S. and three years for the Ph.D.

Students receiving two or more grades of U (unsatisfactory) or below B in the School of Engineering courses are not making adequate progress and will be placed on academic probation for the following three quarters of registered enrollment. Withdrawing or taking a leave of absence does not count as enrollment. Part-time enrollment is counted as a half-quarter of enrollment.

If an electrical engineering graduate student fails a School of Engineering course while on probation, the Electrical Engineering Department may request the graduate dean to dismiss that student from the graduate program. If after being removed from probation, the student again fails a School of Engineering course, he or she will return immediately to academic probation. Graduate students experiencing circumstances or difficulties that impact their academic performance should contact their adviser and the graduate director immediately. Students may appeal their dismissal to the graduate committee.

Materials Fee

Please see the section on fees under School of Engineering.

Lower-Division Courses

80J. Renewable Energy Sources. S

Introduction to energy storage and conversion with special emphasis on renewable sources. Fundamental energy conversion limits based on physics and existing material properties. Various sources, such as solar, wind, hydro-power, geothermal, and fuel cells described. Cost-benefit analysis of different alternative sources performed, and key roadblocks for large-scale implementation examined. Latest research on solar cells and applications

of nanotechnology on energy conversion and storage introduced. (General Education Code(s): T2-Natural Sciences.) *A. Shakouri*

80S. Sustainability Engineering and Practice. F

Topical introduction to principles and practices of sustainability engineering and ecological design with emphasis on implementation in society. Provides an understanding of basic scientific, engineering, and social principles in the design, deployment, and operation of resource-based human systems, and how they can be maintained for this and future generations. No specialized background in engineering, science, or social sciences is assumed. (General Education Code(s): PE-E, T7-Natural Sciences or Social Sciences.) *A. Shakouri*

80T. Modern Electronic Technology and How It Works. W

Basic knowledge of electricity and "how things work," how technology evolves, its impact on society and history, and basic technical literacy for the non-specialist. Broad overview of professional aspects of engineering and introduction and overview of basic systems and components. Topics include electrical power, radio, television, radar, computers, robots, telecommunications, and the Internet. (General Education Code(s): SI, T-2 Natural Sciences.) *K. Pedrotti*

81C. Technological Innovation and Environmental Challenges. S

Introduces key technological solutions to environmental problems; discusses their underlying principles; and examines their societal dimensions. Topics include: conventional and renewable energy; emerging technologies for transportation, energy efficiency clean water; planetary engineering; and lean manufacturing. (Also offered as College Eight 81C. Students cannot receive credit for both courses.) (General Education Code(s): T2-Natural Sciences.) *K. Pedrotti, J. Vesecky*

94. Group Tutorial. F,W,S

A means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

94F. Group Tutorial (2 credits). F,W,S

A means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

101. Introduction to Electronic Circuits. F,W

Introduction to the physical basis and mathematical models of electrical components and circuits. Topics include circuit theorems (Thevenin and Norton Equivalents, Superposition), constant and sinusoidal inputs, natural and forced response of linear circuits. Introduction to circuit/network design, maximum power transfer, analog filters, and circuit analysis using Matlab. Topics in elementary electronics including amplifiers and feedback. (Formerly course 70.) Prerequisite(s): Physics 5C/N or 6C/N, and Mathematics 24 or previous or concurrent enrollment in Applied Mathematics and Statistics 20 or 20A. Concurrent enrollment

in course 101L is required. *M. Isaacson, H. Schmidt, J. Kubby, A. Shakouri, W. Liu, K. Pedrotti*

101L. Introduction to Electronic Circuits Laboratory (1 credit). F,W

Illustrates topics covered in course 101. One two-hour laboratory session per week. Students are billed for a materials fee. (Formerly course 70L.) Prerequisite(s): Physics 5C/N or 6C/N; and Mathematics 24 or previous or concurrent enrollment in Applied Mathematics and Statistics 20 or 20A. Concurrent enrollment in course 101 is required. *M. Isaacson, H. Schmidt, J. Kubby, A. Shakouri, W. Liu, K. Pedrotti*

103. Signals and Systems. F,S

The course covers the following topics: characterization and analysis of continuous-time signals and linear systems, time domain analysis using convolution, frequency domain analysis using the Fourier series and the Fourier transform, the Laplace transform, transfer functions and block diagrams, continuous-time filters, sampling of continuous time signals, examples of applications to communications and control systems. Prerequisite(s): courses 101/L and Applied Mathematics and Statistics 20. *H. Sadjadpour, P. Milanfar, B. Friedlander*

103L. Signals and Systems Laboratory (2 credits). F,S

Use and operation of spectrum analyzers; advanced signal analysis using oscilloscopes; measuring impulse response, step response, frequency response, and computer analysis of real signals. MATLAB programming is taught and used as a tool for signal analysis. Prerequisite(s): course 101 and 101L. Concurrent enrollment in course 103 required. *H. Sadjadpour, P. Milanfar, B. Friedlander*

115. Introduction to Micro-Electro-Mechanical-Systems Design. S

Introduction to Micro-Electro-Mechanical-Systems (MEMS) design. Course begins with overview of MEMS devices and processes that are used to fabricate them. The basic governing equations for MEMS devices in different energy domains (mechanical, electrical, optical, thermal, and fluidic) reviewed, and both analytical and finite element coupled-domain modeling is used to design MEMS devices. Students work in teams to design, lay out, and fabricate MEMS devices and test structures using a standard multi-user process available through a foundry service. A presentation and term paper describing the design and layout will be required. Prerequisite(s): courses 101/L, 135/L, 145/L, Mathematics 19A and 19B, Mathematics 23A and 23B, Applied Mathematics and Statistics 20 or 20A, Physics 5A, 5B, 5C, and 5D. Enrollment limited to 15. *J. Kubby*

123A. Engineering Design Project I. W

First of a two-course sequence that is the culmination of the engineering program. Students apply knowledge and skills gained in elective track to complete a major design project. Students complete research, specification, planning, and procurement for a substantial project. Includes technical discussions, design reviews, and formal presentations; engineering design cycle, engineering teams, and professional practices. Formal technical specification of the approved project is presented to faculty. Prerequisite(s): Electrical Engineering 171 and Computer Engineering 100; previous or concurrent enrollment in Computer Engineering 185; permission of department and instructor. Students are billed a materials fee. *S. Petersen, J. Vesecky*

123B. Engineering Design Project II (7 credits). S

Second of two-course sequence in engineering system design. Students fully implement and test system designed and specified in course 123A. Formal written report, oral presentation, and demonstration of successful project to review panel of engineering faculty required. Students are billed a materials fee. Prerequisite(s): course 123A and Computer Engineering 185. *S. Petersen, J. Vesecky*

130. Introduction to Optoelectronics and Photonics. F

Introduction to optics, photonics and optoelectronics, fiber optic devices and communication systems: Topics include: ray optics, electromagnetic optics, resonator optics, interaction between photons and atoms, dielectric waveguides and fibers, semiconductor light sources and detectors, modulators, amplifiers, switches, and optical fiber communication systems. Taught in conjunction with course 230. Students cannot receive credit for this course and course 230. Prerequisite(s): Physics 5B and 5C, or 6B and 6C; concurrent enrollment in course 130L. *C. Gu*

130L. Introduction to Optoelectronics Laboratory (1 credit). F

Includes a series of projects to provide hands-on experience needed for basic concepts and laboratory techniques of optical fiber technology. Students are billed a materials fee. Prerequisite(s): Physics 5L-M-N, or 6L-M-N; concurrent enrollment in course 130. Enrollment limited to 30. *C. Gu*

135. Electromagnetic Fields and Waves. W

Vector analysis. Electrostatic fields. Magnetostatic fields. Time-varying fields and Maxwell's equations. Plane waves. Students must concurrently enroll in course 135L. Prerequisite(s): course 101/L; Mathematics 23B; and Applied Mathematics and Statistics 20. Students must concurrently enroll in course 135. *M. Isaacson*

135L. Electromagnetic Fields and Waves Laboratory (1 credit). W

Laboratory sequence illustrating topics in course 135. One two-hour laboratory session per week. Students must concurrently enroll in course 135. Students are billed a materials fee. Prerequisite(s): course 101/L; Mathematics 23B; and Applied Mathematics and Statistics 20. Students must concurrently enroll in course 135. *M. Isaacson*

136. Engineering Electromagnetics. S

Course will cover electromagnetic wave propagation, transmission lines, waveguides, and antennas. Prerequisite(s): course 135/L. Enrollment restricted to School of Engineering and Division of Physical and Biological Sciences majors or permission of instructor. *M. Isaacson*

145. Properties of Materials. F

The fundamental electrical, optical, and magnetic properties of materials, with emphasis on metals and semiconductors: chemical bonds, crystal structures, elementary quantum mechanics, energy bands. Electrical and thermal conduction. Optical and magnetic properties. Prerequisite(s): Physics 5A/L, 5B/M, and 5C/N or 6A/L, 6B/M, and 6C/N. Students must also concurrently enroll in course 145L. *H. Schmidt, N. Kobayashi, J. Kubby, A. Shakouri*

145L. Properties of Materials Laboratory (1 credit). F

Laboratory sequence illustrating topics covered in course 145. One two-hour laboratory per week. Students are billed a materials fee. Prerequisite(s): Physics 5A/L, 5B/M, and 5C/N or 6A/L, 6B/M, and 6C/N. Students

must also concurrently enroll in course 145. *H. Schmidt, N. Kobayashi, J. Kubby, A. Shakouri*

151. Communications Systems. W

An introduction to communication systems. Analysis and design of communication systems based on radio, transmission lines, and fiber optics. Topics include fundamentals of analog and digital signal transmission in the context of baseband communications, including concepts such as modulation and demodulation techniques, multiplexing and multiple access, channel loss, distortion, bandwidth, signal-to-noise ratios and error control. Digital communication concepts include an introduction to sampling and quantization, transmission coding and error control. Prerequisite(s): courses 103, 101/L, and Computer Engineering 107 or probability theory and random variables background. Enrollment restricted to School of Engineering and Division of Physical and Biological Sciences majors or permission of instructor. *H. Sadjadpour, P. Mantey, B. Friedlander*

152. Introduction to Wireless Communications.

Introduction to the principles of wireless communications systems. Wireless propagation channels and their impact on digital communications. Modulation techniques for wireless systems and their performance. Multi-antenna systems and diversity. Multicarrier and spread spectrum. Multi-access methods: FDMA, TDMA, CDMA. The structure of cellular systems. Students cannot receive credit for this course and course 252. Prerequisite(s): Computer Engineering 107 and course 151, or by consent of instructor. Enrollment restricted to juniors and seniors. *B. Friedlander*

153. Digital Signal Processing.*

Introduction to the principles of signal processing, including discrete-time signals and systems, the z -transform, sampling of continuous-time signals, transform analysis of linear time-invariant systems, structures for discrete-time systems, the discrete Fourier transform, computation of the discrete Fourier transform, and filter design techniques. Taught in conjunction with Electrical Engineering 250. Students cannot receive credit for this course and Electrical Engineering 250. (Also offered as Computer Engineering 153. Students cannot receive credit for both courses.) Prerequisite(s): course 103. Enrollment restricted to School of Engineering and Division of Physical and Biological Sciences majors or permission of instructor. *P. Milanfar, H. Sadjadpour*

154. Feedback Control Systems. F

Analysis and design of continuous linear feedback control systems. Essential principles and advantages of feedback. Design by root locus, frequency response, and state space methods and comparisons of these techniques. Applications. Prerequisite(s): course 103. Enrollment restricted to School of Engineering and Division of Physical and Biological Sciences majors or permission of instructor. Enrollment limited to 30. *P. Milanfar, P. Mantey, J. Rosen, W. Dunbar, G. Elkaim*

157. RF Hardware Design. W

Engineering design cycle for wireless and RF systems: design, practical hardware implementation, and prototype. Prerequisite(s): courses 101/L, 103, and 171, and Computer Engineering 174; or consent of instructor. Concurrent enrollment in course 157L is required. Enrollment limited to 30. *K. Pedrotti, S. Petersen*

157L. RF Hardware Design Laboratory (2 credits). W

Laboratory to accompany course 157, emphasizing

hardware-design practice and principles applies to RF apparatus. Students design and implement a substantial final project during the last half of the course. Students are billed a materials fee. Prerequisite(s): courses 101/L, 103, 171, and Computer Engineering 174; or consent of instructor. Concurrent enrollment in course 157 is required. Enrollment limited to 30. *K. Pedrotti, S. Petersen*

171. Analog Electronics. S

Introduction to (semiconductor) electronic devices. Conduction of electric currents in semiconductors, the semiconductor p-n junction, the transistor. Analysis and synthesis of linear and nonlinear electronic circuits containing diodes and transistors. Biasing, small signal models, frequency response, and feedback. Operational amplifiers and integrated circuits. Prerequisite(s): course 101/L; previous or concurrent enrollment in course 171L required. *C. Gu, W. Liu, A. Shakouri, K. Pedrotti*

171L. Analog Electronics Laboratory (1 credit). S

Laboratory sequence illustrating topics covered in course 171. One two-hour laboratory session per week. Students are billed a materials fee. Prerequisite(s): courses 101/L; previous or concurrent enrollment in course 171 required. *C. Gu, W. Liu, A. Shakouri, K. Pedrotti*

172. Advanced Analog Circuits. S

Analog circuit design covering the basic amplifier configurations, current mirrors, differential amplifiers, frequency response, feedback amplifiers, noise, bandgap references, one- and two-stage operational amplifier design, feedback amplifier stability, switched capacitor circuits and optionally the fundamentals of digital-to-analog and analog-to-digital converters. Emphasis throughout will be on the development of approximate and intuitive methods for understanding and designing circuits. Cannot receive credit for this course and course 221. Prerequisite(s): course 171. *W. Liu, K. Pedrotti*

175. Energy Generation and Control. S

Introduces electrical energy generation, sensing, and control, emphasizing the emerging smart grid. Topics include 3-phase AC power systems, voltage and transient stability, fault analysis, grid protection, power-flow analysis, economic dispatch, and high voltage DC distribution (HVDC). Prerequisite(s): course 101. Concurrent enrollment in course 175L required. *J. Balachandra*

175L. Energy Generation and Control Laboratory (2 credits). S

Computer analysis and simulation of energy generation, components, power-flow analysis, systems, and control covering topics from course 195. Weekly computer simulations reinforce the concepts introduced in course 175. Prerequisite(s): course 101. Concurrent enrollment in course 175 required. *J. Balachandra*

176. Energy Conservation and Control. F

AC/DC electric-machine drives for speed/position control. Integrated discussion of electric machines, power electronics, and control systems. Computer simulations. Applications in electric transportation, hybrid-car technology, robotics, process control, and energy conservation. Prerequisite(s): courses 103 and 171. Concurrent enrollment in course 176L is required. *J. Balachandra*

176L. Energy Conversion and Control Laboratory (2 credits). F

Simulink-based simulations of electric machines/drives in applications such as energy conservation and motion control in robotics and electric vehicles. Prerequisite(s):

courses 103 and 171. Concurrent enrollment in course 176 is required. *J. Balachandra*

177. Power Electronics. W

Switch-mode power electronics. Switch-mode DC power supplies. Switch-mode converters for DC and AC motor drives, wind/photovoltaic inverters, interfacing power electronic equipment with utility systems. Power semiconductor devices, magnetic design, electromagnetic interference (EMI). Prerequisite(s): courses 103 and 171. Concurrent enrollment in course 177L is required. *J. Balachandra*

177L. Power Electronics Laboratory (2 credits). W

Simulink-based simulations with power electronic devices and systems in applications such as energy conservation and motion control in robotics and electric vehicles. Prerequisite(s): courses 103 and 171. Concurrent enrollment in course 177 is required. *J. Balachandra*

178. Device Electronics.

This course reviews the fundamental principles, device's materials, and design and introduces the operation of several semiconductor devices. Topics include the motion of charge carriers in solids, equilibrium statistics, the electronic structure of solids, doping, the pn junction, the junction transistor, the Schottky diode, the field-effect transistor, the light-emitting diode, and the photodiode. Prerequisite(s): courses 145/L and 171/L. Enrollment restricted to School of Engineering and Division of Physical and Biological Sciences majors or permission of instructor. *C. Gu, W. Liu, K. Pedrotti*

180J. Advanced Renewable Energy Sources. S

Provides a comprehensive overview of renewable energy sources. Fundamental energy-conversion limits based on physics and existing material properties discussed. Various sources and devices, such as solar, wind, hydro-power, geothermal, and fuel cells described. Solar- and wind-site assessment, as well as biofuel energy balance, also discussed. Key scientific and economic roadblocks for large-scale implementation examined. Finally, the latest research on application of nanotechnology to energy conversion and storage introduced. Taught in conjunction with course 80J. Prerequisite(s): Mathematics 3 or Applied Mathematics and Statistics 3, 5 or 7. Enrollment limited to 30. *A. Shakouri*

183. Special Topics in Electrical Engineering. W

Topics vary with instructor. Sample topics include smart grids, bioelectronics, antennas, etc. Enrollment by instructor permission. Approval of undergraduate adviser required for credit as an upper-division elective. May be repeated for credit. *The Staff*

193. Field Study. F,W,S

Provides for individual programs of study with specific academic objectives carried out under the direction of a faculty member of the electrical engineering program and a willing sponsor at the field site and using resources not normally available on campus. Credit is based on the presentation of evidence of achieving the objectives by submitting a written and oral presentation. May not normally be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S

Provides for individual programs of study with specific academic objectives carried out under the direction of a faculty member of the electrical engineering program and a willing sponsor at the field site and using resources not normally available on campus. Credit is based on the presentation of evidence of achieving the objectives by submitting a written and oral presentation. May not normally be repeated for credit. *The Staff*

195. Senior Thesis Research. F,W,S

Individual directed study for upper-division undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195F. Senior Thesis Research (2 credits). F,W,S

Prerequisite(s): petition on file with sponsoring agency. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Individual Study or Research. F,W,S

Provides for department-sponsored individual study program off campus, for which faculty supervision is not in person, but by correspondence. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Provides for department-sponsored individual study program off campus for which faculty supervision is not in person, but by correspondence. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual directed study for upper-division undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual directed study for upper-division undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Graduate Courses***200. Research and Teaching in Electrical Engineering (3 credits). ***

Basic teaching techniques for TAs: responsibilities and rights, resource materials, computer security, leading discussion or lab sessions, presentations techniques, maintaining class records, electronic handling of homework, and grading. Examines research and professional training: use of library and online databases, technical typesetting, writing journal and conference papers, publishing, giving talks, and ethical issues. Enrollment restricted to graduate students. *C. Gu*

211. Introduction to Nanotechnology.

Introduction to underlying principles of the emerging field of nanotechnology. Intended for multidisciplinary audience with a variety of backgrounds. Introduces scientific principles and laws relevant on the nanoscale. Discusses applications in engineering, physics, chemistry, and biology. Students are billed a materials fee. Prerequisite(s): course 145 or consent of instructor. Enrollment limited to 35. *H. Schmidt*

212. Introduction to BioMEMS.

Oriented to general engineering and science students. Topics included are: 1) microfabrication of silicon, glass, and polymer materials; 2) microfluidics and electrokinetics; 3) sensors, actuators, and drug-delivery systems; 4) micro total-analysis systems and lab-on-a-chip devices; 5) detection and measuring systems; 6) genomics, proteomics, DNA, and protein microarrays; 7) emerging applications in medicine, research, and homeland security; 8) packaging, power systems, data communication, and RF safety; and 9) biocompatibility and standards. Recommended for advanced undergraduates and graduate students in bioengineering, electrical engineering, chemistry, and health-related fields including biochemistry, molecular and cellular biology, physiology, and genetics. Enrollment restricted to graduate students, or by permis-

sion of the instructor. *J. Kubby*

213. Nanocharacterization of Materials.

Covers the many characterization techniques used to characterize materials from volumes less than one cubic micrometer, including the basic physics of each method, the methodology used to get quantitative results, and the advantages and limitations of each technique. Enrollment restricted to graduate students, or to undergraduates majoring in engineering or science by permission of instructor. *M. Isaacson*

215. Micro-Electro-Mechanical Systems (MEMS) Design. F

Introduction to MEMS technology: covers basic microfabrication technologies, the governing physics for MEMS devices in different energy domains (mechanical, electrical, optical, thermal, and fluidic). Fabrication and design of MEMS devices illustrated using examples of existing research prototypes and commercial products. Students design, lay out, and fabricate an optical MEMS deformable mirror device for applications in adaptive optics. Students are billed a materials fee. Prerequisite(s): courses 135, 145, and 211; and Physics 5A, 5B, and 5C. Enrollment restricted to seniors and graduate students. May be repeated for credit. *J. Kubby*

216. Nanomaterials and Nanometer-scale Devices. W

Materials controlled at nanometer-scale will revolutionize existing technologies. Offers two core parts: (1) physics and chemistry of nanomaterials discussed in lectures; and (2) advanced research in nanomaterials and nanometer-scale devices presented by leading scientists from academia and industries. Prerequisite(s): course 211; enrollment restricted to graduate students. *N. Kobayashi*

221. Advanced Analog Integrated Circuits. S

Analog integrated circuit design with emphasis on fundamentals of designing linear circuits using CMOS. Covers MOS devices and device modeling, current mirrors, op-amp design, op-amp compensation, comparators, multipliers, voltage references, sample-and-holds, noise, and an introduction to more complicated systems using these building blocks, such as phase locked loops and analog-to-digital converters. If time permits, integrated circuit layout issues and device/circuit fabrication. Students cannot receive credit for this course and course 172. Prerequisite(s): course 171 or equivalent; course 178 or equivalent recommended. Enrollment limited to 20. *W. Liu, K. Pedrotti*

222. High-Speed Low-Power Integrated Circuit Design. *

Digital integrated circuit design covered with an emphasis on high-speed and low-power applications. Covers signaling techniques and circuits including transmitters and receivers, with emphasis on on-chip interconnect, timing fundamentals and timing circuits. Theoretical fundamentals of phase locked loops and design issues of implementation addressed. Course has a project design component. Interview to assess technical skills of student. Enrollment restricted to electrical engineering and computer engineering graduate students. Enrollment limited to 20. May be repeated for credit. *W. Liu*

223. Advanced Solid-State Devices. S

Offers graduate students the opportunity to learn advanced solid-state devices (e.g., electronic, optoelectronic, photonic devices, and smart sensors) from various scientific, technological, and engineering aspects of functional materials (e.g., semiconductors, metals, insulators) used in these devices. Enrollment restricted to undergraduate students who have completed course 178 or to graduate

students. *N. Kobayashi*

224. Physical Design of Micro- and Opto-Electronic Packages.

Micro- and opto-electronic packaging and materials; mechanical properties and behavior, thermal stress in dissimilar materials, and predictive modeling. Design for reliability, dynamic response to shocks and vibrations; reliability evaluations and testing; plastic packages of IC devices; photonics packages, fiber optics structures, and new frontiers. Enrollment restricted to graduate students. *The Staff*

225. Basics of Electronics Reliability.

Basic concepts of reliability engineering taught in application to microelectronic and photonic materials, assemblies, and packages and systems. Emphasis on the physics and mechanics of failure physical design for reliability predictive modeling and accelerated testing, with numerous practical examples and illustrations. Prerequisite(s): basic calculus; electronic and photonic devices and systems. Enrollment restricted to graduate students. *The Staff*

226. CMOS Radio Frequency Integrated Circuit Design.

Covers narrowband and high-frequency techniques, noise, distortion, nonlinearities, low-noise amplifiers, power amplifiers, mixers, receivers, and transmitters for wireless communications. Topics are presented in the context of integrated designs in CMOS, but topics are fundamental and widely applicable. Prerequisite(s): course 172 or 221 or permission of instructor. *K. Pedrotti*

230. Optical Fiber Communication. F

Components and system design of optical fiber communication. Topics include step-index fibers, graded-index fibers, fiber modes, single-mode fibers, multimode fibers, dispersion, loss mechanics, fiber fabrication, light-emission processes in semiconductors, light-emitting diodes, laser diodes, modulation response, source-fiber coupling, photodetectors, receivers, receiver noise and sensitivity, system design, power budget and rise-time budget, fiber-optic networks (FDDI, SONET, etc), wavelength division multiplexing (WDM). Students cannot receive credit for this course and course 130. Enrollment restricted to graduate students. May be repeated for credit. *C. Gu*

231. Optical Electronics. S

Introduction to phenomena, devices, and applications of optoelectronics. Main emphasis is on optical properties of semiconductors and semiconductor lasers. Prerequisite(s): course 145/L. May be repeated for credit. *H. Schmidt, A. Shakouri, C. Gu*

232. Quantum Electronics. F

Covers basic theory of interaction of electromagnetic radiation with resonant atomic transitions; density matrix treatment; Rabi oscillation, laser mode-locking, Q-switching; parametric oscillation, stimulated Brillouin and Raman scattering, coherent radiation; and noise in photodetectors and lasers. Prerequisite(s): course 231 or equivalent. *A. Shakouri*

233. Fiber Optics and Integrated Optics. S

Concepts and analysis of optical wave propagation in optical fibers and waveguides. Topics include geometrical optics description and electromagnetic theory of slab waveguides; modes, dispersion, and birefringence in optical fibers; mode coupling and gratings in fibers; wavelength-division multiplexing; nonlinear optics in fibers and solitons; semiconductor optical amplifiers and Er doped fiber amplifiers. Prerequisite(s): courses 135 and 145. *C. Gu*

234. Liquid Crystal Displays.

Introduction to principle of operation, components and systems of liquid crystal displays (LCDs). Topics include basic LCD components, properties of liquid crystals, polarization of optical waves, optical wave propagation in anisotropic media, Jones matrix method, various display systems, active matrix addressing, and color LCDs. Prerequisite(s): course 135 and 136. Enrollment restricted to seniors and graduate students. *C. Gu*

235. Optical Information Storage and Processing.

Introduction to applications of optical technologies in data storage and information processing. Topics include basic principles of Fourier optics; electro-optic, acousto-optic, and magneto-optic effects and devices; planar and volume holography; optical data storage systems; and optical information processing, interconnecting, and switching systems. Enrollment restricted to graduate students, or undergraduates having completed Physics 5B and 5C and course 103. *C. Gu*

236. Integrated Biophotonics. W

Covers use of integrated optics for study of biological material; fluorescence spectroscopy, single molecule detection, optical tweezers, layered dielectric media, hollow-core waveguides, photonic crystals, optofluidics, biophotonic systems, and applications. Prerequisite(s): course 233 or equivalent. Enrollment restricted to graduate students. Enrollment limited to 20. *H. Schmidt*

241. Introduction to Feedback Control Systems. F

Graduate-level introduction to control of continuous linear systems using classical feedback techniques. Design of feedback controllers for command-following error, disturbance rejection, stability, and dynamic response specifications. Root locus and frequency response design techniques. Extensive use of Matlab for computer-aided controller design. Course has concurrent lectures with Electrical Engineering 154. (Also offered as Computer Engineering 241. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *G. Elkaim, J. Rosen, W. Dunbar*

250. Digital Signal Processing.*

In-depth study of signal processing techniques, including discrete-time signals and systems, the z-transform, sampling of continuous-time signals, transform analysis of linear time-invariant systems, structures for discrete-time systems, the discrete Fourier transform, computation of the discrete Fourier transform, filter design techniques. Students cannot receive credit for this course and course 153. *H. Sadjadpour, P. Milanfar, B. Friedlander*

251. Principles of Digital Communications.*

A core course on digital communications theory. Provides an introduction to digital communication, including source coding, characterization of communication signals and systems, modulation and demodulation for the additive Gaussian channel, digital signaling, and over bandwidth constrained linear filter channels and over fading multipath channels. Prerequisite(s): course 151 and 153 (or Computer Engineering 153) and Computer Engineering 107. *B. Friedlander*

252. Wireless Communications.*

In-depth study of the physical layer of wireless communications. Wireless propagation channels and their impact on digital communications. Modulation techniques for wireless systems and their performance. Multi-antenna systems and diversity. Multicarrier and spread spectrum. Multi-access methods: FDMA, TDMA, CDMA. The

structure of cellular systems. Students cannot receive credit for this course and course 152. Prerequisite(s): course 251. *B. Friedlander*

253. Introduction to Information Theory. F

An introduction to information theory including topics such as entropy, relative entropy, mutual information, asymptotic equipartition property, channel capacity, differential entropy, rate distortion theory, and universal source coding. (Also offered as Computer Science 250. Students cannot receive credit for both courses.) Prerequisite(s): Computer Engineering 107, or Applied Mathematics and Statistics 131 or equivalent course, or permission of instructor. Enrollment restricted to graduate students. *H. Sadjadpour*

254. Multi-User Information Theory.

Topics include basic information theory, multiple-access channel, broadcast channel, interference channel, relay channel, capacity with feedback, capacity of networks, and channels with state and current research. Prerequisite(s): course 253. Enrollment restricted to graduate students. *The Staff*

255. Multiple-Antenna Wireless Communications.

Basic theory of multiple-antenna wireless systems. Introduction to space-time propagation models, capacity of multiple-input multiple-output (MIMO) channels, space-time coding, transmitter CSI, and multiuser space-time systems. Includes discussion of multiple antennas in emerging systems and standards. Prerequisite(s): course 252 and Computer Engineering 107, or Applied Mathematics and Statistics 131, or equivalent. *The Staff*

256. Introduction to Radar Systems and SAR.

Fundamentals of radar systems and radar-signaling processing, including SAR. Emphasizes real-world applications. MATLAB emphasizes algorithm development and performance analysis. Basic EM theory and a first course in signal processing are recommended. Enrollment limited to 20. *F. Dowla*

261. Error Control Coding.

Covers the following topics: introduction to algebra; linear block code; cyclic codes; BCH code; RS codes; spectral domain study of codes; CRC; and product codes. Enrollment restricted to graduate students. *H. Sadjadpour*

262. Statistical Signal Processing I. W

Covers fundamental approaches to designing optimal estimators and detectors of deterministic and random parameters and processes in noise, and includes analysis of their performance. Binary hypothesis testing: the Neyman-Pearson Theorem. Receiver operating characteristics. Deterministic versus random signals. Detection with unknown parameters. Optimal estimation of the unknown parameters: least square, maximum likelihood, Bayesian estimation. Will review the fundamental mathematical and statistical techniques employed. Many applications of the techniques are presented throughout the course. Note: While a review of probability and statistics is provided, this is not a basic course on this material. Prerequisite(s): course 103 and Computer Engineering 107, or permission of instructor. *P. Milanfar*

263. Advanced Topics in Coding Theory.

Covers convolutional codes and its principles, maximum likelihood decoding and Viterbi decoding, performance evaluation of convolutional codes, trellis coded modulation (TCM), rotationally invariant convolutional codes, turbo codes, turbo decoding principles, performance evaluation of turbo codes, interleaver design for turbo codes, topics on turbo codes, space-time codes, and LDPC.

Prerequisite(s): course 261. Enrollment restricted to electrical engineering, computer engineering, and computer science graduate students. Enrollment limited to 10. *H. Sadjadpour*

264. Image Processing and Reconstruction.

Fundamental concepts in digital image processing and reconstruction. Continuous and discrete images; image acquisition, sampling. Linear transformations of images, convolution and superposition. Image enhancement and restoration, spatial and spectral filtering. Temporal image processing: change detection, image registration, motion estimation. Image reconstruction from incomplete data. Applications. Students that have completed Computer Engineering 261 may not take this course for credit. Prerequisite(s): course 153 or permission of instructor. *P. Milanfar*

265. Introduction to Inverse Problems (3 credits).

Fundamental approaches and techniques in solving inverse problems in engineering and applied sciences, particularly in imaging. Initial emphasis on fundamental mathematical, numerical, and statistical formulations and known solution methods. Sampling of applications presented from diverse set of areas (astronomical, medical and optical imaging, and geophysical exploration). Enrollment restricted to graduate students. *P. Milanfar*

270. Neural Implant Engineering. W

Advanced studies of the basic neuroscience-engineering design requirements and technological issues associated with implantable neural prostheses, with particular emphasis on retinal and cortical function. Course is team-taught via remote web cast. A basic understanding of physics, circuit theory, and electronics is required. Enrollment restricted to graduate students; juniors and seniors may enroll by permission of instructor. *W. Liu*

280B. Seminar on Integrated Bioelectronics (2 credits). F,W,S

Weekly seminar covering current research in integrated bioelectronics. May be repeated for credit. *W. Liu*

280I. Seminar on Microscopy and Nanotechnology (1 credit).

Weekly seminar series covering research topics and experimental research in microscopy and nanotechnology. Current research and literature are discussed. Students lead discussion and participate in all meetings. Enrollment restricted to graduate students. Enrollment by permission of instructor. Enrollment limited to 10. May be repeated for credit. *M. Isaacson*

280M. Seminar on Micro-Electro-Mechanical Systems (MEMS) (2 credits). F,W,S

Weekly seminar series covering topics of current research interest in Micro-Electro-Mechanical Systems (MEMS) design, fabrication and applications. Current research work and literature in these areas are discussed. Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. May be repeated for credit. *J. Kubby*

280O. Seminar on Applied Optics (2 credits). F,W,S

Weekly seminar series covering topics of current research in applied optics, including integrated, quantum, non-linear, and nano-optics. Current research work and literature in these areas are discussed. Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. May be repeated for credit. *H. Schmidt*

280Q. Seminar on Quantum Electronics and Nanoelectronics (2 credits). F,W,S

Weekly series covers current research in quantum electronics including electron and photon transport in nanostructures; nanoscale heat transport; optoelectronic integrated circuits; nanoscale devices for energy conversion; micro-refrigeration; thermal and acoustic imaging of nanostructures. Current research work and recent literature are discussed. Enrollment restricted to graduate students; undergraduates may enroll by permission of instructor. May be repeated for credit. *A. Shakouri*

281. Guest Seminar Series (1 credit).

Distinguished speakers from industry, universities, and government discuss current developments in electrical engineering and related fields. Emphasis on research questions that may lead to collaborative work with faculty and graduate students. Enrollment restricted to graduate students. May be repeated for credit. *N. Mingo, The Staff*

283. Special Topics in Electrical Engineering (3 credits). W

Graduate seminar on a research topic in electrical engineering that varies with the particular instructor. Topics may include, but are not limited to, electromagnetics, antennas, electronics biotechnology, nanotechnology, signal processing, communications, VLSI, MEMS, and radio frequency. Enrollment restricted to graduate students and consent of instructor. Enrollment limited to 25. May be repeated for credit. *The Staff*

290. EE Graduate Seminar (1 credit).

Research seminar at the graduate level regarding technical areas of electrical engineering activity that are of interest to the research and/or commercial communities. Enrollment restricted to computer engineering, electrical engineering, or physics graduate students, or by permission of instructor. Enrollment limited to 30. May be repeated for credit. *The Staff*

291. Tomorrow's Professor: Preparing for an Academic Career in Science and Engineering (3 credits).

The aim of this course is two-fold: (1) inform, motivate, and prepare graduate students for a possible career in academia; (2) expose both undergraduate and graduate students to the academic enterprise, possible career options for those who pursue advanced degrees in engineering and science. Restricted to graduate students. Appropriate for graduate students in all fields of engineering, science, and mathematics; advanced undergraduates in good standing may enroll with permission of instructor. *P. Milanfar*

293. Advanced Topics in Electrical Engineering.

Graduate seminar course on a research topic in electrical engineering that varies with the particular instructor. Typical topics include, but are not limited to, electromagnetics, antennas, electronics biotechnology, nanotechnology, signal processing, communications, VLSI, and MEMS. Prerequisite(s): Consent of instructor. Enrollment restricted to graduate students. Enrollment limited to 25. May be repeated for credit. *The Staff*

297. Independent Study or Research. F,W,S

Independent study or research under faculty supervision. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Thesis research conducted under faculty supervision. Students submit petition to sponsoring agency. *The Staff*

Information Systems Management

Baskin School of Engineering
(831) 459-2158
<http://www.soe.ucsc.edu>

Faculty and Professional Interests**Professor****RAMAKRISHNA AKELLA**

Information technology and systems, management of technology, new product introduction and development, enterprise and knowledge management, supply chain management and e-business, financial engineering

MARC MANGEL (Distinguished Professor of Applied Mathematics and Statistics)

Program director, Information Systems Management

Mathematical modeling of biological phenomena, especially quantitative issues in fishery management; mathematical and computational aspects of aging and disease; impact of technology on biological systems

Associate Professor**JOHN MUSACCHIO**

Control, analysis, and pricing of communications networks; applications of game theory in networking; wireless ad-hoc networks; and management of technology

Assistant Professor**KEVIN ROSS**

Service engineering and management; resource allocation; operations research; pricing; scheduling; queueing theory; networks

YI ZHANG

Information retrieval, knowledge management, natural language processing, machine learning

Lecturer**SUBHAS DESA**

Product development, supply chain management, management of technology, system dynamics and control

**YIN-WONG CHEUNG (Economics)**

Econometrics, applied econometrics, exchange rate dynamics, financial price behavior, aggregate output dynamics

LUCA DE ALFARO (Computer Science)

Formal methods, game theory, embedded systems, software engineering

WILLIAM B. DUNBAR (Computer Engineering)

Theory and application of feedback control, single-molecule biophysics, nanopore sensors, dynamics and control of biomolecules

DANIEL FRIEDMAN (Economics)

Microeconomic theory, experimental economics, evolution and learning, behavioral economics, financial markets

BRENT HADDAD (Environmental Studies)

Fresh-water economics, policy, and communications; economic institutions and the environment; climate-change mitigation and adaptation; institutional and ecological economics

MICHAEL ISAACSON (Electrical Engineering)

Nano- and microfabrication technology and applications to

biomedical and diagnostic devices, nanocharacterization of materials with emphasis on the development of microscopy tools, novel modes of imaging, electron and light optics

ROBERT A. LEVINSON (Computer Science)

Artificial intelligence, machine learning, heuristic search, associative pattern retrieval, hierarchical reinforcement learning, semantic networks

DARRELL LONG (Computer Science)

Storage systems, distributed computing systems, operating systems, mobile computing, performance evaluation, fault tolerance, computer security, multimedia, and video-on-demand systems

PATRICK MANTEY (Baskin Professor of Computer Engineering) (CITRIS Campus Director)

Multimedia systems, digital signal processing, sensor systems and networks, real-time monitoring and control, image systems, image processing, visualization, geographic information systems, decision support systems

CHARLES E. McDOWELL (Computer Science)

Programming languages, parallel computing, and computer science education

ALEX PANG (Computer Science)

Uncertainty visualization, tensor visualization, scientific visualization, comparative visualization, collaboration software, virtual reality interfaces

IRA POHL (Computer Science)

Artificial intelligence, programming languages, heuristic methods, educational and social issues, combinatorial algorithms

NIRVIKAR SINGH (Economics)

Industrial organization, political economy, economic development, technology and innovation, South Asian immigrants in the U.S.

LINDA WERNER

Software engineering, testing, usability engineering, educational and social issues

JAMES WHITEHEAD, JR. (Computer Science)

Software engineering, software evolution, software bug prediction, automated software construction, video game level design

Program Description

Information systems management (ISM) is a multidisciplinary program that focuses on the integration of engineering, computer science, information technology, and business management for two purposes: the technology of management, which includes the design of information technology to solve business problems, and the management of technology, which includes the management of new-product development and entrepreneurship. The program offers a bachelor of science (B.S.) degree in information systems management (ISM) as well as a minor in information systems and technology management (ISTM). See description below concerning advanced degree programs that are available starting fall 2009.

ISM is a rigorous, challenging major for those students wanting to pursue careers in the management of information and technology. ISM students will receive a thorough grounding in the fundamental principles and practices of technology (in particular, computer science and computer engineering) and management, and the scientific, mathematics, and economics principles upon which they are built. In particular, they will become proficient in the following areas: strategy, planning, innovation, entrepreneurship, information technology, software design, product development, and supply-chain management.

The essence of the information systems management

major at UCSC is the integration of fundamental intellectual content from the disciplines of computer science, computer engineering, business management economics, and finance. ISM students learn how to apply the fundamentals of these diverse disciplines to solving problems that require the integration of management and technology, e.g., developing information technology systems to manage all activities and operations in a firm, e-commerce, managing and commercializing a new technology, and starting a new high-technology company.

To graduate with a B.S. in information systems management, students normally complete 22 required courses (with four laboratories, totaling 115 quarter credits) plus four elective courses (20 quarter credits) for the information systems management major program. To plan for completion of these course requirements within the normative time, students should consult with an adviser as early as possible. Honors students are likely to find the rigorous management and leadership elements of the new program of significant interest. Industrial interactions and projects are key features of this major.

Information Systems Management Policies

Admissions Policy

Lower-division students will be accepted into the information systems management (ISM) major on completion of the School of Engineering (SOE) major declaration process during any of their first three quarters at UCSC. See <http://ua.soe.ucsc.edu/declare-your-major> for the complete process.

After the first three quarters, petitions to declare the major are reviewed individually. Students must have completed the foundation courses required for the major, and are expected to have a grade point average (GPA) among School of Engineering and Division of Physical and Biological Science courses (the SOE GPA) of 2.5. Progress in the major and ability to complete the major within campus limits will also be considered.

Foundation Courses: Computer Science 12A, or 5J and 11; Computer Engineering 16; and Mathematics 19A-B, or Mathematics 20A-B, or Economics 11A and 11B; Information Systems Management 50 (or Economics 1 and 2).

Disqualification and Satisfactory Progress in the Major

Please refer to the Engineering section of this catalog for the School of Engineering's major disqualification policy.

Letter Grade Policy

Information systems management requires letter grading for all courses applied toward the B.S. in information systems management, with the exception of two lower-division courses which students may elect to take Pass/No Pass (not to include course 50 or 58). This policy includes courses required for the information systems management major but sponsored by other departments.

Transfer Students

Articulation agreements with other California institutions are in place for some courses required for the information systems management major; it is important for students to inquire whether specific courses meet the requirements of this major. Articulation information is available on ASSIST at www.assist.org. Courses taken at other institutions which emphasize applications of programming languages often do not count toward

the information systems management major at UCSC. Please refer to the School of Engineering section of the catalog for the policy regarding transfer students.

School of Engineering Policies

Please refer to the School of Engineering section of the catalog for additional policies that apply to all School of Engineering programs. These policies include admission to the major, limits on the number of times courses can be attempted, and the need for UCSC students to obtain pre-approval before taking courses elsewhere.

Preparation for the Major

The information systems management major is intended for students with an interest in both technology and business. It is recommended that students intending to declare this major have completed four years of mathematics (through advanced algebra and trigonometry) and three years of science in high school. Completion of business-oriented computer literacy and basic programming courses is of benefit to students entering this major. Completion of any economics and/or business-related courses in high school is also beneficial, but the faculty realizes that these courses may not be available at many high schools. Completion of comparable college courses at other institutions serves to strengthen the preparation of a student for the information systems management major.

Information Systems Management Major Requirements

In addition to completing UCSC general education requirements, students must complete 22 required courses (with four laboratories, totaling 115 quarter credits) plus four elective courses (20 quarter credits) for the information systems management major program. To plan for completion of these course requirements within the normative time, students should consult with a School of Engineering adviser as early as possible. These 26 courses include the following:

Required Courses (22 courses plus four laboratories)

Applied Mathematics and Statistics (one course)

Applied Mathematics and Statistics 5, *Statistics*

Mathematics (four courses)

19A-B, *Calculus for Science, Engineering, and Mathematics*; or

Applied Mathematics and Statistics 11A and 11B, or Economics 11A and 11B, *Mathematical Methods for Economists*; and

Applied Mathematics and Statistics 10A and 20A, *Basic Mathematical Methods for Engineers I and II*

(3 credits each); or Applied Mathematics and Statistics 10 and 20, *Mathematical Methods for Engineers I and II*; or Mathematics 21, *Linear Algebra* and Mathematics 24, *Ordinary Differential Equations*

Economics (five required 5-credit courses)

1 *Introductory Microeconomics: Resource Allocation and Market Structure*

2 *Introductory Macroeconomics: Aggregate Economic Activity*

10A, *Economics of Accounting*

100A, *Intermediate Microeconomics*; or

100M, *Intermediate Microeconomics Math Intensive*

113, *Introduction to Econometrics*

Computer Engineering (three 5-credit courses and two 2-credit laboratories)

12/L, *Computer Systems and Assembly Language/Laboratory*

16, *Applied Discrete Mathematics*

150/L, *Introduction to Computer Networks/Laboratory*

Computer Science (three 5-credit courses and two 2-credit laboratories)

12A/L, *Introduction to Programming(Accelerated)/Laboratory*; or 5J, *Introduction to Programming in Java* and 11, *Intermediate Programming*

12B/M, *Introduction to Data Structures/Laboratory*

182, *Introduction to Database Management Systems*

Information Systems Management (five 5-credit courses and one 2-credit seminar)

50, *Business Information Systems*

58, *Systems Analysis and Design*

101, *Management of Technology Seminar*

105, *Management of Technology I*

125, *Management of Technology II*

158, *Business Strategy and Information Systems*

Elective Courses (four courses)

Two 5-credit School of Engineering courses

- Students select two upper-division School of Engineering electives on the basis of their particular interests. These electives may be any 5-credit upper-division or graduate School of Engineering courses, with the following limitations:

4. either Computer Engineering 153 or Electrical Engineering 153, but not both;
5. either Applied Mathematics and Statistics 131 or Computer Engineering 107, but not both;
6. at most one independent and field-study course (193, 195, 198, 199) with prior approval from the department to be used as an elective.

- One 5-credit upper-division economics course
- One 5-credit, upper-division School of Engineering or economics course (the limitations on School of Engineering electives given above apply)

Information Systems Management Major Planners

The following are three sample academic plans for students to complete during their first two years as preparation for the information systems management major. Plan One A is recommended for students who are more proficient in mathematics and programming and Plan One B is recommended for students who need more time to develop proficiency in mathematics and programming. Plan Two is for students who are considering the major.

Plan One A

| Year | Fall | Winter | Spring |
|---------------|--|----------------------|---------------------------------|
| 1st (frsh) | ECON 10A CMPS 10 (recommended) college core | ECON 1 MATH 19A | ECON 2 MATH 19B |
| 2nd (soph) | CMPS 12A/L ISM 50 | CMPS 12B/M ISM 58 | CMPE 16 AMS 10A ECON 100A |

Plan One B

| Year | Fall | Winter | Spring |
|---------------|---|--------------------|---------------------|
| 1st (frsh) | ECON 1 MATH 3 college core | ECON 2 ECON 11A | ISM 150 ECON 11B |
| 2nd (soph) | CMPS 10 (recommended) ECON 10A CMPE 16 | CMPS 5J ISM 58 | CMPS 11 AMS 10A |

Plan Two

| Year | Fall | Winter | Spring |
|---------------|--|------------------------------------|--------------------|
| 1st (frsh) | MATH 3 | ECON 1 | ECON 2 ISM 50 |
| 2nd (soph) | CMPS 10 MATH 19A or ECON 11A ECON 10A | CMPS 5J MATH 19B or ECON 11B | CMPS 11 AMS 10A |

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in information systems management is satisfied by completing course 158.

Comprehensive Requirement

Students complete two project-intensive courses, Information Systems Management 158 and Information Systems Management 105, which constitute the comprehensive requirement for the information systems management major, based on the dual aspects (technology of management and management of technology) of the program. Course 158 deals with the technology of management, and course 105 deals with the management of technology. Both courses involve a substantial amount of critical thinking and writing within the context of comprehensive projects.

Information Systems Management 158, *Business Strategy and Information Systems*, requires that students understand and use a structured methodology to evaluate the competitive use of information systems within an enterprise. This is accomplished by a team project as well as by an individual project that involves researching and writing a comprehensive analytical term paper using a methodology taught as part of this course.

Information Systems Management 105, *Management of Technology I*, requires that students understand and apply structured methodologies for the development, management, and commercialization of technologies and products. Students will work in teams on a comprehensive term project in the development, commercialization, and management of technologies such as computers, networks, semiconductors, mechatronics, and biotechnology.

Honors

The ISM program awards honors to students whose academic performance is excellent. Students with a GPA between 3.5 and 3.75 will be awarded honors, and students with GPAs greater than 3.75 will be awarded high honors.

Minor in Information Systems and Technology Management (ISTM)**Purpose**

There is a growing need in today's increasingly complex socio-technological world for the fusion of information systems, technology, and business management for two important purposes: the use of information systems to solve business problems, and the management of technology, which includes new product development and enterprise management. The information systems management (ISM) program therefore offers a minor in information systems and technology management (ISTM) to provide undergraduates in the School of Engineering as well in other programs and divisions in the university, such as economics and business management economics, the physical and biological sciences, and arts, the opportunity to expand the breadth of their knowledge and training to include the management of information systems and the management of technology.

Rationale for the Courses

Courses for the information systems management minor will include a combination of courses from the ISM program, computer engineering, computer science, and economics as well as the chains of prerequisites behind these courses. The ISM program courses for the information systems management minor will include a mix of information systems and management of technology courses, providing students with a strong foundation in both the management of information systems and the management of technology.

Course Requirements

Requirements for the minor in information systems management are the following:

Lower-Division Requirements**Mathematics (2 courses)**

Mathematics 19A, *Calculus* (or Applied Mathematics and Statistics 11A/Economics 11A, *Mathematical Methods for Economists*, or Mathematics 11A, *Calculus*, or Mathematics 20A, *Honors Calculus*)

Mathematics 19B, *Calculus* (or Applied Mathematics and Statistics 11B/Economics 11B, *Mathematical Methods for Economists*, or Mathematics 11B, *Calculus*, or Mathematics 20B, *Honors Calculus*)

Computer Science (1 course)

12A/L, *Introduction to Programming (Accelerated) Laboratory*; or Computer Science 5J, *Introduction to Programming in Java*

Information Systems Management (2 courses)

Information Systems Management 50, *Business Information Systems*

One of the following courses:

Information Systems Management 58, *Systems Analysis and Design*; or

Information Systems Management 80C, *Starting a New Technology Company*

Upper-Division Requirements**Mathematics (1 course)**

One of the following courses:

Economics 113, *Introduction to Econometrics*; or

Computer Engineering 107, *Mathematical Methods of Systems Analysis: Stochastic*; or

Applied Mathematics and Statistics 131, *Introduction to Probability Theory*

Upper-Division Electives (4 courses)

Four upper-division courses selected from the following:

Information Systems Management 105, *Management of Technology I*

Information Systems Management 125, *Management of Technology II*

Information Systems Management 158, *Business Strategy and Information Systems*

Computer Engineering 150/L, *Introduction to Computer Networks/Laboratory*

Computer Science 180, *Database Systems I* (or Computer Science 182, *Introduction to Database Management Systems*)

Economics 100A, *Intermediate Microeconomics* (or 100M, *Intermediate Microeconomics*, mathematics intensive—requires additional prerequisites)

Economics 100B, *Intermediate Macroeconomics* (or 100N, *Intermediate Macroeconomics*, mathematics intensive—requires additional prerequisites)

With pre-approval from the information systems management undergraduate director, up to two graduate information systems management courses may be used to satisfy upper-division elective requirements.

Graduate Programs**Technology and Information Management Ph.D. and Master's Degrees**

Technology and information management (TIM) is a new and distinct discipline within engineering, combining technology management, systems engineering, and information technology. TIM's research and academic programs, combining information technology with both knowledge management and systems management, address problems facing firms today as they deal with more complex decisions in a global environment, facing new business models (e.g., "services") and business practices. TIM places special emphasis on research arising from challenges faced in creation and management of knowledge-based services and enterprises. TIM themes include:

- **Management and optimization of enterprise systems**, which is the integration of business, technology, and management perspectives to enable an entity to achieve enhanced growth and profitability through use of analytical methods including stochastic models, optimization, game theory and knowledge management.
- **New product, technology, and services management**, which is the design and development of products and services, the design and risk management of product portfolios, and pricing.
- **Financial engineering**, which addresses the management of risk, reward, and allocation of resources in technology development and deployment.
- **Information retrieval and knowledge management**, which includes semantic mining and machine learning, linking business to knowledge management.

TIM offers a master of science (M.S.) degree as a terminal degree for engineers who wish to prepare for careers in management in high-tech enterprises, providing the appropriate breadth and depth of courses for preparation of these engineering managers.

The TIM doctor of philosophy (Ph.D.) degree

focuses on research, with emphasis on analytic methods for managing high-tech enterprises, including product, services, and business-process innovation and development; financial engineering for technology and enterprise management; entrepreneurship; operations and supply-chain management; costing and strategy; marketing engineering; data mining; and the applications of information technology to knowledge-management, high-tech enterprises.

Base Requirement

Most entering students are expected to come from undergraduate engineering programs. Students with quantitative undergraduate preparation in the sciences, economics, or mathematics would also be prepared if they had significant industry experience in a technology field or if they are prepared to take extra courses and/or an internship in industry to obtain this background. The TIM M.S. attracts students now employed in industry and also recent B.S. graduates who have not yet entered the workforce. For this latter group, industrial experience will be encouraged through internships with local companies. TIM M.S. students may take up to two upper-division, undergraduate, prerequisite courses and, with adviser approval, may count these as credit toward the M.S. degree. (These courses will not count as credit toward the Ph.D. degree.)

Mathematics

- Probability and statistics (AMS 131)—Focus on probability models, random variables, maximum likelihood and Bayesian estimation
- Linear algebra (AMS 10 or MATH 21)
- Differential equations (AMS 10 or MATH 24)

Computer Science

- *Abstract Data Types* (CMPS 101)—Focus on abstract data types and common algorithms
- Programming project (e.g., CMPS 104A, CMPS 115, CMPS 111)—Any upper-division, computer science course that involves a large programming project
- Database systems (CMPS 180, 181)

Computer Engineering

- *Probability and Statistics for Engineers* (CMPE 107)
- Computer networks (CMPE 150, 151)
- *Computer Architecture* (CMPE 110)
- *Applied Graph Theory and Algorithms* (CMPE 177)

Economics

- Microeconomics (ECON 100A)
- Macroeconomics (ECON 100 B)
- *Managerial Economics* (ECON 101)—Includes pricing schemes, non-price competition, and game theory

Field examinations and/or other pre-qualifying examinations

The graduate record examination (GRE) General Test is required for admission and a GRE subject advanced test—preferably in computer science, engineering, physics, or mathematics—is highly recommended. Chemistry and biology students with adequate training in mathematics and physics may also be considered. Student GPA of 3.5 or higher is recommended for admission into the program.

Relationship of Master's and Doctor's programs

The M.S. and Ph.D. programs have the same admission requirements. As in other SOE graduate programs, students admitted to the M.S. program may be subsequently admitted to the Ph.D. program by departmental approval. Ph.D. students may receive the M.S. degree upon fulfillment of the M.S. degree requirements.

Course requirements

Masters students must complete a minimum of 49 credits, comprising the following:

- Four ISM core courses (20 credits minimum);
- Two ISM seminars (4 credits minimum);
- Four elective graduate courses offered by ISM, or relevant graduate courses from other UCSC departments as approved by the graduate adviser and the TIM graduate director. Up to two appropriate upper-division undergraduate courses may be used as electives, to strengthen a student's preparation for graduate studies, with approval of the adviser. (20 credits minimum);
- Thesis research or independent study (5 credits minimum).

Up to 15 credits of appropriate UCSC Extension XSC or concurrent credit may be used to satisfy the degree credit requirements (core and elective), as approved by the graduate adviser and TIM graduate director.

Ph.D. students must complete a minimum of 62 credits:

- Four ISM core courses (20 credits);
- Two ISM seminars (4 credits minimum);
- Two elective graduate courses (10 credits) offered by ISM;
- Three additional graduate electives (15 credits) chosen with approval of the adviser and TIM graduate director. Students may substitute other appropriate courses for the ISM core courses or electives with the approval of their adviser and TIM graduate director;
- A minimum of 10 credits of thesis research or independent study;
- Applied Mathematics and Statistics 200, *Research and Teaching in AMS* (3 credits), or Computer Science 200, *Research and Teaching in Computer Science and Engineering* (3 credits).

Master's Requirements

Core Courses (4 required)

- ISM 205, *Management of Technology I* (5 credits)
- ISM 206, *Optimization Theory and Applications* (5 credits) (Possible substitutes include: ISM 207, CMPE 230, ECON 216, 217, AMS 205)
- ISM 225, *Management of Technology II* (5 credits), or ISM 270, *Service Engineering and Management* (5 credits) or Applied Mathematics and Statistics 215, *Stochastic Modeling in Biology*
- ISM 240, *Information Technology for Decision Support: An Introduction* (5 credits)

Seminars (2 required)

- Two ISM graduate seminars

Other Courses (electives)

- Ten (10) or more credits of graduate courses in related disciplines outside the Baskin School of Engineering (requires adviser and graduate director approval). A maximum of two SOE upper-division undergraduate courses may be counted as electives when necessary to strengthen a student's preparation for graduate studies (requires adviser approval).
- All remaining credits must be graduate elective courses approved by the adviser and the TIM graduate director. The program offers a wide variety of electives (see Table 8, Section 5).
- With appropriate preparation and/or student interests, proposals will be accepted to allow substitution of another graduate course for one of the core courses. This proposal will require approval of the faculty adviser and the TIM graduate director.
- On-campus students serving as teaching assistants or who plan to pursue a Ph.D. must take Applied Mathematics and Statistics 200, *Research and Teaching in AMS* (3 credits), or Computer Science 200, *Research and Teaching in Computer Science and Engineering* (3 credits) before or during their first teaching-assistant (TA) assignment.

Optional Elective Concentrations: The range of elective options allows for the diversity of M.S. student interests. It also allows TIM M.S. students to specialize. For example, a student specializing in the following areas of management of technology and technology of management could take the corresponding elective classes:

Management of technology track—ISM 208, ISM 220, ISM 225, and ISM 230;

Technology of management track—ISM 209, ISM 245, ISM 260, CMPE 276, and CMPS 277.

Ph.D. Requirements

- A minimum of 45 credits of approved graduate courses, of which 30 credits must be from courses offered by TIM (unless exceptions are approved by the faculty adviser and TIM graduate director);
- Two ISM seminars (4 credits minimum);
- Applied Mathematics and Statistics 200, *Research and Teaching in AMS* (3 credits), or Computer Science 200, *Research and Teaching in Computer Science and Engineering* (3 credits);
- A minimum of 10 credits of dissertation research or independent study credits; and
- Ph.D. dissertation.

The research areas in TIM are varied, and each will require a different sequence of classes to develop appropriate depth in analytical methods and technology. The selection of graduate courses will be in consultation with the dissertation supervisor.

Although there is no teaching requirement, students will be encouraged to gain teaching experience by becoming teaching assistants (TAs).

Where appropriate, research internships with companies, government laboratories, or elsewhere are recognized (and may be required) as an integral part of the research leading to the dissertation.

*Lower-Division Courses***50. Business Information Systems. F,W,S**

Addresses the use of information systems (IS) within a business enterprise. Subjects include computer hardware and software concepts, system design and implementation, telecommunications, data management, transaction-based systems, management information systems, and the use of IS to compete. Intended for information system management and business management economics majors. *R. Akella, J. Musacchio, K. Ross*

58. Systems Analysis and Design. W

Students learn how information technology is used to deal with business requirements and/or solve business problems. Provides an understanding of structured computer systems analysis and design methodologies and techniques and their application to business information systems. Intended for information systems management and business management economics majors. Prerequisite(s): course 50. Enrollment limited to 40. *Y. Zhang*

80C. Starting a New Technology Company. S

Focuses on the creation and management of technology start-ups and small companies, using case studies and team projects as the basis for learning and applying the course materials. (General Education Code(s): T7-Natural Sciences or Social Sciences.) *S. Desa, R. Akella*

94. Group Tutorial. F,W,S

A means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

94F. Group Tutorial (2 credits). F,W,S

A means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***101. Management of Technology Seminar (2 credits). F,W,S**

Uses weekly talks by leading industry practitioners and university researchers to provide in-depth exposure to the management of technology. Topics covered include product development, operations, strategy, finance, and marketing for technologies such as software and information systems. May be repeated for credit. *S. Desa*

105. Management of Technology I. F

An in-depth examination of technological, strategic, marketing, and financial methods and analytical tools for the management of technology to enable cost-effective and rapid development of profitable and high quality technologies. Includes case studies and a comprehensive project. Students who receive credit for this course cannot also receive credit for course 80A; students who receive credit for course 205 cannot also receive credit for this course. Prerequisite(s): Mathematics 19B or 11B or Applied Mathematics and Statistics 11B or Economics 11B. *S. Desa*

125. Management of Technology II. W

High-technology enterprises must understand and operate

effectively within their technology-business value chains in order to maximize profitability. This course develops and applies methods and tools for the design, optimization, selection, and management of these value chain networks. Students who receive credit for this course cannot also receive credit for course 80B; students who receive credit for course 225 cannot also receive credit for this course. Prerequisite(s): course 105. *S. Desa, R. Akella*

158. Business Strategy and Information Systems. S

Analysis of effective use of information systems within a business enterprise, with emphasis on gaining a competitive advantage. Integration of information systems with business strategy, financial justification, personnel, and organizational considerations are highlighted. Intended for information system management majors or senior engineering majors who have a business interest. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 50 or permission of instructor. (General Education Code(s): W.) *K. Ross*

193. Field Study. F,W,S

Provides individual programs of study with specific academic objectives carried out under direction of faculty member of Information Systems Management and a willing sponsor at field site. Uses resources not normally available on campus. Credit based on presentation of evidence of achieving objectives by submitting written and oral presentation. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S

Provides individual programs of study with specific academic objectives carried out under direction of faculty member of Information Systems Management and a willing sponsor at field site. Uses resources not normally available on campus. Credit based on presentation of evidence of achieving objectives by submitting written and oral presentation. Cannot normally be repeated for credit. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195. Senior Thesis Research. F,W,S

Intended for majors. Students submit petition to sponsoring agency. *The Staff*

195F. Senior Thesis Research (2 credits). F,W,S

Intended for majors. Students submit petition to sponsoring agency. *The Staff*

198. Individual Study or Research. F,W,S

Intended for majors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Individual Study or Research (2 credits). F,W,S

Intended for majors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Individual Study or Research. F,W,S

Individual directed study for upper-division undergraduates. Students submit petition to sponsoring agency. Enrollment restricted to senior information systems man-

agement majors. May be repeated for credit. *The Staff*

*Graduate Courses***205. Management of Technology I. F**

Addresses technological, strategic, marketing, financial methods, and analytical tools for management of technology in an integrated manner that enables the cost-effective and rapid development of profitable and high quality technologies. Includes case studies and a comprehensive project. Students cannot receive credit for this course and either course 80A or 105. Enrollment restricted to juniors, seniors, and graduate students. *S. Desa, R. Akella*

206. Optimization Theory and Applications. F

A first graduate course in optimization with an emphasis on problems arising in management and engineering applications. Objectives are to become experts in problem formulation, comfortable with software for solving these problems, and familiar with analytical methods behind these solver technologies. Prerequisite(s): calculus and linear algebra. Enrollment restricted to graduate students. *K. Ross, S. Desa*

207. Random Process Models in Engineering. S

A first graduate course in stochastic process modeling and analysis with an emphasis on applications in technology management, information systems design, and engineering. Enrollment restricted to graduate students. Prerequisite: Computer Engineering 107 or other undergraduate probability course recommended. *J. Musacchio*

209. Knowledge Services and Data Analytics. F

Provides students with the systematic methodology and analytical tools to address the field of knowledge services in an integrated manner. Focuses on data, text, and business analytics. Includes training in the basic elements of stochastic optimization and other algorithmic approaches, such as stochastic dynamic programming, statistics, and machine learning. These methods enable corporate enterprises to achieve rapid, effective, and profitable optimization of knowledge-services management. Students are expected to have undergraduate preparation in probability and statistics. Undergraduates may enroll with instructor approval. Enrollment restricted to graduate students. Students are expected to have undergraduate preparation in probability and statistics. Undergraduates may enroll with instructor approval. *R. Akella*

211. E-Business Technology and Strategy.

Surveys structure of modern information technology, the relation of that structure to structure of the industry that creates it, and the economic forces that drive the players in the industry. Building on these technological and economic concepts, studies how firms can craft a technology and business strategy to create and capture value in the information technology product and/or services sectors. Enrollment restricted to graduate students. *J. Musacchio*

225. Management of Technology II. W

High technology enterprises must understand and operate effectively within their technology-business value chains in order to maximize profitability. Course develops and applies methods and tools for the design, optimization, selection, and management of these value chain networks. Students cannot receive credit for this course and either course 80B or 125. Prerequisite(s): course 205 or consent of instructor. Enrollment restricted to juniors, seniors, and graduate students. *S. Desa, R. Akella*

230. Financial Engineering and Management in High Technology Firms.

Course provides students with a systematic methodology, and the corresponding set of methods and analytical tools,

to address the field of financial engineering and its use in high-tech enterprises in an integrated manner. Covers basic concepts of stochastic optimization and other algorithmic approaches, such as stochastic dynamic programming; decision models and analysis; and binomial trees; and their application in financial engineering in the context of high-tech enterprises. Prerequisite(s): Computer Engineering 107 or Economics 113 or Applied Mathematics and Statistics 131, or instructor approval. Enrollment restricted to graduate students. *R. Akella*

240. Information Technology for Decision Support: An Introduction.

Introduction to the information technologies useful to IT management. Reviews/surveys four major topics: 1) information systems: from computer technology—systems architecture (hardware and software), multiprocessors and cluster—to client-server, networking and distributed computing, data storage and data servers, file management, database systems, input/output technology, graphics and multimedia; 2) IT as a "service": commercial and open-course tools for information-system development and knowledge management; 3) managing, searching, and mining of structured and unstructured data; 4) decision-support systems that integrate knowledge with data mining and text mining tools to support decision-making in product development, supply-chain management, marketing, sales and logistics. Enrollment restricted to graduate students. *The Staff, Y. Zhang, P. Mantey*

245. Data Mining. S

Covers the principles, algorithms, and applications of data mining, including mining sequential data, structured data, stream data, text data, spatiotemporal data, biomedical data, and other forms of complex data. Enrollment restricted to graduate students. *R. Akella, Y. Zhang*

250. Stochastic Optimization in Information Systems and Technology. W

First in a sequence of courses in information systems and technology management (ISTM). Provides systematic methodology and corresponding set of methods and analytical tools to address the field of ISTM in an integrated manner; provides required training in stochastic optimization and other algorithmic approaches, such as dynamic programming, to achieve business intelligence in corporate enterprises. Students should have solid background in the following: probability equivalent to statistics, stochastic methods, calculus, linear algebra, mathematical maturity, stochastic processes, and optimization. Enrollment restricted to graduate students; undergraduates who have completed Computer Engineering 107 or Applied Mathematics and Statistics 131 enroll by permission of instructor. Applied Mathematics and Statistics 205A, Computer Engineering 230 recommended. *R. Akella*

251. Information Systems and Technology Management 2.

Provides a systematic methodology and corresponding set of methods and analytical tools in stochastic and neurodynamic programming used for business intelligence in corporate enterprises and AI and Machine learning research and applications in computer science, computer engineering, and electrical engineering and related to applied mathematics and statistics, business, management, and economics. Students should have solid background in probability equivalent to statistics, stochastic methods, calculus, mathematical maturity, stochastic processes and optimization, business intelligence and algorithms. Prerequisite(s): Computer Engineering 107 or Applied Mathematics and Statistics 131 or permission of instructor. Enrollment restricted to graduate students. Course 230, 250, and Applied Mathematics and Statistics 205A

or 205B recommended. *R. Akella*

260. Information Retrieval.

Course covers major topics of information retrieval, including statistical characteristics of text, several important retrieval models, text clustering, text classification, text filtering, web analysis, information extraction, peer to peer research, distributed search, personalized search, and other related topics. Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. *Y. Zhang*

270. Service Engineering and Management. W

Introduction to service engineering and management, from the role of services in the global economy to analytical models in service operations management. This field is developing rapidly; the material covers the fundamental principles of services as well as recent research. Topics include designing efficient service networks, forecasting, resource allocation, and globalization. Enrollment restricted to graduate students. *K. Ross, The Staff*

280A. Graduate Research Seminar (2 credits). *

Weekly seminar series in topics of current research in information systems and technology management. Enrollment by permission of instructor. Enrollment limited to 30. May be repeated for credit. *The Staff*

280I. Seminar on Information Retrieval and Knowledge Management (2 credits). S

Seminar series discussing advanced topics in information retrieval and knowledge management. Current research and literature are presented during each meeting. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *Y. Zhang*

280M. Sales and Marketing for Technologists and Engineers (2 credits).

Perspective on the theory, plus examples, and tools useful to technologists and engineers for successfully guiding and supporting sales and marketing endeavors and, thereby, ensuring funding, staffing, product appeal, positive customer relationships, and marketplace success. *P. Mantey, The Staff*

280S. Seminar Topics (2 credits). *

Weekly seminar series of current research on a special topic in information systems and technology management. The theme of research presented throughout the course selected by the instructor. Topics may include, but are not limited to, knowledge planning, new product development and management of technology. Enrollment with permission of instructor. Enrollment limited to 30. May be repeated for credit. *P. Mantey*

293. Advanced Topics in Technology and Information Management (TIM). *

Advanced research topics in TIM (as determined by instructor). Topics include, but are not limited to, approaches and solutions to complex business problems, and development of information-based technology and services. Enrollment restricted to graduate students. Enrollment limited to 25. May be repeated for credit. *P. Mantey, The Staff*

297. Independent Study. F,W,S

Independent study under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Thesis research under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

English

See Literature, page 359, and Linguistics, page 354.

English-Language Literatures

Students wishing to pursue a course of study in English literature should consult the concentration in national/transnational literatures under Literature, page 361.

Entry-Level Writing Requirement

See page 25.

Environmental Sciences and Policy

Program Description

UCSC offers a range of options for students to pursue environmental topics. The Environmental Studies Department offers an interdisciplinary B.A. program that emphasizes social sciences, conservation biology, and agroecology (see Environmental Studies, below). The Environmental Studies Department offers combined majors with the Departments of Biological Sciences, Earth and Planetary Sciences, and Economics. Effectively, the environmental studies/biology and environmental studies/Earth sciences combined majors extend the scientific training in disciplinary areas but are not intended to develop a student's core competence to a level equivalent to that attained with a major in the related science. The Chemistry and Earth and Planetary Sciences Departments offer concentrations in environmental topics within their B.S. degree programs. The environmental sciences concentrations are designed for students in the natural sciences who wish to pursue interdisciplinary study of the environment. These develop a level of competency suitable for pursuing graduate work in these disciplinary areas or in graduate environmental programs (see descriptions in the appropriate sections: Chemistry; and Earth and Planetary Sciences).

Environmental Studies

405 Interdisciplinary Sciences Building
(831) 459-2634
<http://envs.ucsc.edu>

Faculty and Professional Interests

Professor

WEIXIN CHENG
Soil ecology, agroecology, biogeochemistry, global change ecology

ROBERT R. CURRY, Emeritus

BRYAN H. FARRELL, Emeritus

MARGARET FITZSIMMONS

Social and spatial aspects of environmental change, the development and regulation of primary-sector activities and the regional integration of environmental planning and resources management institutions in urban and rural settings

GREGORY S. GILBERT

Disease ecology, forest ecology, tropical ecology, biological invasions, conservation biology

STEPHEN R. GLIESSMAN

Agroecology, sustainable agriculture, tropical land use and development, alternative trade networks, sustainable livelihoods and conservation, linking community and agroecology

DAVID GOODMAN, Emeritus

BRENT HADDAD

Fresh-water economics, policy, and communications; economic institutions and the environment; climate-change mitigation and adaptation; institutional and ecological economics

KAREN D. HOLL

Restoration ecology, conservation biology, landscape ecology

SHELDON KAMIENIECKI

Environmental politics and policy; agenda building; strategic regulatory planning; business and interest group influence; political campaigns and elections; research methodology

DEBORAH K. LETOURNEAU

Agroecology, tropical biology, insect-plant interactions, biological control as an alternative to chemical pesticides, environmental risks of genetically modified crops

PAUL L. NIEBANCK, Emeritus

JAMES E. PEPPER, Emeritus

DANIEL M. PRESS

U.S. environmental politics and policy, social capital and democratic theory, industrial ecology, land and species conservation, regionalism

ALAN RICHARDS, Emeritus

CAROL SHENNAN

Agroecology, ecosystem studies, agriculture-wetland interactions, participatory research, gender, and environmental issues

MICHAEL E. SOULÉ, Emeritus

Associate Professor

JEFFREY T. BURY

Political ecology; sustainable development; Latin America; extractive industries; climate change; new models of conservation

TIMOTHY DUANE

Environmental law and policy, renewable energy development, ecosystem-based management, land use planning and regulation, water law and policy, conservation

MICHAEL E. LOIK

Plant physiological ecology, climate change ecology, biometeorology, ecophysiology

S. RAVI RAJAN

Environmental history and political ecology, risk and disaster studies, science and technology studies, North-South environmental conflicts, environmental social theory, environmental ethics

Assistant Professor

ZDRAVKA TZANKOVA

Environmental policy and politics (United States and

comparative); marine policy; democratic and conservation consequences of non-state, market-based initiatives in environmental governance

CHRISTOPHER C. WILMERS

Wildlife ecology and conservation; food webs and climate change; movement ecology; animal behavior; predator-prey dynamics; ecological modeling

ERIKA ZAVALETA

Ecology and evolutionary biology, biodiversity and global change, biological invasions, terrestrial plant and ecosystem ecology, ecological economics, human ecology, conservation

Lecturer

ANDREW SCHIFFRIN

Environmental assessment, transportation, watershed management



DORIS ASH (Education)

Informal science learning, teacher professional development, science discourse in and out of the classroom

GIACOMO BERNARDI (Ecology and Evolutionary Biology)

Fish biology, phylogenetics, evolution

MICHAEL K. BROWN, Emeritus (Politics)

Inequality, race and African American politics, political economy, political development of welfare states, theories and methods of historical social science

KENNETH W. BRULAND (Ocean Sciences)

Chemical oceanography, biogeochemistry of trace metals and radionuclides, aquatic chemistry, geochemistry

EDMUND BURKE III (History)

Islamic history, modern Middle East and North African history, French history, European imperialism, world history

MELISSA L. CALDWELL (Anthropology)

Poverty and welfare, religious development work, food, transnationalism, socialism and postsocialism, Russia, the former Soviet Union, and Eastern Europe

MARK CIOC (History)

German history, modern European history, environmental history

DANIEL P. COSTA (Ecology and Evolutionary Biology)

Physiological ecology of marine mammals and birds

DONALD CROLL (Ecology and Evolutionary Biology)

Ecology and conservation of islands and seabirds

BEN CROW (Sociology)

International development, sociology of water and markets, global inequality, South Asia and East Africa, political economy, and green enterprise

E. MELANIE DUPUIS (Sociology)

Economic sociology, sociology of consumption, sociology of development, political sociology, sociology of the environment, technological change, historical sociology, social theory, food and social change

KENT EATON (Politics)

Comparative politics, international relations, political economy, public policy, territorial conflict, federalism, decentralization, party and electoral systems, Latin America, the Philippines

JAMES ESTES (Ecology and Evolutionary Biology, and Ocean Sciences)

Marine sciences, community ecology

ANDREW FISHER (Earth Sciences and Planetary Sciences)

Hydrogeology, crustal studies, heat flow, modeling

JONATHAN A. FOX (Latin American and Latino Studies)

Latin American and Latino politics, including issues of democratization, social movements, social and environmental policy, immigration, and public interest groups

LAUREL R. FOX (Ecology and Evolutionary Biology)

Terrestrial population and community ecology, plant-animal interactions

DIANE GIFFORD-GONZALEZ (Anthropology)

Paleolithic and Neolithic Africa and Eurasia, colonial New Mexico, origins of food production, pastoralists, zooarchaeology, history of archaeology, interpretive theory, visual anthropology

JAMES B. GILL (Earth Sciences and Planetary Sciences)

Igneous petrology, geochemistry of island arcs

GARY B. GRIGGS (Earth Sciences and Planetary Sciences)

Coastal processes, hazards and engineering

DANIEL GUEVARA (Philosophy)

Kant, moral philosophy, moral psychology, environmental ethics, history of modern philosophy

JULIE H. GUTHMAN (Community Studies)

Sustainable agriculture and alternative food movements, international political economy of food and agriculture, politics of obesity, political ecology, race and food, critical human geography

DONNA J. HARAWAY (History of Consciousness and Feminist Studies)

Feminist theory, cultural and historical studies of science and technology, relation of life and human sciences, human-animal relations, and animal studies

SUSAN HARDING (Anthropology)

Culture, politics, narrative, gender, local/global studies, ethnographic writing, fundamentalism, Christianity, state-making, aging, America, and Spain

A. MARM KILPATRICK (Ecology and Evolutionary Biology)

Disease ecology, population biology

PAUL L. KOCH, Professor (Earth and Planetary Sciences)

Isotope biogeochemistry, vertebrate paleontology

RONNIE D. LIPSCHUTZ (Politics)

International relations; international political economy; foreign policy; resource/environmental politics; global political networks; global civil society; film, fiction, and politics; technology and society; states of terror

FLORA LU, Assistant (Latin American and Latino Studies)

Ecological anthropology, human behavioral ecology, Amazon rainforest, indigenous peoples, conservation, Ecuador, culture change, market integration, indigenous resource management, political ecology, environmental justice

PAUL M. LUBECK (Sociology)

Political sociology; political economy of development, globalization, labor and work; logics of methodology; religion and social movements; Islamic society and identities; information and networks

ANDREW SALVADOR MATHEWS (Anthropology)

Environmental anthropology, science and technology studies, conservation and development

JONATHAN MOORE (Ecology and Evolutionary Biology)

Freshwater ecology, conservation biology

INGRID M. PARKER (Ecology and Evolutionary Biology)

Plant ecology, plant-pathogen interactions, biological invasions

MANUEL PASTOR JR., (Latin American and Latino Studies)

Urban poverty and regional development, Latinos in the urban U.S., environmental justice, macroeconomic stabilization in Latin America; distribution and growth in the developing world; Cuban economic reform; Mexican economic reform

ADINA PAYTAN, IMS Research Scientist (Earth and Planetary Sciences)

Biogeochemistry, paleoceanography, environmental and aquatic chemistry

GRANT H. POGSON (Ecology and Evolutionary Biology)

Molecular population genetics, ecological genetics, marine invertebrates and fishes

DONALD C. POTTS (Ecology and Evolutionary Biology)

Coral reef ecology, genetics, evolution, and geological history; marine biodiversity; tropical biology, global change, and remote sensing

PETER T. RAIMONDI (Ecology and Evolutionary Biology)

Marine ecology, evolutionary ecology, experimental design, applied ecology

DANILYN RUTHERFORD (Anthropology)

Borders and frontiers, colonialism, nationalism, ethnicity, kinship, performance, Christianity, secularism, sovereignty, publics, affect, technology, governancy, theory and method in anthropology, West Papua, Indonesia, the U.S.

ALI SHAKOURI (Electrical Engineering)

Quantum electronics; nano- and microscale heat and current transport in semiconductor devices; thermoelectric/thermionic energy conversion; renewable energy sources; thermal imaging; micro-refrigerators on a chip; and optoelectronic integrated circuits

LISA C. SLOAN (Earth Sciences and Planetary Sciences)

Paleoclimatology, climate change, Earth system science, surficial processes

DONALD R. SMITH (Microbiology and Environmental Toxicology)

Neurotoxicity, cellular and organismal responses to environmental toxins

ANDREW SZASZ (Sociology)

Environmental sociology (environmental movements, policy, environmental justice); theory

DANA Y. TAKAGI (Sociology)

Social inequality and identity, research methods, race relations, nationalism and social movements

ANNA TSING (Anthropology)

Culture and politics, feminist theory and gender in the U.S., social landscapes and tropical forest ethnographies, ethnicity, local power and relations to the state in Indonesia, Southeast Asia, and the U.S.

TERRIE M. WILLIAMS (Ecology and Evolutionary Biology)

Vertebrate locomotor and thermoregulatory physiology; marine biodiversity; comparative vertebrate energetics, exercise physiology

PATRICIA ZAVELLA (Latin American and Latino Studies)

Relationship between women's work and domestic labor, poverty, family, sexuality and social networks, feminist studies, ethnographic research methods, and transnational

migration of Mexican/lo workers and U.S. capital

Program Description

The environmental studies major prepares students for meaningful lifetime engagement with the environmental challenges that are facing society. UCSC environmental studies graduates hold leadership positions as legislative and policy analysts, environmental management officials, educators, restoration ecologists, conservation and field biologists, museum curators, business consultants, and political advocates. In addition, many graduates go on to obtain professional, master's, or doctoral degrees at the nation's finest institutions.

Students pursue an interdisciplinary curriculum that combines course work in the natural and social sciences. Introductory courses cover the ecological, political, and economic aspects of historic, current and future environmental issues. The core course, Environmental Studies 100/L, *Ecology and Society* (most often completed during the fall quarter of a student's junior year) builds on the skills acquired in the lower-division classes, and encourages students to apply ecological, economical and political skills toward environmental and ecosystem management. The remaining upper-division elective courses further emphasize the integration of ecological knowledge with an understanding of social institutions and policies. The program emphasizes active, interdisciplinary learning with the overall objective of instilling the necessary skills to conserve biodiversity and integrate the principles of sustainability with respect to management of complex environmental systems. Faculty work on these issues at local, regional, and global levels providing a unique, proactive, and progressive academic environment for students wishing to pursue a degree program within the Environmental Studies Department.

In addition to the single environmental studies major, students may choose to pursue one of three combined majors with biology, Earth sciences, or economics. The combined major curricula offer the unique integration of the underlying concepts of environmental studies with a focus on the application of these concepts in a closely related field (or vice versa).

As a complement to classroom instruction and research, many courses have field components. The Environmental Studies Internship Program helps qualified students find placements with government and educational agencies, community organizations, and private firms. Furthermore, faculty-directed, independent, or field-oriented research courses allow environmental studies students the opportunity to learn more about their specific academic career or personal interests, often while earning academic credit.

Requirements for the Major

Prerequisites for the Single Major

Continuing UCSC students are required to complete all six prerequisite courses before taking Environmental Studies 100/L. Five of the prerequisite courses are pre-set and are listed below. See the course descriptions for more specific information.

Environmental Studies 23, *The Physical and Chemical Environment* (offered in spring quarter); or Chemistry 1A, *General Chemistry*.

Environmental Studies 24, *General Ecology* (offered in fall and summer quarters); or Ecology and Evolutionary Biology 20C, *Ecology and Evolution*. *

Environmental Studies 25, *Environmental Policy and Economics*. Offered in winter and summer quarters.

Applied Mathematics and Statistics 2, *Pre-Statistics*; or Applied Mathematics and Statistics 3, *Precalculus for Science and Engineering*; or Mathematics 3, *Precalculus*; or a score of 3 or higher on the College Board AP calculus examination, or equivalent. Check the catalog for the quarters offered.

Applied Mathematics and Statistics 7/L, *Statistical Methods for the Biological and Environmental Studies*. Check the catalog for the quarters offered. Applied Mathematics and Statistics 2, *Pre-Statistics*, or Applied Mathematics and Statistics 3, *Precalculus for Science and Engineering*, or Mathematics 3, *Precalculus* is a required prerequisite for this course.

*Prerequisite for Environmental Studies 24 is Applied Mathematics and Statistics 2 or 3 or Mathematics 3.

In addition, students choose one introductory course in sociology, cultural anthropology, or ethics. The acceptable courses are as follows:

Anthropology 2, *Introduction to Cultural Anthropology*

Sociology 1, *Introduction to Sociology*

Sociology 10, *Issues and Problems in American Society*

Sociology 15, *World Society*

Philosophy 21, *Wilderness Studies*

Philosophy 22, *Introduction to Ethical Theory*

Philosophy 24, *Introduction to Ethics: Contemporary Moral Issues*

Philosophy 28, *Environmental Ethics*

Philosophy 80G, *Bioethics in the 21st Century: Science, Business, and Society*

Plan One

| Year | Fall | Winter | Spring |
|------------|----------------------------------|--|---------------------------------|
| 1st (frsh) | MATH 3 or AMS 2 or 3 gen ed | AMS 7/L or SOC/ANTH/ Ethics gen ed | ENVS 23 gen ed |
| 2nd (soph) | PHYS 5D MATH 23A CMPE 12/L | EE 101/L AMS 20 MATH 23B | EE 171/L CMPS 13/L gen ed |
| 3rd (jr) | ENVS 100/L | | |

Plan Two

| Year | Fall | Winter | Spring |
|------------|-------------------|---|---|
| 1st (frsh) | ENVS 24 gen ed | ENVS 25 AMS 7/L or SOC/ANTH/ Ethics | ENVS 23 AMS 7/L or SOC/ANTH/ Ethics |
| 2nd (soph) | ENVS 100/L | | |

Declaration Process for Environmental Studies Students

Students wishing to declare within the Environmental Studies Department are to visit the Environmental Studies web site at <http://envs.ucsc.edu/undergraduate> and follow the steps listed there. In order to be officially declared and enroll in the core course, Environmental Studies 100/L, students must have the official declaration of major form filed with the Environmental Studies Department. Study plans may be downloaded

from the environmental studies web site (<http://envs.edu/undergraduate/>).

Transfer Students

Transfer students are accepted in the environmental studies major in the fall quarter only. Students transferring to UCSC should complete as much of the lower-division curriculum as possible, with a grade of C or better, at another recognized institution before transferring to UCSC. Below is an outline of acceptable substitute courses for the lower-division environmental studies single major prerequisites. Please note that as of fall 2006, all students wishing to pursue a degree within the Environmental Studies Department must complete Applied Mathematics and Statistics 7/L at UCSC to fulfill the introductory statistics requirement. It is recommended that transfer students plan to enroll in Applied Mathematics and Statistics 7/L and any other missing prerequisite during the summer quarter.

- Completion of an introductory college chemistry course will substitute for Environmental Studies 23.
- Two courses, one in politics, one in economics, will substitute for Environmental Studies 25.
- A college-level precalculus course will substitute for Mathematics 3 or Applied Mathematics and Statistics 3 at UCSC.

Environmental Studies 24 and 25 are offered during Summer Session at UCSC, and transfer students are encouraged to take them. If you are transferring, compare catalog descriptions, consult your current institution's adviser, and refer to the ASSIST web site, www.assist.org, to determine equivalency.

Upper-Division Requirements

In addition to lower-division course work, students are required to complete nine upper-division courses: Environmental Studies 100/L, *Ecology and Society* (environmental studies core course, offered once yearly during the fall quarter).

Seven upper-division electives (environmental studies courses numbered 101-179). One must be based in the social sciences and one course must be based in the natural sciences. List of these courses is available from the Environmental Studies Department.

Senior comprehensive requirement (see below).

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. A primary goal of the environmental studies major is to train students who are able to critically analyze interdisciplinary environmental problems, justify their position on an issue, and communicate that position to a range of audiences in writing. The DC Requirement in environmental studies is satisfied by completing Environmental Studies 100/L and one of the following courses: 183B, 190, 195A, 195B, or 196.

Comprehensive Requirement

The senior comprehensive may be satisfied by completing one of the options listed below. Before enrolling in the senior thesis or senior internship option, students must formally apply to work with a particular faculty mentor very early in their thesis or project preparation. These courses require careful planning, additional independent research, and at least a two-quarter commitment.

Environmental Studies 183B, *Senior Internship*

Environmental Studies 190, *Capstone Course: Environmental Problem Solving* (offered winter quarter only)

Environmental Studies 195A or 195B, *Senior Thesis*
Environmental Studies 196 (one course from the series), *Senior Seminar*

Students with advanced skills in one of the graduate focal areas may also take a graduate seminar by invitation from the instructor.

Major Disqualification Policy

There are six introductory requirements for the environmental studies major. Five required courses include: Environmental Studies 23; Environmental Studies 24 (or Biology: Ecology and Evolutionary Biology 20C); Environmental Studies 25; Applied Mathematics and Statistics 2 or 3 or Mathematics 3; Applied Mathematics and Statistics 7/L.

Students must also take one of the following courses: Anthropology 2; or Philosophy 21, 22, 24, 28, or 80G; or Sociology 1, 10, or 15.

Students are also required to complete Environmental Studies 100/L.

A student who either 1) fails two of these required courses, or 2) fails one required course twice, will be disqualified from the major. The department also reserves the right to disqualify from the major students who fail three or more upper-division environmental studies elective courses numbered 100 or above.

Procedures

Students who wish to appeal their disqualification based on extenuating circumstances must submit a letter to the department chair or designee within 15 days from the date the notification was mailed. Within 15 days of receipt of the appeal, the department will notify the student, college, and Office of the Registrar of the decision.

Requirements for the Combined Majors

Environmental Studies/Biology

This course of study provides students with the basic tools of biological science and sufficient understanding of resource conservation, conservation biology, and concerns about environmental sustainability to apply these tools to environmental problems.

Prerequisites

All courses must be taken for a letter grade.

Biology and mathematics courses may require placement examinations. See course descriptions for prerequisite information.

Ecology and Evolutionary Biology 20A, 20B, and 20C
Environmental Studies 25

Anthropology 2; or Philosophy 21, 22, 24, 28, or 80G; or Sociology 1 or 15

Applied Mathematics and Statistics 3, *Precalculus* or Applied Mathematics and Statistics 2 *Pre-Statistics*; Mathematics 3; or a score on the math placement examination or the College Board AP calculus examination sufficient to be placed into calculus)

Applied Mathematics and Statistics 7 and 7L

Chemistry 1A, 1B, and 1C/N

Two courses in physics, Physics 1 and 2, or Physics 6A/L and 6B/M.

Upper-Division Requirements

Students are required to complete nine upper-division courses and the comprehensive requirement listed below.

Environmental Studies 100/L (prerequisites are: Chemistry 1A; Ecology and Evolutionary Biology 20C; Environmental Studies 25; Applied Mathematics and Statistics 2 or 3, or Mathematics 3; Applied Mathematics and Statistics 7/L; and the cultural anthropology/sociology/philosophy option).

Biology 105, *Genetics*

Biology 175, *Evolution*

Six upper-division courses, three in biology and three in environmental studies. One of the six must be a laboratory course, and one of the three environmental studies courses must be based in the social sciences. Students wishing to pursue an advanced degree in the pure or applied sciences are strongly encouraged to complete the organic chemistry series as well. Chemistry 108A/L and 108B/M may be substituted to fulfill one of the upper-division biology elective requirements.

These upper-division elective courses should be selected in pursuit of a coherent plan of study, chosen in consultation with faculty sponsors from both the Biological Sciences and Environmental Studies Departments. None of the three environmental studies upper-division courses can be an environmental studies internship, individual study, or substitution course.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC Requirement for the environmental studies/biology combined major is satisfied by completing Environmental Studies 100/L and one of the following courses: Environmental Studies 183B, 190, 195A, 195B, or 196, or Biology: Ecology and Evolutionary Biology 109.

Comprehensive Requirement

Students satisfy the senior comprehensive requirement by completing either:

- one of the options for environmental studies majors (see Comprehensive Requirement above); or
- one of the approved internships, independent research or field course or a thesis

Disqualification Policy for the Environmental Studies/Biology Combined Major

All environmental studies/biology combined majors are covered by the biology and environmental studies major disqualification policies, which limit the number of times a student may receive a No Pass, D, and/or F in the introductory major requirements for both biological sciences and environmental studies and still remain a combined major, and which also limits the number of times a student may receive a No Pass, D, and/or F in upper-division biology and environmental studies courses. Students should refer to the Biological Sciences section and the Major Disqualification Policy section above for more information.

Environmental Studies/Earth Sciences

This course of study provides students with the basic tools of Earth sciences and environmental studies needed to address environmental problems.

Prerequisites

Applied Mathematics and Statistics 7 and 7L

Mathematics 11A-B (or 19A-B)

Chemistry 1A, 1B/M, and 1C/N
 Physics 6A/L and 6B/M (or 5A/L and 5B/M)
 Earth Sciences 20/L (or 5/L or 10/L)
 Environmental Studies 24 and 25
 Anthropology 2 or Philosophy 21, 22, 24, 28, or 80G
 or
 Sociology 1 or 15.

Upper-Division Requirements

Earth Sciences 110A/L, 110B/M, or 110C/N

Environmental Studies 100/L (Prerequisites are:

Chemistry 1A, Ecology and Evolutionary Biology 20C, Environmental Studies 25, Applied Mathematics and Statistics 2 or 3 or Mathematics 3, Applied Mathematics and Statistics 7/L, and the cultural anthropology/sociology/philosophy option)

Three additional upper-division environmental studies courses, including at least one course based in the social sciences

Three additional upper-division Earth sciences courses

The upper-division courses should be selected in pursuit of a coherent plan of study, such as water policy-hydrology, restoration ecology-geochemistry, agroecology-soil physical processes, or environmental policy-climate change, among others, in consultation with faculty from both the Environmental Studies and Earth Sciences Departments. None of the three environmental studies upper-division courses can be an environmental studies internship, individual study or substitution course.

Disqualification Policy for the Environmental Studies/Earth Sciences Combined Major

All environmental studies/earth sciences majors are covered by the earth science and environmental studies major disqualification policies.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC Requirement for the environmental studies/Earth and planetary sciences combined major is satisfied by completing Environmental Studies 100/L and one of the following courses: Environmental Studies 183B, 190, 195A, 195B, or 196, or Earth Sciences 195 or 188A-B.

Comprehensive Requirement

Students satisfy their senior comprehensive requirement in environmental studies or Earth sciences by completing either:

One of the senior comprehensive options for single environmental studies majors (see Comprehensive Requirement above) or one of the senior comprehensive options for Earth sciences majors (see Comprehensive Requirement under Earth Sciences).

Environmental Studies/Economics

This major provides students with the basic tools of economic analysis and an understanding of the mechanics of resource production, conservation, and use, in both ecological and economic terms.

Prerequisites

Economics 1, 2, 11A, 11B

Environmental Studies 23, 24, 25

Anthropology 2; or Philosophy 21, 22, 24, 28, or 80G; or Sociology 1 or 15.

Upper-Division Requirements

Economics 100A, Intermediate Microeconomics

Economics 113, Econometrics

Environmental Studies 100/L

Six elective courses from, three from each discipline.

Only specifically approved economics electives. List of approved courses available at the Economics Department. *

Environmental Studies courses numbered 101-179, with one course based in the natural sciences. None of the three environmental studies upper-division courses can be an environmental studies internship, individual study or substitution course.

* Subject to change. Please see the Economics Department adviser or the environmental studies adviser for the most up-to-date approved course listings.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC Requirement in environmental studies/economics combined major is satisfied by completing Environmental Studies 100/L and one of the following courses: Environmental Studies 183B, 190, 195A, 195B, or 196.

Comprehensive Requirement

Students satisfy the senior comprehensive requirement by completing the following:

- one of the options for environmental studies majors (see Comprehensive Requirement above); and
- pass those portions of the economics comprehensive examination administered in Economics 100A and 113.

Disqualification Policy for the Environmental Studies/Economics Combined Major

There are eight introductory requirements for the environmental studies/economics combined major. Seven required courses include: Environmental Studies 23, Environmental Studies 24 (or Biology: Ecology and Evolutionary Biology 20C); Environmental Studies 25; Economics 1; Economics 2; Economics 11A; and Economics 11B. Students must also take one of the following courses: Anthropology 2, Philosophy 21, 22, 24, 28, or 80G, or Sociology 1, 10, or 15. Students are also required to complete Environmental Studies 100/L. A Student who either (1) fails two of these required courses, or (2) fails one required course twice, will be disqualified from the combined major. The department also reserves the right to disqualify from the combined major students who fail three or more upper-division environmental studies or economics elective courses numbered 100 or above.

Honors

Senior Comprehensive Honors. Only applicable is senior thesis, internship, or individual work in a senior seminar. Honors must be awarded by the student's faculty sponsor, and a second faculty member (chosen by the student's advisor) must confer.

Departmental Honors. To be considered for departmental honors, students must have a grade point

average (GPA) of 3.5 in upper-division environmental studies courses.

Highest Departmental Honors. To be considered for highest departmental honors, students must have a GPA of 3.75 in the major in upper-division environmental studies courses, and received honors on the senior comprehensive.

For combined majors, students must fulfill all requirements for honors from both departments.

Graduate Program

The doctor of philosophy (Ph.D.) program in Environmental Studies at UCSC draws from two areas of knowledge: ecology and social sciences. Our interests in ecology range from conservation biology, to agroecology, and to global change. Our interests in the social sciences bridge the dimension between environmental policy analysis and political economy of the environment. These all are historically independent fields and UCSC's program is one of the first to link them.

Graduates of the program are expected to be informed in all of these fields, to have deep intellectual strength in their area of specialty, and to have made substantial contributions toward the understanding of an environmental problem. We expect our doctoral students to be as skilled and intellectually rigorous within their research emphases as are students emerging from more traditional programs-but also to possess the knowledge needed to understand, analyze, and communicate in different but highly relevant fields of study. This expectation of intellectual breadth as well as disciplinary depth is a central goal of our doctoral program.

Given the strong interdisciplinary focus of the environmental studies Ph.D. program, study in other fields is encouraged. The environmental studies faculty have a wide range of research interests, and most are affiliated with other departments on campus. Students have the option of pursuing a "designated emphasis in environmental studies," the equivalent of a graduate minor. These provide a framework for in-depth study in specialized fields in your area, and an opportunity for recognition of particular scholarly expertise. We currently have agreements with the Ecology and Evolutionary Biology, Latin American and Latino Studies, Sociology, and Applied Mathematics and Statistics Departments, and are pursuing agreements with others.

Requirements for the Doctorate

The typical duration of the doctoral program is five to six years.

A dissertation in environmental studies is expected to present an original contribution to the understanding of a significant environmental problem or issue. It should demonstrate a clear understanding of the relevant literature, careful and rigorous research design, and effective communication of the results within the context of the student's area of emphasis.

Also note:

- Students are expected to serve as teaching assistants in undergraduate courses for two quarters, unless they can demonstrate equivalent experience.
- Students have the option of pursuing a "designated emphasis," the equivalent of a graduate minor. Designated emphases provide a framework for in-depth study in specialized fields in the area, and an opportunity for recognition of particular scholarly expertise. The Environmental Studies Department has agreements with the Sociology Department and the Latin American and Latino Studies

Department, and is pursuing agreements with other departments.

- The Environmental Studies Department does not offer a terminal master's degree, except for students who have been advanced to candidacy but who do not complete the Ph.D. dissertation.

Program Prerequisites

The interdisciplinary nature of the core curriculum requires rigorous preparation at the undergraduate level. Students are expected to have had at least one course in statistical analysis. Calculus is useful in many areas of the program and essential to independent work in some areas. In addition, all students should have—either from prior course work or independent reading—an advanced upper-division knowledge of ecology; genetics; evolutionary biology; macro- and microeconomics; politics; and political economy. However, preparation in these areas is best accomplished by course work.

Committees

On admission to the program, each student is assigned a guidance committee of three faculty: two from the student's general research area and one from a complementary field. Thus, a student whose interests are in conservation biology has two committee members who are natural scientists and one who is a social scientist; similarly, a student whose interests are in the political economy of agriculture has a natural scientist on the guidance committee.

Through the membership of the committee may change as the student forms relationships with particular faculty and begins to define the dissertation research, subsequent committees always include one environmental studies faculty member from the other metadiscipline to ensure that the student takes fully into account the interdisciplinary implications of the student's training and research.

Under the guidance of an interdisciplinary faculty committee, a student is expected to begin to define and plan further education and research. For some students, further education and research may involve closely focused preparation and additional course work in particular fields, (such as ecology, economics, or politics), guided by environmental studies faculty and other campus and UCSC faculty. Depending on the student's background, interests, and intentions, the student's advisers may suggest or require additional course work, including courses from other departments.

The guidance committees work with students throughout the first two years to ensure that each student's preparation is individually designed to meet particular needs and interests. At the same time, the various research-seminar formats are intended to encourage students to work collaboratively in reading and research preparation.

Required Courses

- Environmental Studies 201A, *Keywords and Concepts* part 1
- Environmental Studies 201B, *Keywords and Concepts* part 2
- Environmental Studies 201M, *Interdisciplinary Research Methods*
- Environmental Studies 201N, *Interdisciplinary Research Design*
- Two of the following, one each from the social and natural sciences:
- Social Sciences:

- o Environmental Studies 210, *Political Ecological Thought and the Environment*, or
- o Environmental Studies 240, *Public Policy and Conservation*
- Natural Sciences:
 - o Environmental Studies 220, *Conservation Biology*, or
 - o Environmental Studies 230, *Agroecology and Sustainable Agriculture*
- An upper-division or graduate course in quantitative methods, providing a basis in research design and analysis

These courses are designed to ensure that students acquire disciplinary depth in their chosen research fields; gain experience of their research communities; and refine the research skills necessary to perform successfully in their professional arena.

In addition, every quarter before advancement to candidacy, all students are required to participate in:

- Environmental Studies 290, *Interdisciplinary Research Seminar* (2 credits)
- Environmental Studies 290L, *Graduate Research Seminar* (2 credits)
- Environmental Studies 292, *Topics in Research in Environmental Studies* (2 credits)

Graduate students are encouraged to participate in course Environmental Studies 291, *Advanced Readings in Environmental Studies*, in areas of interest.

Pre- and Qualifying Examinations

During the second year, students prepare for the pre-qualifying examination, which must be taken no later than winter quarter of the third year. The qualifying examination for advancement to candidacy normally takes place by the end of the spring quarter of the third year (UCSC requires that the qualifying examination be completed no later than the end of the fourth year).

If the venue of a student's research is in a non-English-speaking country, a language examination testing for reading and speaking competence in the language of that country must be passed before advancement to candidacy.

Application and Admission

For admission to the doctoral program, students must have completed a bachelor's degree or the equivalent in a related disciplinary field. Students with interdisciplinary degrees, such as environmental studies should have disciplinary course work equivalent to a double major or a master's degree in an appropriate field.

Superior scholarship, capacity to carry out independent research, and commitment to disciplinary integration must be demonstrated in the statement of purpose, course work, Graduate Record Examination (GRE) General Test, and letters of recommendation. The GRE Subject Test (in a disciplinary field of the student's choice) is strongly recommended. Prospective students must contact faculty directly to inquire about specific course requirements and sponsorship. Students are rarely accepted into the program without significant, early communications with potential faculty sponsors. See the faculty list at <http://envs.ucsc.edu/faculty/> for contact information.

Other considerations for admission include grades, evaluation, publications, professional or extramural experience, and more than one degree (second bachelor's or master's). Students are required to have completed coursework, or equivalent practical experience, in ecology, statistics, sociology/political science,

and economics. Limited deficiencies in these areas can be remedied during the first year of graduate study. In addition to the application materials, students are strongly encouraged to submit a substantial written project (undergraduate or master's research project).

Admissions information and the online graduate application are at the UCSC Division of Graduate Studies web site under prospective student information (<http://graddiv.ucsc.edu/prospective/whyucsc.php>).

Admission is only considered for the fall quarter. Completed applications are due by December 15th of the previous academic year.

Lower-Division Courses

15. Natural History of the UCSC Campus (2 credits). S

Introduces students to the range of natural species and communities occurring on the UCSC campus. All class time is spent outside, and each week a different area of campus is visited. Course 24 is recommended. Enrollment limited to 21. C. Lay

23. The Physical and Chemical Environment. S

Introduces students to basic physical and chemical processes that govern the structure and function of ecosystems. Topics to be covered include climate and weather, soil types and their formation, and biogeochemical cycles. (General Education Code(s): IN.) W. Cheng

24. General Ecology. F

Covers principles of ecology including limits to species abundances, evolutionary ecology, population dynamics, community interactions and patterns, and ecosystem patterns and dynamics. Prerequisite(s): Applied Mathematics and Statistics 2 or 3, or Mathematics 3 or higher level Mathematics course or placement exam score of 31 or higher; or AP Calculus AB exam score of 3 or higher; course 23 recommended as prerequisite to this course. (General Education Code(s): SI, IN.) J. Washburn

25. Environmental Policy and Economics. W

Environmental policy issues are situated within historical developments in political and economic systems. Introduces some of the key concepts of politics and economics by way of examining the processes which have given rise to environmental issues, their social and political perception, and institutional responses. Enrollment limited to 450. (General Education Code(s): PE-E, IS.) J. Barsimantov

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision. (See course 192.) The Staff

80A. The Future of Rain Forests. *

A broad overview of both ecological and social aspects related to tropical rain forests drawing on case studies worldwide. Topics include the biology and distribution of rain forests, causes and effects of their destruction, and management options to facilitate their conservation. (General Education Code(s): PE-E, T7-Natural Sciences or Social Sciences.) The Staff

80B. The Ecological Forecast for Global Warming. F

A broad overview of the impacts of human activities on the global climate system. Topics include how climate affects the distribution of ecosystems, the influence of global climate change on biodiversity, ecosystem function, and consequences for the human enterprise. (General Education Code(s): PE-E, T7-Natural Sciences or Social Sciences.) M. Loik

83. Environmental Studies Internship. F,W,S

A supervised off-campus learning experience related to environmental problem solving. Focuses on initial experiences in applied work and specific skill development. Students may be placed individually or with a team in government agencies, private organizations, citizen action groups. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

84. Environmental Studies Internship (2 credits). F,W,S

Supervised learning experience designed to introduce environmental issues and problem solving. Places students with governmental and nongovernmental agencies, private organizations, schools, or in specialized apprenticeships. Two-unit internship intended to focus interest and to develop skills for more advanced work. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

91F. Community and Agroecology (2 credits). F,W,S

Interdisciplinary two-credit seminar designed to introduce students to concepts of community and agroecology in the context of sustainability. Course can serve as a gateway to or as a continuing basis for participation in PICA (Program in Community and Agroecology). Specific topics and readings change each quarter. Enrollment limited to 25. May be repeated for credit. *S. Gliessman*

99. Tutorial. F,W,S

Directed reading, supervised research, and organized projects relating to environmental problems. May be repeated for credit with consent of the chairperson of Environmental Studies Department. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Provides for department-sponsored directed reading, supervised research, or organized project for lower-division students under the direct supervision of a faculty sponsor. May not be counted toward major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***100. Ecology and Society. F**

Introduction to environmental issues in an interdisciplinary matrix. Focuses on three issues at the intersection of ecological questions and social institutions: agroecology and sustainable agriculture; population growth, economic growth, and environmental degradation; and biodiversity conservation and land management. Reviews the important roles of disciplinary abstraction and of the application of that knowledge to context-dependent explanation of environmental problems. Enrollment restricted to environmental studies, environmental studies/biology, environmental studies/economics, and environmental studies/Earth sciences majors. Prerequisite(s): course 23 or Chemistry 1A; course 24 or BIOE 20C; course 25; and Applied Mathematics and Statistics 7/L; and one from: Anthropology 2, Sociology 1,10,15, Philosophy 21,22,24,28, or 80G. Concurrent enrollment in 100L is required. *Z. Tzankova, E. Zavaleta*

100L. Ecology and Society Writing Laboratory (2 credits). F

Required writing lab accompanying course 100. Students are introduced to writing in different styles and for different audiences typical of the ecosystem-society interface. Course 100 writing assignments are developed, written, and revised in conjunction with the lab. W credit is granted only upon successful completion of course 100.

Prerequisite(s): Satisfaction of the Entry Level Writing and Composition requirements. Concurrent enrollment in 100 is required. (General Education Code(s): PR-E.) *Z. Tzankova, E. Zavaleta*

104A. Introduction to Environmental Field Methods. W

A course in basic field skills including habitat description, behavior observation, specimen collection techniques, mapping and map interpretation, vegetation analysis, population sampling, microclimate measurement, soil and water sampling. Emphasis on use of the scientific method; experimental design, data handling, statistical analysis and presentation; and basic field methodologies. Enrollment restricted to environmental studies majors and combined majors. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; concurrent enrollment in course 104L and previous or concurrent enrollment in courses 100/L required, or by permission of instructor. (General Education Code(s): W.) *E. Zavaleta*

104L. Field Methods Laboratory (2 credits). W

Students directly observe elements of natural history and ecological process; design and implement field studies based on lectures; deploy the methods discussed in lectures; and collect data to analyze, interpret, and report in written and oral forms. Concurrent enrollment in course 104A is required. *E. Zavaleta*

107A. Natural History Field Quarter. S

A 15-unit field course that uses California wild lands to develop skills of natural history observation and interpretation. Students gain the ability to identify plants, animals, vegetation types, and landscapes, as well as address the complex issues of preservation and management of these resources. Enrollment by interview. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L; concurrent enrollment in courses 107B and 107C required. Enrollment restricted to environmental studies majors and combined majors with biology, Earth sciences and economics. Students are billed a materials fee. *The Staff*

107B. Natural History Field Quarter. S

A 15-unit field course that uses California wild lands to develop skills of natural history observation and interpretation. Students gain the ability to identify plants, animals, vegetation types, and landscapes, as well as address the complex issues of preservation and management of these resources. Enrollment by interview. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L; concurrent enrollment in courses 107A and 107C required. Enrollment restricted to environmental studies majors and combined majors with biology, Earth sciences and economics. *The Staff*

107C. Natural History Field Quarter. S

A 15-unit field course that uses California wild lands to develop skills of natural history observation and interpretation. Students gain the ability to identify plants, animals, vegetation types, and landscapes, as well as address the complex issues of preservation and management of these resources. Enrollment by interview. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L; concurrent enrollment in courses 107A and 107B required. Enrollment restricted to environmental studies majors and combined majors with biology, Earth sciences and economics. *The Staff*

108. General Entomology. *

Introduction to entomology including anatomy, physiology, systematics, evolution, behavior, and reproduction of the world's most diverse group of organisms. These topics

are illustrated in several contexts, from the importance of insects as disease vectors to the historical and contemporary uses of insects by humans. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors with biology, Earth sciences and economics. Offered in alternate academic years. *D. Letourneau*

108L. General Entomology Laboratory (3 credits). *

Laboratory sections are devoted to the identification of insects. Individual collections representing 15 orders, sight identification of 60 families, and use of taxonomic keys for positive designations required. Concurrent enrollment in course 108 is required. Offered in alternate academic years. *D. Letourneau*

109A. Ecology and Conservation in Practice Super-course: Ecological Field Methods. *

An intensive, on-site learning experience in terrestrial field ecology and conservation, using the University of California Natural Reserves. Students study advance concepts in ecology, conservation, and field methods for four weeks, then experience total immersion in field research at the UC Natural Reserves. Lectures, field experiments, and computer exercises familiarize students with research methods, study design, statistical approaches, and analytical tools for ecological research. Enrollment by application. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151B-C-D or ENVS 109B-C-D is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 107, 107L, ENVS 104A or 196A. (Also offered as Biology:Ecology & Evolutionary 151A. Students cannot receive credit for both courses.) *D. Croll*

109B. Ecology and Conservation in Practice Super-course: Ecological Field Methods Laboratory. *

Field-oriented course in ecological research. Combines overview of methodologies and approaches to field research with practical field studies. Students complete field projects in ecology and also learn the natural history of the flora and fauna of California. Students are billed a materials fee. Enrollment by application. Prerequisite(s): Entry Level Writing and Composition requirements; BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151A-C-D or ENVS 109A-C-D is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 150, 150L, ENVS 104A or 196A. (Also offered as Biology:Ecology & Evolutionary 151B. Students cannot receive credit for both courses.) (General Education Code(s): W.) *D. Croll*

109C. Ecology and Conservation in Practice Super-course: Functions and Processes of Terrestrial Ecosystems. *

From lectures and discussion of terrestrial community and ecosystem ecology, students work individually or in small groups to present an idea for a project, review relevant literature, develop a research question/hypothesis, design and perform an experiment, collect and analyze data, and write a report. The instructor evaluates the feasibility of each student's project before it begins. Enrollment by application. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C or ENVS 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151A-B-D or ENVS 109A-

B-D is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 150, 150L, ENV5 104A or 196A. (Also offered as Biology:Ecology & Evolutionary 151C. Students cannot receive credit for both courses.) *D. Croll*

109D. Ecology and Conservation in Practice Supercourse: Conservation in Practice. *

Focuses on current issues in environmental and conservation biology and the emerging field methods used to address them. From field-oriented lectures about current issues in environmental and conservation biology, students pursue research project as individuals and small groups to develop hands-on experience with field skills in conservation research and resource management. Enrollment by application. Prerequisite(s): BIOL 20A, BIOE 20B, BIOE 20C or ENV5 23, 24, 100; and AMS 7 and 7L. Concurrent enrollment in BIOE 151A-B-C or ENV5 109A-B-C is required. Satisfies the senior exit requirement for biological sciences majors and satisfies the senior exit requirement for environmental studies majors by prior approval. Students cannot receive credit for this course and BIOE 150, 150L, ENV5 104A or 196A. (Also offered as Biology:Ecology & Evolutionary 151D. Students cannot receive credit for both courses.) *D. Croll*

110. Institutions, the Environment, and Economic Systems. S

Debate about environmental policy is often couched in economic terms. Environmental issues have become questions of political economy, as they influence international and domestic policy and reflect on the functioning of the market system. Examines the assumptions and implications of alternative approaches to political economy, as these pertain to questions of environmental policy and political institutions. Prerequisite(s): previous or concurrent enrollment in courses 100 and 100L, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors with biology, Earth sciences and economics. *M. Fitzsimmons*

115A. Geographic Information Systems and Environmental Applications. F

Introduction to geographic information systems (GIS) as the technology of processing spatial data, including input, storage and retrieval; manipulation and analysis; reporting and interpretation. Emphasizes GIS as a decision support system for environmental and social problem solving, using basic model building, experimental design, and database management. Students cannot receive credit for this course and course 215A. Enrollment restricted to environmental studies majors and combined majors. Prerequisite(s): Previous or concurrent enrollment in course 115L, 100/L, or permission of instructor. Course in computer science, Earth science, math, or geography recommended. Enrollment restricted to environmental studies majors and combined majors. *B. Nickel*

115L. Exercises in Geographic Information Systems (2 credits). F

Exercises in Geographic Information Systems and Remote Sensing that demonstrate the development of digital geographic data. Students gain hands-on experience with developing datasets, using imagery to create GIS layers, performing spatial analysis, and utilizing GPS technology. Emphasis placed on environmental applications. Students cannot receive credit for this course and course 215L. Students are billed a materials fee. Concurrent enrollment in course 115A is required. *The Staff*

120. Conservation Biology. W

Explores biological and anthropogenic influences on the

diversity and scarcity of organisms. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *C. Wilmers*

122. Tropical Ecology and Conservation. *

An introduction to the ecological processes, principles, and players of tropical ecosystems, and to conservation issues facing tropical American forests. We will look at how tropical ecosystems work, roles of humans in shaping them, and current conservation opportunities and dilemmas. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L is required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *G. Gilbert*

123. Animal Ecology and Conservation. S

Advanced course in animal ecology and conservation focusing on the ecology, behavior, biogeography, and evolution of vertebrates. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *C. Wilmers*

129. Integrated Pest Management. S

Provides an extensive coverage of applied ecology, pest control technology, and the social, political, and economic factors regulating the ideologies and practice of pest management. Topics include agroecosystem design and population regulation of insects, weeds, vertebrates, and pathogens; field monitoring, chemical and biological control; economic thresholds, decision-making processes, and the role of agribusiness. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *D. Letourneau*

129L. Integrated Pest Management Laboratory (2 credits). *

Field trips and field exercises that demonstrate the practice of integrated pest management techniques. Individual and group projects provide hands-on experience with field sampling techniques, pest identification, recognition of biological control agents, experimental design, interview techniques, data interpretation and field report writing. Prerequisite(s): concurrent enrollment in course 129. Enrollment restricted to environmental studies majors and combined majors. *The Staff*

130A. Agroecology and Sustainable Agriculture. F

Ecological concepts and principles are applied to the design and management of sustainable agroecosystems. Alternatives for agriculture are discussed in terms of ecosystem structure and function. A weekly three-hour lab is required. Prerequisite(s): Concurrent enrollment in course 130L and previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *S. Gliessman*

130B. Principles of Sustainable Agriculture. W

Agricultural sustainability is examined as a complex set of interactions between ecological, social, and economic components of an agroecosystem. Case studies are drawn from issues facing current U.S. agriculture and a basis for formulating policy for change that ensures sustainability is developed. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *M. Fitzsimmons*

130L. Agroecology and Sustainable Agriculture

Laboratory (2 credits). F

Laboratory and field exercises to train in the analysis of ecological processes in agricultural systems, with a focus on the quantification of ecological sustainability. Experimental design, analysis, and data interpretation are emphasized. Concurrent enrollment in course 130A is required. *S. Gliessman*

131. Insect Ecology. *

Advanced course in ecology featuring insect-plant interactions such as herbivory, pollination, and the effects of plants on insect population dynamics. Lectures emphasize current controversies in ecological theory and relate theory to application. Prerequisite(s): previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. Offered in alternate academic years. *D. Letourneau*

131L. Insect Ecology Laboratory (3 credits). *

Field and laboratory exercises are designed to test hypotheses or demonstrate principles in areas such as behavior, mutualism theory, community ecology, and agricultural ecology. Experimental design, analysis and interpretation of data are emphasized along with observational skills. Prerequisite(s): Concurrent enrollment in course 131 required. Offered in alternate academic years. *D. Letourneau*

133. Agroecology Practicum. *

Lectures and demonstrations are combined with field applications to give students direct experience and knowledge of sustainable agriculture and horticulture practices and principles. UCSC Farm and Garden are the living laboratories for testing agroecological principles. Emphasis is placed on small-farm systems. May be applied to major only once. Prerequisite(s): courses 130A and 130L and previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. Offered in alternate academic years. May be repeated for credit. *C. Shennan*

138. Field Ethnobotany. S

Lectures, laboratory, and fieldwork examine field botany from a human ecology perspective. Students have the opportunity to learn the skills of field botany and plant identification through the study of plants that are of major significance for human cultures. The emphasis of field skills is on applications to sustainable management of natural resources. Prerequisite(s): courses 130A and 130L, or by permission of instructor. Concurrent enrollment in course 138L required. Enrollment restricted to environmental studies majors and combined majors. Offered in alternate academic years. *S. Gliessman*

138L. Ethnobotany Laboratory (2 credits). S

Laboratory and field studies allow students to learn the taxonomy of important useful plant families, carry out field studies on local plant use and management practices, and investigate in detail home garden agroecosystems and model systems. Prerequisite(s): concurrent enrollment in course 138 required. *S. Gliessman*

140. National Environmental Policy. W

An overview of all major federal environmental policy domains. Analyzes political, social, economic, and other forces influencing federal (and some state) public policy responses to land use, natural resources, pollution, and conservation dilemmas. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *D. Press*

141. Ecological Economics. F

Application of economic analysis to natural resource policy and management. Topics include welfare economics, property rights and externalities, natural resource valuation, exhaustible and renewable resources, and sustainable development. Prerequisite(s): Economics 1 is strongly recommended as preparation. Previous or concurrent enrollment in courses 100 and 100L is required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *J. Barsimantov*

142. Energy Politics and Policy. W

Explores the social and environmental dimensions of energy production and consumption. Provides an overview of the tools to evaluate a new clean-energy economy and its wider political and economic implications. Students study assessment tools, such as risk assessment, material energy balances, and life-cycle assessment. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *T. Duane*

142L. Energy Politics and Policy Laboratory (2 credits). *

Trains students in the concepts and skills required to make decisions about energy production. Concurrent enrollment in course 142 required. Enrollment limited to 24. *T. Duane*

143. Sustainable Development: Economy, Policy, and Environment. W

Considers whether and how global poverty can be alleviated without irreparably damaging the environment. Examines interactions among population, economic growth, poverty, global consumption ethos, property rights systems, global economy, state capacity, and environmental damage. Scrutinizes impact of various developmental strategies adopted during the past 50 years on poverty, governance, and the environment. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *J. Bury*

145. Green Building Design. W

Promotes an ecological approach to design with an understanding of the environmental opportunities and constraints at play on the site and situation; works with the environment to maximize human comfort and energy efficiency. Enrollment restricted to environmental studies majors and combined majors. *The Staff*

149. Environmental Law and Policy. S

Surveys a wide range of topics in environmental law, including population control, state and federal jurisdiction, land and resources control, public land management, pollution control, and private rights and remedies. Students read a large number of judicial cases and other legal documents. (Also offered as Legal Studies 149. Students cannot receive credit for both courses.) Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *T. Duane*

150. Coastal and Marine Policy. S

Introduces and analyzes the history, design, implementation, and effectiveness of key legal and institutional frameworks that govern the use and stewardship of coastal and marine areas and resources. Primary focus is on the U.S., although attention is also devoted to international laws and institutions targeting major transboundary issues

like marine pollution and management of migratory fish stocks. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *Z. Tzankova*

151. Environmental Assessment. S

Introduction to California land use planning law and practice, and the theory, practice, and public policy aspects of environmental assessment, using the California Environmental Quality Act (CEQA) as a model. The National Environmental Policy Act (NEPA) and other environmental and planning legislation also considered. Covers elements of State law and regulations, environmental impact assessment requirements, and practical procedures for preparing and evaluating CEQA documents, with case studies that exemplify legal, regulatory and public policy and practice aspects of the assessment process. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *A. Schiffrin*

152. Science and Land Use Decisions. *

Technical and policy dimensions of major land use decisions will be assessed through a detailed case study. Technical review will stress geological constraints; policy review will stress the CEQA process. The initial case study will be the reuse of Ford Ord. One field trip is required. Enrollment restricted to environmental studies majors and combined majors. Prerequisite(s): one of courses 140, 149, 151 (recommended), 165 or Earth Sciences 20; and previous or concurrent enrollment in courses 100 and 100L, or by permission of instructor. *J. Gill*

156. Environmental Action through Writing. *

Guided practice in writing skills useful to environmental activists. Assignments emphasize thinking quickly, revising adeptly, researching resourcefully, and tempering powerful passions with careful arguments. Toward the development of effective individual voices, students read each other's drafts as well as the published work of established writers. Enrollment priority will be given to students who have not taken course 157. Enrollment restricted to environmental studies majors and combined majors. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. (General Education Code(s): W.) *S. Rabkin*

157. Writing in the Natural Sciences. S

Guided practice in writing effectively about science and natural history for a variety of audiences. Assignments emphasize reporting first-hand observations, explaining processes and phenomena, understanding scientific papers, and writing about scientific and technical subjects for a general audience. Enrollment priority will be given to students who have not taken course 156. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and previous or concurrent enrollment in courses 100/L required, or by permission of instructor. Enrollment restricted to environmental studies and combined majors (General Education Code(s): W.) *S. Rabkin*

158. Political Ecology and Social Change. S

The object is to provide a rigorous grounding in the method of political ecology and to demonstrate how this approach has been used in environmental analysis and problem solving by environmental social movements. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L is required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *J. Bury*

159. Nature Literature. *

Introduction to 19th- and 20th-century American writers who have influenced our understanding of humans' place in the natural world. Readings include original works as well as biographical and critical texts. Discussions, field trips, and writing assignments emphasize active learning. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *S. Rabkin*

160. Restoration Ecology. F

A multidisciplinary overview of restoring degraded ecosystems. Among the topics addressed are linkages between ecological principles and restoration, planning and implementing restoration projects, evaluating restoration success, and case studies of restoration of specific ecosystem types. Participation in one work day is required. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L is required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *K. Holl*

161A. Soils and Plant Nutrition. *

Provides fundamentals of soils and plant nutrition. The physical, biological, and chemical components of soils are investigated in relation to their ecological functions, fertility to plants, and sustainable management. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *W. Cheng*

161L. Soils and Plant Nutrition Laboratory (2 credits). *

Practice analytical techniques for evaluation of physical, chemical, and biological properties of soils. Grow plants to observe some typical symptoms of plant nutrient deficiencies. Prerequisite(s): Concurrent enrollment in course 161A is required. *W. Cheng*

162. Plant Physiological Ecology. W

Introduces the theory of plant interactions with the physical environment. Emphasizes influence of abiotic stresses on the recruitment, survival, growth, productivity, and reproduction of plants. Prior course work in ecology and/or plant physiology is recommended. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *M. Loik*

162L. Plant Physiological Ecology Laboratory (2 credits). W

Introduces techniques for the study of plant interactions with the physical environment. Examines the role of stress on energy budgets, water relations, photosynthesis, and reproductive allocation. Emphasizes experimental design, field techniques, and instrumentation during field trips to local chaparral and grassland ecosystems. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. *M. Loik*

163. Plant Disease Ecology. S

Introduction to ecological roles of plant diseases, including their importance in regulating plant population dynamics, community diversity, and system function in natural ecosystems; considerations of plant diseases in conservation ecology; and ecological approaches to managing diseases in agroecosystems. Students cannot receive credit for this course and course 263. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *G. Gilbert*

163L. Plant Disease Ecology Lab (2 credits). *

Introduction to techniques for studying plant diseases, including detection, isolation, cultivation, and identification of important groups of plant pathogens, completing Koch's postulates; diseases assessment techniques; experimental manipulation of plant-pathogen systems; and basic epidemiological tools. One field trip required. Prerequisite(s): concurrent enrollment in course 163 required. *G. Gilbert*

165. Freshwater Issues and Policy. W

Concepts, vocabulary, and skills necessary to the analysis of freshwater issues are introduced from hydrology, ecology, law, economics, engineering, and other disciplines. The skills are then applied to case studies involving local, state, and international freshwater conflicts and crises. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L is required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *B. Haddad*

166. Agroecosystem Analysis and Watershed Management. S

Explores a range of approaches to examine agroecosystem function, watershed management, and concepts of sustainability. Uses a combination of lecture, demonstration, field work, and field trips to illustrate approaches to analysis of managed ecosystems behavior and the integration of biophysical and socio-political knowledge to aid in watershed management. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor; and course 130A or 130B or 129 or 133 or 160 or 167. Enrollment restricted to environmental studies majors and combined majors. *C. Shennan*

167. Freshwater and Wetland Ecology. F

Field and lecture course teaches the physical and biological patterns and processes in freshwater and wetland systems, primarily focusing on Central Coast systems from headwaters to coastal marshes. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *C. Shennan*

167L. Freshwater and Wetland Ecology Lab (2 credits). *

Provides basic skills to assess chemical, biological, and physical characteristics of freshwater creeks, rivers, and wetlands. These skills are needed in environmental consulting, municipal agencies engaging in water management or impacts on water, and regulatory agencies. Relies on methods in geomorphology, biogeochemistry, hydrology, and field biology. Concurrent enrollment in course 167 is required. *The Staff*

168. Biogeochemistry and the Global Environment. W

Studies biogeochemical cycles and related environmental issues such as global environmental change, eutrophication, ecosystem degradation, and agricultural sustainability. Discusses transformation and movement of major nutrient elements in context of watershed ecology and societal implications. Students cannot receive credit for this course and course 268. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *W. Cheng*

169. Climate Change Ecology. F

Advanced topics in atmospheric science and ecological theory. Topics include impacts on biodiversity, carbon se-

questration, sustainable agriculture, and innovative solutions. Prerequisite(s): courses 100 and 100L. Enrollment restricted to environmental studies majors and combined majors. Enrollment limited to 40. *M. Loik*

172. Science, Policy, and the Environment. *

Introduces students to the dilemmas of science-based environmental policy and discusses their underlying philosophical underpinnings. Explores emergent alternatives, such as the precautionary principle and alternatives assessment, and examines the relationship between experts and the lay public in public controversies. Prerequisite(s): previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. (General Education Code(s): W.) *S. Rajan*

173. An Introduction to World Environmental History. W

Introduces students to some of the central issues in world environmental history such as: human attitudes toward the natural environment; the role of human societies, their institutions and technologies in changing the face of the earth; and the historical impact of environmental and developmental policies on race, class, and gender differences in a variety of human communities across the world. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *K. Worthy*

175. Biotechnology: Social and Environmental Dimensions. *

Surveys the rapid development of genetic engineering science and biotechnology-based industries and examines the economic, health, environmental, legal, and social justice dimensions of new biotechnology applications: genetic screening, cloning, transgenic animals and crops, genetically engineered food, and biodiversity prospecting. Readings, lectures, World Wide Web site reviews, student presentations, and papers will address controversial choices faced now by scientists, farmers, doctors, consumers, public officials, and global governance agencies. Prerequisite(s): Previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *The Staff*

177. Teaching Environmental Education. F

Designed for environmental studies majors interested in teaching environmental education in the K-12 school system. Students investigate incorporation of environmental education in the classroom; design an environmental education school project; and are placed in a school where they observe environmental education in practice. Prerequisite(s): course 91F or 191F, and previous or concurrent enrollment in courses 100 and 100L required, or by permission of instructor. Enrollment restricted to environmental studies majors and combined majors. *R. Jaffe*

179. Environmental Interpretation. S

A field course in theory and practice of environmental interpretation in parks, museums, and school programs with special attention to local natural history and children. Students will work to define their own interpretive philosophy, skills, and style. Background in natural history and/or experience working with children recommended. Prerequisite(s): course 100. Concurrent enrollment in course 184 required. Enrollment restricted to environmental studies majors and combined majors with economics, Earth sciences, and biological sciences. Enrollment by instructor interview only. *B. Dowd*

183. Environmental Studies Internship. F,W,S

A supervised off-campus learning experience related to environmental problem solving. Students may work with government agencies, private organizations, citizen action groups, or in specialized apprenticeships on an individual or team basis. Internship intended for environmental studies majors. Prerequisite(s): permission of instructor. Students submit petition to course sponsoring agency. May be repeated for credit. *The Staff*

183B. Senior Internship. F,W,S

This course combines fieldwork at an off-campus agency and a comprehensive analytical paper produced for the agency. Equivalent to a thesis in terms of the depth and quality of the work expected, it is combined with a 5-credit internship. Prerequisite of course 183. Students submit petition to sponsoring agency. Enrollment restricted to environmental studies majors and the combined majors with Earth sciences, biology and economics. Prerequisite(s): Entry Level Writing and Composition requirements. *The Staff*

184. Environmental Studies Internship (2 credits). F,W,S

A supervised learning experience related to environmental problem solving. Students may work with government agencies, private organizations, citizen action groups, or in specialized apprenticeships on an individual or team basis. This 2-credit internship focuses on specific skill development and must be connected to another internship, thesis, or course—except in rare circumstances for which students must petition. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

189. Environmental Studies Research Seminar (1 credit). F,W,S

Research seminars presented weekly throughout the year by environmental studies faculty, visiting scholars, and graduate students. Students discuss content and methodology of research presented following each seminar. Students write critiques of some seminars. May be repeated for credit. *K. Holl, E. Zavaleta*

190. Capstone Course: Environmental Problem Solving. W

A synthetic course that draws on the knowledge and skills students bring from other courses in the major. Focuses on written and oral individual and group projects in which students must take the initiative. Emphasizes developing skills critical for students in their future careers. Prerequisite(s): course 100; Entry Level Writing and Composition requirements. Enrollment restricted to senior environmental studies majors and the combined majors with Earth sciences, biology, and economics. *D. Letourneau*

191F. Community and Agroecology Seminar (2 credits). F,W,S

Interdisciplinary two-credit seminar designed for upper-division students who want to become involved in PICA (Program in Community and Agroecology) and to explore concepts of community and agroecology as they relate to sustainability. Also emphasizes development of leadership skills. Specific topics and readings change each quarter. Prerequisite(s): course 91F, 130A, 130B, 133, or equivalent experience. Enrollment limited to 25. May be repeated for credit. *S. Gliessman, The Staff*

192. Directed Student Teaching. F,W,S

Teaching a lower-division seminar. (See course 42.) Prerequisite(s): upper-division standing; permission of environmental studies faculty member and chairperson of department. *The Staff*

194. Teaching Environmental Studies. F,W,S

This provides an opportunity to participate in the preparation and teaching of introductory environmental studies courses. Students will have significant responsibility in leading discussion sections. Students submit petition to sponsoring agency. *The Staff*

195A. Senior Research. F,W,S

An individually supervised course, with emphasis on independent research that either results in a thesis or project or is done in conjunction with a senior internship. In order to receive credit, students must turn in an electronic copy of the final write-up. Satisfies the senior comprehensive requirement. Students submit petition to sponsoring agency. Prerequisite(s): Entry Level Writing and Composition requirements. *The Staff*

195B. Senior Thesis Group. S

Students involved in group or individual research that results in a senior thesis or project or done in conjunction with an internship meet regularly with their faculty sponsor to discuss the progress of their work, to receive academic and technical guidance, and to critique one another's written work. To receive credit the student must submit two bound copies of the completed research and write-up. Satisfies the senior comprehensive requirement. Students must discuss details with faculty sponsor. Students submit petition to sponsoring agency. Prerequisite(s): Entry Level Writing and Composition requirements. *J. Bury, K. Holl*

196. Senior Seminar. F,W,S

Readings and discussions of primary literature on a current environmental studies topic. Field or literature-based research projects (individual or group) writing multiple drafts resulting in a final paper. Topics vary yearly; consult current course listings. Enrollment by application with selection based on appropriate background and academic performance. Satisfies senior comprehensive requirement. Enrollment restricted to senior environmental studies majors; senior environmental studies/biology combined majors; senior environmental studies / Earth sciences combined majors; and senior environmental studies / economics combined majors. Prerequisite(s): Entry Level Writing and Composition requirements. *M. Fitzsimmons, B. Nickel, C. Shennan*

199. Tutorial. F,W,S

Advanced directed reading, supervised research, and organized projects relating to environmental problems. May be repeated for credit with consent of the chair of environmental studies. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Provides for department-sponsored directed reading, supervised research, or organized project under the direct supervision of a faculty sponsor. May not be counted toward major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**201A. Keywords and Concepts. F**

Two-quarter course introduces keywords and concepts that underlie interdisciplinary work in environmental studies through lectures, directed readings, and discussion. Modules include resonant concepts in ecology and society; ecology and evolution; environment and development; the global environment and society; agroecology and conservation biology; and public policy, economics, and law. Final grade for both courses assigned at the end of the second quarter. Enrollment restricted to graduate students. *G. Gilbert*

201B. Keywords and Concepts. W

Two-quarter course introduces keywords and concepts that underlie interdisciplinary work in environmental studies through lectures, directed readings, and discussion. Modules include resonant concepts in ecology and society; ecology and evolution; environment and development; the global environment and society; agroecology and conservation biology; and public policy, economics, and law. Final grade for both courses assigned at the end of the second quarter. Enrollment restricted to graduate students. *T. Duane, W. Cheng*

201M. Developing Research Proposals (2 credits). F

Offers graduate students the opportunity to become familiar with the research expertise of the faculty in the Environmental Studies department. Enrollment restricted to graduate students. *K. Holl*

201N. Interdisciplinary Research Design in Environmental Studies. S

Provides students with opportunities to learn research protocols, practices, and methods used in environmental studies. Combination of lectures, reading, practical exercises, and short projects used to explore how these methods can best be incorporated into interdisciplinary research designs. Enrollment restricted to graduate students. *D. Letourneau*

210. Political Ecological Thought and Environment. W

Provides an introduction to social scientific analyses of the relationships between capitalistic development and the environment in the late 20th century. It has a dual purpose: First, to develop a contemporary historical understanding and sensibility of how economic change, new institutional configurations, and world scale processes are shaping interactions with the environment. Second, to examine some recent political social theoretical perspectives on nature-society relations and radical environmental and social movements. Enrollment restricted to graduate students in environmental studies. *S. Rajan*

215A. Geographic Information Systems and Environmental Applications. F

Introduction to geographic information systems (GIS) as the technology of processing spatial data, including input, storage and retrieval; manipulation and analysis; reporting and interpretation. Emphasizes GIS as a decision support system for environmental and social problem solving, using basic model building, experimental design, and database management. Students cannot receive credit for this course and course 115A. Concurrent enrollment in course 215L is required. Enrollment restricted to environmental studies graduates students. *B. Nickel*

215L. Exercises in Geographic Information Systems (2 credits). F

Exercises in Geographic Information Systems and Remote Sensing that demonstrate the development of digital geographic data. Students gain hands-on experience with developing datasets, using imagery to create GIS layers, performing spatial analysis, and utilizing GPS technology. Emphasis placed on environmental applications. Students cannot receive credit for this course and course 115L. Students are billed a materials fee. Concurrent enrollment in course 215A is required. Enrollment restricted to environmental studies graduate students. *B. Nickel*

220. Conservation Biology. *

The principles of conservation biology, including a review of the core disciplines of demography, population genetics, island biogeography, and community ecology and discussion of area and edge effects, population viability, and

ecosystem issues related to the maintenance of biological diversity, especially in fragmented landscapes. Enrollment restricted to environmental studies graduate students. *C. Wilmers*

230. Agroecology and Sustainable Agriculture. *

The application of ecological concepts and principles to the design and management of agricultural systems. The long-term goal of sustainable agroecosystems is examined in economic, social, and ecological contexts. Enrollment restricted to environmental studies graduate students. *C. Shennan*

235. Social Theories of Nature. *

Intensive reading and discussion seminar on the treatment of nature in social theory. Focuses on major recent works which examine nature in social theory, in themselves, and in the context of the intellectual history of development of disciplinary discourses about nature. Students write critical reviews of assigned books and a research paper situating a particular book within its intellectual tradition. Prerequisite(s): interview with instructor to determine preparedness. May be repeated for credit. *M. Fitzsimmons*

240. Public Policy and Conservation. F

Introduction to political and economic approaches to policy analysis, with particular reference to natural resource scarcity, property rights, and environmental conservation. Case studies apply economic and policy process concepts to the management of public lands, biodiversity, and renewable resources. Enrollment restricted to environmental studies graduate students. *D. Press*

247. Regional Approaches to Environmental Policy. *

A research seminar combining theoretical issues in democratic theory, political economy, and planning with emerging concepts of bioregionalism. The focus is on institutional, scientific, and political innovations in managing the environment. Students evaluate current and historical proposals to regionalize environmental policy in the U.S. Enrollment restricted to environmental studies graduate students. *The Staff*

263. Plant Disease Ecology. *

Introduction to ecological roles of plant diseases, including their importance in regulating plant populations dynamics, community diversity and system function in natural ecosystems, considerations of plant diseases in conservation ecology, and ecological approaches to managing diseases in agroecosystems. Students cannot receive credit for this course and course 163. Prerequisite(s): one ecology course. Enrollment restricted to graduate students. *G. Gilbert*

268. Biogeochemistry and the Global Environment. *

Studies biogeochemical cycles and related environmental issues such as global environmental change, eutrophication, ecosystem degradation, and agricultural sustainability. Discusses transformation and movement of major nutrient elements in context of watershed ecology and societal implications. Students cannot receive credit for this course and course 168. Enrollment restricted to environmental studies graduate students. *W. Cheng*

271. Valuing the Environment. *

Intensive seminar examining the normative underpinnings of environmental values. Draws on tools from analytical, ethical, and political philosophy to develop normative arguments concerning environmental inequality and justice, environmental preservation, and risk evaluation. Involves team projects in which students develop cases on controversial contemporary issues such as biotechnology.

Prerequisite(s): interview only. Enrollment restricted to graduate students. May be repeated for credit. *S. Rajan*

280. Advanced Topics in Environmental Studies. W

Intensive research seminar, including reading and critique of primary research literature and research in progress. Topics vary and are announced in advance; students should consult with faculty prior to enrolling. Enrollment by permission of instructor. Enrollment restricted to graduate students. May be repeated for credit. *J. Bury*

283. Environmental Studies Internship. F,W,S

Graduate level internship focuses on integrating interdisciplinary academic theory with practical, specialized experience in a professional setting. Course intended for environmental studies graduate students; students must complete paperwork and meet with coordinator prior to first day of instruction. *The Staff*

290. Interdisciplinary Research Seminar (2 credits). F,W,S

Research seminars presented weekly throughout the year by environmental studies and affiliated faculty, by visiting scholars, and by graduate students. Students discuss the content and methodology of research presented following each seminar. Enrollment restricted to graduate students. May be repeated for credit. *K. Holl, E. Zavaleta*

290L. Graduate Research Seminar (2 credits). F,W,S

Graduate student presentations of doctoral research proposals, dissertation work-in-progress, grant applications, and conference papers. This weekly laboratory meeting seeks to develop professional skills, teach constructive criticism, and foster effective discussion among peers. Enrollment restricted to graduate students. *G. Gilbert, K. Holl*

291. Advanced Readings in Environmental Studies (3 credits). S

Focusing on a recently published volume or on a topic of current interest, this seminar requires a rigorous analysis of the principles and methods employed in the four core areas of the program: sustainable agriculture and agroecology; conservation biology; environmental policy analysis; and political economy. Enrollment restricted to graduate students. May be repeated for credit. *B. Nickel, K. Holl*

291C. Advanced Readings in Risk and Public Policy (3 credits). *

Advanced readings and research on environmental risk and public policy. Explores environmental decision making given the question of the burden of proof and scientific uncertainty and grapples, in an advanced manner, with emergent policy alternatives, such as the precautionary principle. Also offered as course 281C for 5 credits. Prerequisite(s): course 172 or equivalent work demonstrated by an interview. Enrollment restricted to graduate students. May be repeated for credit. *S. Rajan*

291D. Advanced Readings in Tropical Ecology, Agriculture, and Development (3 credits). S

Analyzes recent publications in ecology, conservation, agroecology, and development in tropical and subtropical regions, particularly Latin America. Discussions place special emphasis on integration across natural and social science disciplines to address issues of sustainability in tropical regions. Enrollment restricted to graduate students. *G. Gilbert, K. Holl*

291M. Advanced Readings in Biogeochemistry (3 credits). *

Course consists of three parts: fundamental biogeochem-

istry of the Earth, global cycles of nutrient elements, and societal and scientific issues of global change. Class activities include (1) presentation of summary statements based on reading assignments; (2) discussion of theories, concepts, methodologies, and applications; (3) computer simulation and modeling of elemental cycles using STELLA; and (4) integration of scientific information on global change with social issues by writing. Enrollment restricted to graduate students. *W. Cheng*

291P. Advanced Readings in Environmental History and Anthropology (3 credits). *

Course of readings systematically surveying the theoretical contributions of the disciplines of environmental history, historical ecology, environmental anthropology, and geography. After an overview of the evolution of 20th-century thought on the relationship between environment and culture as seen through the lenses of these disciplines, explores emerging research hybrids and new research frontiers. Enrollment restricted to graduate students. *S. Rajan*

292. Topics in Research in Environmental Studies (2 credits). F,W,S

Seminar in which students give critically evaluated presentations regarding current research in environmental studies and issues in research design. Students should consult with faculty prior to enrolling. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Independent study and research under faculty supervision. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Environmental Toxicology

See Microbiology and Environmental Toxicology, page 380.

Ethnic Studies

209 Humanities 1
(831) 459-4658
<http://amst.usc.edu>

Program Description

Ethnic studies is not a separate undergraduate program of study at UCSC, but students with an interest in ethnic studies can find an extensive array of courses on the subject in the following departments: American Studies, Anthropology, Community Studies, Education, Feminist Studies, Film and Digital Media, Economics, History, History of Art and Visual Culture, History of Consciousness, Latin American and Latino Studies, Literature, Music, Politics, Psychology, Sociology, and Theater Arts. The Community Studies Department and the Latin American and Latino Studies Department offer opportunities for fieldwork that extend ethnic studies outside the traditional classroom setting. See also the campus general education requirement (codes E, CC, and ER). Faculty for whom ethnic studies are a professional specialty are listed in the individual departments' faculty and professional interests sections in the *UCSC General Catalog*.

Feminist Studies

315 Humanities 1
(831) 459-2461
fmst@ucsc.edu
<http://feministstudies.ucsc.edu/>

Faculty and Professional Interests

BETTINA APTHEKER, Professor of Feminist Studies and History

Feminist histories, feminist oral history and memoir; feminist pedagogy; African-American women's history; queer studies; feminist Jewish studies; feminist critical race studies

ANJALI ARONDEKAR, Associate Professor of Feminist Studies

South Asian studies, colonial historiography; feminist theories; queer theory; critical race studies; 19th-century interdisciplinary studies

NEDA ATANASOSKI, Assistant Professor of Feminist Studies

U.S. and Eastern European film and media; cultural studies and critical theory; war and nationalism; gender, ethnicity, and religion

KAREN BARAD, Professor of Feminist Studies,

History of Consciousness, and Philosophy
Science studies, poststructuralist theory, feminist theory, queer theory, 20th-Century continental philosophy, philosophy of science, and physics

GINA DENT, Associate Professor of Feminist Studies, History of Consciousness, and Legal Studies

Africana literary and cultural studies, legal theory, popular culture

MARGARET M. DOWNES-BASKIN, Research Associate in Feminist Studies

Presidential leadership styles, elections and the media, women's political and corporate leadership style, intergenerational relations

MARGE FRANTZ, Emerita, Lecturer in American Studies and Feminist Studies

AKASHA HULL, Emerita, Professor of Feminist Studies and Literature

FELICITY SCHAEFFER-GRABIEL, Assistant Professor of Feminist Studies

Transnational feminisms; sexuality and migration, technology, and subjectivity; Latin American/Latino studies; border studies; Chicano/a studies; affect and globalization



ANGELA Y. DAVIS, Emerita, Professor of History of Consciousness and Feminist Studies

Feminism, African American studies, critical theory, popular music culture and social consciousness, philosophy of punishment (women's jails and prisons)

CARLA FRECCERO, Professor of Literature, Feminist Studies, and History of Consciousness
Renaissance studies, French and Italian language and literature, early modern studies, postcolonial theories and literature, contemporary feminist theories and politics, queer theory, U.S. popular culture

ROSA LINDA FREGOSO, Professor of Latin American and Latino Studies, Feminist Studies, and Film and Digital Media

Human-rights studies; intercultural and transborder feminism; cultural studies; Latino/a and Latin American film and media arts

JODY GREENE, Associate Professor of Literature and Feminist Studies
Seventeenth- and 18th-century British and French literature and culture, pre- and early modern studies, early modern colonialisms, gay and lesbian cultural studies, gender studies, history of authorship, history of the book

DONNA J. HARAWAY, Professor of History of Consciousness and Feminist Studies
Feminist theory, cultural and historical studies of science and technology, relation of life and human sciences, human-animal relations, and animal studies

HELENE MOGLEN, Emerita, Professor of Literature
The English novel; feminist, critical, cultural, and psychoanalytic theory; gender and genre in social and psychological contexts

Affiliated Faculty

GABRIELA ARREDONDO, Associate Professor of Latin American and Latino Studies
U.S. social and cultural history; Chicano/a history; critical race and ethnicity theories; immigration history; Latinas/os in the U.S.; Chicana feminisms; "borderlands" studies, modern Mexico history

LORA BARTLETT, Assistant Professor of Education
Educational policy and school reform, schools as workplaces for teachers, the conditions of teachers' commitment

KAREN BASSI, Professor of Classics (Literature)
Greek and Latin literatures, Greek drama, Hellenistic poetics, feminist interpretation, literary and cultural theory, pre- and early modern studies, historiography

CAETLIN BENSON-ALLOTT, Assistant Professor, Film and Digital Media
Distribution studies, technology and culture, film history and theory, new media studies; queer and feminist theory, horror

JULIE BETTIE, Associate Professor of Sociology
Cultural studies, feminist studies, race/ethnic studies, identity, popular culture, critical ethnography, visual ethnography

HEATHER BULLOCK, Professor of Psychology
Poverty and economic inequality, welfare policy, feminist psychology, discrimination

JULIANNE BURTON-CARVAJAL, Professor Emerita of Literature
American visual media, particularly film; melodrama as a transnational form; gender and authorship; history, cultures, and representations of California, particularly the Central Coast

NANCY N. CHEN, Professor of Anthropology
Medical anthropology, visual anthropology, urban anthropology, Asian American identity, mental health, food, China

VILASHINI COOPAN, Associate Professor of Literature
Postcolonial studies, comparative and world literature, literatures of slavery and diaspora, globalization studies, cultural theory of race and ethnicity

E. G. CRICHTON, Associate Professor of Art
Intermedia, electronic arts, photography, installation

FAYE J. CROSBY, Professor of Psychology
Gender; social identity; and social justice, especially affirmative action

TERESA DE LAURETIS, Emerita, Professor of History of Consciousness
Semiotics, psychoanalysis, feminism, film theory, literary theory, queer studies

DANA FRANK, Professor of History
U.S. social and economic history; women, labor, and

working-class history; contemporary political economy

MAYANTHI FERNANDO, Assistant Professor of Anthropology
Anthropology of religion, secularism, Islam, multiculturalism/pluralism; colonial and post-colonial France, Europe

PASCALE GAITET, Professor of Literature and Language Studies
Nineteenth- and 20th-century French literature, sociolinguistics, political history, Celine, Genet

MARY-KAY GAMEL, Professor of Classics and Comparative Literature
Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and Roman texts and artifacts, film, feminist approaches to literature and performance

DIANE GIFFORD-GONZALEZ, Professor of Anthropology
Paleolithic and Neolithic Africa and Eurasia, colonial New Mexico, origins of food production, pastoralists, zooarchaeology, history of archaeology, interpretive theory, visual anthropology

SUSAN GILLMAN, Professor of American Literature
Nineteenth-century American literature and culture; theories of culture, race, and gender; world literature and cultural studies

JENNIFER A. GONZÁLEZ, Associate Professor of History of Art and Visual Culture
Contemporary theories of visual culture, semiotics, critical museum studies, photography, public and activist art in the U.S.

JUNE GORDON, Professor of Education
Urban education of working-class and ethnic minority students in East Asia, Britain, and the U.S. and related issues in teacher education

DEBORAH GOULD, Assistant Professor of Sociology
Political emotion; social movements and contentious politics; classic and contemporary social theory; sexualities; lesbian/gay/queer studies; feminist and queer theory

SHELLY A. GRABE, Assistant Professor of Psychology
Cultural objectification of women and women's bodies as a pervasive global phenomenon played out in different ways across different cultures; how "embodied oppression" affects women's psychological well-being and empowerment

HERMAN GRAY, Professor of Sociology
Cultural studies, media and television studies, black cultural politics, social theory

IRENE GUSTAFSON, Associate Professor of Film and Digital Media
Producing across the boundaries between "theory" and "practice," non-fiction, gender and queer studies, production design

JULIE GUTHMAN, Associate Professor of Community Studies
Sustainable agriculture and alternative food movements, international political economy of food and agriculture, politics of obesity, political ecology, race and food, critical human geography

LISBETH HAAS, Professor of History
U.S.-Mexico borderlands, Chicano and Native American history; visual culture in the colonial Americas; the U.S. West and California; historical memory, theory, and historical methodology

AMELIE HASTIE, Associate Professor of Film and Digital Media
Film theory and history, feminist film and television studies, Chinese cinemas, issues of authorship, interdisciplinary

approaches

MARGO HENDRICKS, Professor Emerita of Literature
Early modern English literature and culture; theories and discourses of race, gender, drama, and theory; women playwrights; pre- and early modern studies

GAIL B. HERSHATTER, Professor of History
Modern Chinese social and cultural history; labor history; gender history; history of sexuality; feminist theory; history, memory, and nostalgia

EMILY HONIG, Professor of History
Gender, sexuality, and ethnicity in modern Chinese history; comparative labor history; Chicana history, nationalism, and sexuality in the Third World; oral history

JOCELYN HOY, Lecturer in Philosophy
Feminist philosophy, 19th- and 20th-century continental philosophy

DONNA HUNTER, Associate Professor of History of Art and Visual Culture
European painting (especially French) from 1600 to the 1960s; German art and visual culture between the two world wars; art as social practice, portraiture

AIDA HURTADO, Professor of Psychology
Social identity, feminist theory, social psychology of education, survey methodology

VIRGINIA JANSEN, Professor of History of Art and Visual Culture
Medieval visual culture, urbanism, and secular building; Gothic architecture; campus planning and architecture

STACY KAMEHIRO, Associate Professor of History of Art and Visual Culture
Visual cultures of the Pacific, 19th-century Hawai'i, (inter) nationalism, culture contact; (post)colonialism

L. S. KIM, Associate Professor of Film and Digital Media
Television history and theory, racial discourse, feminist criticism, Asian-American media production, industrial practices and social change in both mainstream Hollywood and alternative media

NORMA KLAHN, Professor of Literature
Latin American literary and cultural studies (specialization: Mexico), Chicano/Latino literature and culture from a cross-border perspective, modernity/postmodernity, poetics and politics, genre theory (novel, poetry, autobiography), contemporary critical theories (i.e., border, ethnic, feminist, transnational/global)

LORI G. KLETZER, Professor of Economics
Employment and wage determination, impact of globalization on the domestic labor market, industrial relations, government labor market policies, higher education and the labor market

CAMPBELL LEAPER, Professor of Psychology
Social construction and socialization of gender in childhood, adolescence, and adulthood; self-concept and social identity; language and social interaction; social relationships, gender bias in the schools and academic achievement; images of gender in the media; perceptions and consequences of sexism

CAROLYN MARTIN SHAW, Professor Emerita of Anthropology
African societies, colonial discourse, social theory, anthropology of women, sexuality

LOURDES MARTÍNEZ-ECHAZÁBAL, Associate Professor of Latin American Literature
Latin American and Caribbean literatures; Afro-Latin American literatures, cultures, and societies; found(n)ational narratives; Brazilian literature; literatures of Cuba and the Cuban diaspora; critical race theory

PETER LIMBRICK, Assistant Professor of Film and Digital Media

International cinemas; intersections of race, gender, and sexuality; theories of globalization, transnationalism, and postcoloniality; queer theory

JENNIE LIND MCDADE, Professor of Art

Drawing, painting

MEGAN MOODIE, Assistant Professor of Anthropology

South Asian studies, feminist theory, reproductive and population politics, kinship, development, legal identities, tribal communities

TANYA MERCHANT, Assistant Professor of Music

Ethnomusicology, musics of Central Asia and the former Soviet Union, music and gender, identity, nationalism, globalization, and the institutionalization of music

LETA E. MILLER, Professor of Music

Renaissance and baroque music history and performance practices, 20th-century American music, modern and baroque flute, 16th-century chanson and madrigal, music and science, 18th- and 20th-century flute literature and performance styles, music of C.P.E. Bach and Lou Harrison

MARGARET MORSE, Professor of Film and Digital Media

Digital and electronic media theory and criticism, media art, media history, technology and culture, film history and theory, German cinema, documentary and science fiction

MARCIA OCHOA, Assistant Professor of Community Studies

Gender and sexuality, race and ethnicity, Latina/o studies, media and cultural studies, ethnography of media, feminism, queer theory, multimedia production, Latin American studies—Colombia and Venezuela, political philosophy, geography

CATHERINE RAMIREZ, Associate Professor of American Studies

Chicana and U.S. Latino literature, culture, and history; gender studies and feminist theory; visual culture and style politics; cultural studies; popular and urban youth cultures; speculative fiction, Afrofuturism, and Chicanafuturism; science, technology, race, and gender; theories and methods of American studies

JENNIFER E. REARDON, Associate Professor of Sociology

Issues of social identity as influenced by the new sciences of genetics and genomics; intersection of the sociology of science and knowledge and the sociology of race, gender, and class

B. RUBY RICH, Professor of Community Studies

Documentary film and video, post-9/11 culture, new queer cinema, feminist film history, Latin American and Latina/o cinema, U.S. independent film and video, the essay film, the politics of film festival proliferation and the marketing of foreign films in the U.S.

CECILIA RIVAS, Assistant Professor of Latin American and Latino Studies

Salvadoran transnationalism; media (Internet, newspapers); migration; globalization; race, ethnicity, and gender; bilingualism; consumption; El Salvador; Central America

PAMELA ANN ROBY, Emerita, Professor of Sociology

Sociology of learning, women and work, leadership and social change, sociology of emotions, feminist research, inequality and social policy

LISA ROFEL, Professor of Anthropology

Critical theory, anthropology of modernity, popular/public culture, gender and sexuality, cultures of capitalism, postcolonial feminist anthropology, China

GABRIELA SANDOVAL, Assistant Professor of

Sociology

Race and ethnic studies, Latina/o and Chicana/o studies, stratification, urban and political sociology, and voting behavior

VANITA SETH, Associate Professor of Politics

Early modern and modern political theory, feminist theory, cultural history, race politics, postcolonial theory

DEANNA SHEMEK, Professor of Literature

Italian literature and cultural history, Renaissance studies, early modern popular culture, narrative (early modern to contemporary), women's studies, literary theory

MARY W. SILVER, Professor of Ocean Sciences

Biological oceanography, marine plankton, midwater ecology

SHELLEY STAMP, Professor of Film and Digital Media

Film history, theory, and criticism; silent cinema; women's filmmaking; film censorship; histories of moviegoing; feminist approaches to cinema

ELIZABETH STEPHENS, Professor of Art

Intermedia, electronic art, sculpture, and performance art

NANCY STOLLER, Emerita, Professor of Community Studies

Race and gender aspects of health, the AIDS epidemic, community organizing, sexualities, and medicine in prisons

RENEE TAJIMA-PEÑA, Professor of Community Studies

Documentary film and video focusing on Asian American and immigrant communities, media, and social change

AVRIL THORNE, Professor of Psychology

Identity development through personal memory telling, development of meaning in adolescents' self-defining memory narratives, family storytelling and the development of a sense of self, narrative co-construction of identity and intimacy

NINA K. TREADWELL, Associate Professor of Music

Renaissance through early baroque music history and performance practices, early plucked-string instruments (theorbo, renaissance, and baroque guitar; renaissance lute), 16th- and 17th-century Italian theatrical music, gender studies, women and music, literary and critical theory

ANNA TSING, Professor of Anthropology

Culture and politics, feminist theory and gender in the U.S., social landscapes and tropical forest ethnologies, ethnicity, local power and relations to the state in Indonesia, Southeast Asia, and the U.S.

CANDACE WEST, Professor of Sociology

Language and social interaction, sociology of gender, conversation analysis, microanalysis and medicine

MARILYN J. WESTERKAMP, Professor of History

British America, American revolution/early national U.S., U.S. religious history, early modern cultural and religious history, women/gender

AARONETTE WHITE, Associate Professor of Psychology

Adult feminist-identity development; personality correlates of feminist activism; feminist masculinities studies; feminist perspectives on peace and violence; narrative psychology and adult personality change; black feminist political psychology in the U.S. and abroad; critical psychology

ROB WILSON, Professor of Literature

Transnational and postcolonial literatures, especially as located in Asia/Pacific emergences as posited against American empire of globalization; cultural poetics of America; the sublime, Longinus to Hiroshima; mongrel poetics of experimental writing, especially poetry

ALICE YANG, Associate Professor of History

Historical memory, Asian American history, gender history, race and ethnicity, 20th-century U.S., oral history

PATRICIA ZAVELLA, Professor of Latin American and Latino Studies

Relationship between women's work and domestic labor, poverty, family, sexuality and social networks, feminist studies, ethnographic research methods, and transnational migration of Mexican/o workers and U.S. capital

EILEEN ZURBRIGGEN, Associate Professor of Psychology

Connections between power and sex, sexual aggression and abuse, sexual decision making. Motivation, especially power and affiliation-intimacy motives. Information processing models of social and personality psychology

Program Description

Feminist studies is an interdisciplinary field of analysis that investigates how relations of gender are embedded in social, political, and cultural formations. The undergraduate program in feminist studies provides students with a unique interdisciplinary and transnational perspective. The department emphasizes theories and practices derived from multiracial and multicultural contexts.

Feminist studies prepares undergraduates for a variety of careers. The bachelor of arts (B.A.) degree in feminist studies provides excellent grounding for undergraduates who have career aspirations in, for example, law, health, public administration, community organizations, and social services. Students wishing to pursue doctoral work will also find that interdisciplinary training in feminist studies equips them with theoretical and methodological strengths in most disciplines and applied research fields. Specialists in feminist studies are employed as consultants in industry, higher education, and human resources. State and federal government agencies employ people who have special training in understanding gender relations. Educational institutions need specialists to develop and administer feminist studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

Requirements for the Major

Feminist studies majors must complete 10 courses and a senior comprehensive exit requirement in the feminist studies program. Students must choose one of the following concentrations within the major: Culture, Power, and Representation; Law, Politics, and Social Change; Science, Technology, and Medicine; or Sexuality Studies. Courses appropriate for each concentration are listed at <http://feministstudies.ucsc.edu>.

A proposal for an independent concentration will be approved only when a student presents a clear, coherent, and rigorous plan of study that does not fit the existing concentrations. Both the student's adviser and the Feminist Studies Department chair must approve a proposal for an independent concentration.

Required courses include course 1, *Feminist Studies: An Introduction*; course 80 or another 80 course taught by feminist studies affiliated faculty; course 100, *Feminist Theories* (must be taken at UCSC); five 5-credit, upper-division courses in the concentration; two 5-credit, upper-division electives; and an upper-division exit (comprehensive) requirement course. One independent study (course 199) may count toward the concentration or toward the elective requirements. Either course 193 or 198 may be used to count toward the elective requirements.

Feminist studies is an interdisciplinary major and lists courses taught by affiliate faculty in other departments, however, feminist studies majors must take a minimum of five courses at UCSC taught directly in

the Feminist Studies Department, i.e., courses designated FMST, not including course 193, 198, or 199. Two Education Abroad Program (EAP) courses may count towards the major; three transfer courses may count towards the major; and the total combined number of EAP and transfer courses that may count towards the major is a maximum of three.

Exit requirement options include a senior seminar (course 194) taught by core or affiliate faculty, senior thesis, or a senior project (course 195). Courses 1, 80, 100, and the composition (general education code C) requirement are prerequisites to course 194 and 195.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in feminist studies is satisfied by completing course 194A, 194D, 194E, 194F, 194G, 194I, 194J, 194M, 194N, 194O, 194P, or 195.

Honors

Feminist studies awards honors and highest honors in the major. At the end of each quarter, a faculty committee meets to review each graduating student's file. Students are considered for honors and highest honors based on the preponderance of excellent narrative evaluations for applicable course work and senior exit requirement. Writing a thesis is not a requirement for receiving honors or highest honors.

Transfer Students

Transfer students are encouraged to declare the major as soon as possible to be assured entrance into the required core courses. Feminist studies advisers or the chair determine which courses from other institutions are transferable. Courses 1, 80, and 100 must be completed in the junior year so that the exit requirement may be completed in the senior year.

Graduate Studies

Graduate students may work toward a doctor of philosophy (Ph.D.) degree that notes a designated emphasis in feminist studies on the graduation documents. Students wishing to pursue this option should consult with the chairs of their respective Ph.D. programs and are encouraged to apply in the first or second year of graduate study. The application and an annually updated list of regularly offered, approved graduate courses are available at <http://feministstudies.ucsc.edu>.

The following are required for the designated emphasis:

- *Committee composition.* The student must have a designated graduate adviser from the feminist studies core or associate faculty who serves on the qualifying examination committee or in some other appropriate capacity.
- *Writing.* The student must prepare a significant piece of writing in the area of feminist studies. This writing must be a master's essay or a chapter of the doctoral dissertation.
- *Course requirements.* The student must take four graduate courses in feminist studies, two of which must be taught directly in the department. Two courses can be selected from among the graduate offerings of any UCSC department, as long as they are taught by core or affiliate feminist studies faculty.

- *Teaching.* The student must be a teaching assistant in at least one feminist studies course or teach a feminist studies course independently (designated FMST) in the regular curriculum or in Summer Session.

Lower-Division Courses

1. Feminist Studies: An Introduction. W

Introduces the core concepts underlying the interdisciplinary field-formation of feminist studies within multiple geopolitical contexts. Explores how feminist inquiry rethinks disciplinary assumptions and categories, and animates our engagement with culture, history, and society. Topics include: the social construction of gender; the gendered division of labor, production, and reproduction; intersections of gender, race, class, and ethnicity; and histories of sexuality. (Formerly *Introduction to Feminisms*.) (General Education Code(s): CC, IH.) *A. Arondekar*

80A. Feminism and Social Justice. W

Examines, and critically analyzes, select post-World War II movements for social justice in the United States from feminist perspectives. Considers how those movements and their participants responded to issues of race, class, gender, and sexuality. A feminist, transnational, analytic framework is also developed to consider how those movements may have embraced, enhanced, or debilitated feminist formations in other parts of the world. (General Education Code(s): ER, T5-Humanities and Arts or Social Sciences.) *B. Aptheker*

80B. Sexuality and Globalization. F

Examines the relationship between sexuality and the contemporary term "globalization" as a dense entanglement of processes that emerges from a history of U.S. empire. Sexuality cannot be separated from power struggles over the classification of bodies, territories, and questions of temporality. Examines how sexualized contact zones produce new knowledge, commerce, inequalities, possibilities, and identities. (General Education Code(s): CC, T5-Humanities and Arts or Social Sciences.) *F. Schaeffer-Grabiel*

80F. Feminisms of/and the Global South. S

Explores feminist theories from domestic U.S. and global contexts in order to ask how interventions of women of color in the U.S. and of radical feminist movements in non-U.S. locations radically re-imagine feminist politics. Rather than focusing on feminist movements that represent different regions of the world, course examines feminist theory through multiple histories of colonialism, post-colonialism, and globalization. (General Education Code(s): CC, T5-Humanities and Arts or Social Sciences, E.) *A. Arondekar*

80K. Feminism and Science. S

Considers the nature of scientific practice, the culture of science, and criteria for the responsible practice of science. Particular attention is given to feminist commitments to strengthening objectivity, increasing scientific literacy, and including ethical considerations in the practice of science. Enrollment limited to 80. (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *K. Barad*

80P. War in Film and Culture. W

Explores how war films, media, and political discourses about war and violence shape and transform ideas about national identity. Focuses on how ideas about gender, sexuality, race, and class have particularly affected representations of military conflicts. (General Education Code(s): IM, T5-Humanities and Arts or Social Sciences, E.) *N. Atanasoski*

80S. Women in Music. F

An exploration of the sociological position of women as composers and performers in Western and non-Western musics, with a focus on both ethnographic and historical sources. (Also offered as Music 80S. Students cannot receive credit for both courses.) Offered in alternate academic years. (General Education Code(s): CC, T4-Humanities and Arts.) *L. Miller*

80T. Religion in American Politics and Culture. *

Introduces dominant discourses about Christianity and Islam in the American public sphere, with particular attention paid to race, gender, sexuality, and class in thinking about religion. Visual and textual media, political commentary, and popular ethnographies are analyzed. (Also offered as Anthropology 80R. Students cannot receive credit for both courses.) *M. Fernando, N. Atanasoski*

Upper-Division Courses

100. Feminist Theories. W

Core course for feminist studies. Serves as an introduction to thinking theoretically about issues of feminism within multiple contexts and intellectual traditions. Sustained discussion of gender and its critical connections to productions of race, class, and sexuality. Focus will change each year. Enrollment restricted to sophomores, juniors, and seniors. *N. Atanasoski*

102. Feminist Critical Race Studies. *

Working from the perspective that race is a cultural invention and racism is a political, economic, and social relation, investigates how "race" is produced as a meaningful and powerful social category, examines the effects of racism as a social relation, and argues for the necessity of combining feminist and critical race studies. By considering different historical periods and places, aims to equip students with the tools necessary to critically examine the production and reproduction of race and racism in the U.S. Prerequisite(s): one course from feminist studies. Enrollment restricted to juniors and seniors. Enrollment limited to 20. (General Education Code(s): E.) *The Staff*

112. Women and the Law. *

Interdisciplinary approach to study of law in its relation to category "women" and production of gender. Considers various materials including critical race theory, domestic case law and international instruments, representations of law, and writings by and on behalf of women living under different forms of legal control. Examines how law structures rights, offers protections, produces hierarchies, and sexualizes power relations in both public and intimate life. (Also offered as Politics 112. Students cannot receive credit for both courses.) Enrollment restricted to feminist studies, politics, legal studies, and Latin American and Latino studies/politics combined majors during priority enrollment only. *G. Dent*

115. Gender, Sexuality, and Transnational Migration Across the Americas. F

Examines migration as a mode of inquiry into transnational practices across geographic locales and temporal zones. Analyzes migration in relation to the transnational formation of gender, race, and sexuality as well as processes of neocolonialism, the state, and globalization. Prerequisite(s): course 1, 100, or 145. Enrollment restricted to sophomores, juniors, and seniors. (General Education Code(s): ER, E.) *F. Schaeffer-Grabiel*

116. Feminist Ethnographies. *

Examines ethnographic methods and writing in anthropology from a feminist perspective; focuses on questions of representation and representativeness, power, and knowledge production; traces theories of exchange in

20th-century anthropology including outsourcing, financialization, and microcredit. (Formerly *Ethnographies of Transnational Feminisms*.) Prerequisite(s): course 1. Enrollment restricted to junior and senior feminist studies majors or by permission of instructor. Enrollment limited to 20. *The Staff*

120. Transnational Feminisms. *

Explores the emergence of transnational feminism through U.S. women of color and postcolonial feminism. Underscores the role of globalization, nationalism, and state formation in relation to feminist theorizing, activism, and labor across the Global South. In an attempt to understand the salience of inequalities, the course interrogates the continuation of feminist critique that is attentive to the war on terror, neocolonialism, and empire. Prerequisite(s): course 1. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 40. (General Education Code(s): CC, E.) *F. Schaeffer-Grabiel*

123. Feminism and Cultural Production. *

Explores relationship between feminism and culture. Topics will vary and include different forms of cultural production such as film and literature. Regional/national focus will also vary. Prerequisite(s): course 1. Enrollment restricted to sophomores, juniors, and seniors. May be repeated for credit. (General Education Code(s): A, E.) *The Staff*

124. Technology, Science, and Race Across the Americas. S

Examines new ways of understanding the body and race through the intersection of technology and science. Addresses how broader structures of power and the rise of new technological and scientific discoveries mediate power relations and alter how race, national boundaries, the body, and citizenship are normalized and contested from colonialism to the present. Course content may vary; themes may include: U.S. eugenics, I.Q. tests, patenting debates, sterilization, assisted reproduction, biometrics, and genetics across the Americas. (Formerly *Technologies and Latinidad: Cyberspace and Beyond*.) Enrollment restricted to sophomore, junior, and senior feminist studies majors during priority enrollment only. Enrollment limited to 25. (General Education Code(s): E.) *F. Schaeffer-Grabiel*

126. Images, Power, and Politics: Methods in Visual and Textual Analysis. F

Introduces the analysis of visual images and text with particular emphasis on feminist critical methodologies. Using case studies from photography, film, TV, advertising, and new media, students learn how to read and analyze culture. Enrollment restricted to sophomore, junior, and senior feminist studies majors during priority enrollment only. Enrollment limited to 25. (General Education Code(s): IM.) *N. Atanasoski*

132. Gender and Postcoloniality. *

Postcolonial feminist studies. Explores how discourses of gender and sexuality shaped the policies and ideologies of the historical processes of colonialism, the civilizing mission, and anticolonial nationalism. Considers orientalism as a gendered discourse as well as colonial understandings of gender and sexuality in decolonialization. Explores Western media representations, literature, the law, and the place of gender in the current debate between cultural relativism and universalism. Provides an understanding of some key terms in postcolonial studies and an in-depth examination of the place of gender in these processes. Prerequisite(s): courses 80F and 100 or permission of instructor. Enrollment restricted to juniors and seniors. Enrollment limited to 20. (General Education Code(s):

E.) *A. Arondekar*

133. Science and the Body. F

Contemporary technoscientific practices, such as nano-, info-, and biotechnologies, are rapidly reworking what it means to be human. Course examines how both our understanding of the human and the very nature of the human are constituted through technoscientific practices. Prerequisite(s): courses 1 and 100. Enrollment restricted to juniors and seniors. *K. Barad*

139. African American Women's History. *

Considers African American women as central to understanding of U.S. history, focusing on everyday survival, resistance, and movements for social change. Discussion of critical theories for historical research, gender, and race. Emphasis on biography, cultural history, and documentary and archival research. Enrollment restricted to sophomores, juniors, and seniors. (General Education Code(s): ER, E.) *B. Aptheke*

145. Racial and Gender Formations in the U.S. S

Introduces the defining issues surrounding racial and gender formations in the U.S. through an understanding of the term "women of color" as an emergent, dynamic, and socio-political phenomenon. Interrogates organizing practices around women of color across multiple sites: film and media, globalization, representation, sexuality, historiography, and war, to name a select few. (General Education Code(s): ER, E.) *F. Schaeffer-Grabiel*

148. Gender and Development. *

Uses the critical tools of feminist theory and cultural anthropology to look at how global development discourses and institutions mobilize, reinforce, and challenge systems of gender-based inequality. Topics include non-governmental organizations (NGOs), development practice, microcredit, and technocrat cultures. (Also offered as Anthropology 148. Students cannot receive credit for both courses.) *M. Moodie*

151A. Chicana Feminism. *

Students are introduced to the writings of Chicana feminists to identify the gender issues that produce conflict and cooperation in their communities. The course also makes linkages to gender issues in other U.S. communities of color and Latin America. (Also offered as Psychology 157. Students cannot receive credit for both courses.) Prerequisite(s): course 1 or Psychology 3 or 100. (General Education Code(s): E.) *A. Hurtado*

151B. Advanced Topics in Chicana Feminism. *

Course is a continuation of course 151A which introduces students to the writings of Chicana feminists to identify the gender issues that cause conflict and cooperation in their communities. The seminar format allows students an opportunity for extensive discussion. (Also offered as Psychology 159K. Students cannot receive credit for both courses.) Prerequisite(s): courses 1, 100, or 151A or Psychology 1, 40, or 157A, or consent of instructor. Enrollment restricted to juniors and seniors. Enrollment limited to 30. *A. Hurtado*

168. Topics in Feminist Philosophy. *

Topics in feminist philosophy, which may include: the nature of feminist philosophy, feminist approaches to philosophical issues, social and political philosophy, theories of knowledge, ethics, aesthetics, and science, technology, and medicine studies. Presupposes some familiarity with philosophy or feminist scholarship. (Also offered as Philosophy 147. Students cannot receive credit for both courses.) Prerequisite(s): Philosophy 100A or 100B or 100C. *J. Hoy*

185. Psychoanalysis and Feminism. *

Introduction to Freudian and Lacanian theories of sexual-

ity and the construction of the self as well as to feminist critiques and rewritings of those theories. An attempt is made to place psychoanalytic theory in socioeconomic, racial, and colonialist contexts. Appropriate prior work in theory is recommended as preparation. Enrollment restricted to juniors and seniors. Enrollment limited to 25. *H. Moglen*

189. Advanced Topics in Feminist Theory. *

Focus on a particular problem in feminist theory. Problems vary each year but might include theorizing the gendered subject, racializing gender, the meeting points of psychoanalysis and social-political analysis in theorizing gender, the relationship between queer theory and feminist theory, postcolonial feminist theory. Prerequisite(s): course 100. Enrollment restricted to juniors, seniors, and graduate students. Enrollment limited to 20. May be repeated for credit. *The Staff*

193. Field Study. F,W,S

Individual field study in the vicinity of the campus under the direct supervision of a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S

Individual field study in the vicinity of the campus under the direct supervision of a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Senior Seminar.

Discussion classes providing a broad overview of some general "area of concentration." Discussion of assigned readings, focus on oral presentations, and a final 20- to 25-page paper. Satisfies the senior comprehensive requirement in feminist studies. Enrollment limited to 20. *The Staff*

194A. Feminist Jurisprudence. *

Approaches legal reasoning from a feminist and intersectional perspective with attention to structures and jurisdiction, case materials, and emerging international frameworks for gender justice. Designed to facilitate completion of a substantial research essay based in feminist legal philosophy. Instructor permission required to enroll. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 112 or Politics 112. Enrollment restricted to senior feminist studies majors. Enrollment limited to 20. *G. Dent*

194D. Feminist Science Studies. *

Examines different feminist approaches to understanding the nature of scientific practices. Particular attention paid to notions of evidence, methods, cultural and material constraints, and the heterogeneous nature of laboratory practices. Considers the ways in which gender, race, and sexuality are constructed by science and how they influence both scientific practices and conceptions of science. Also examines the feminist commitment to taking social factors into account without forfeiting the notion of objectivity. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; and courses 1 and 100. Enrollment restricted to senior feminist studies majors. Enrollment limited to 20. *K. Barad*

194E. History of Sexuality. *

Explores one of the central texts of dialogue and contestation in sexuality studies today: Michel Foucault's *The History of Sexuality*. Considers the epistemic challenges outlined in Foucault's early work and engages its instantiations in the proliferating scholarship on gender, sexuality, and critical race studies. Readings challenge the marginalization of empire in Foucault's work and demonstrate that a history of 19th-century European sexuality

must also be a history of race. Interview with instructor required. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; enrollment restricted to senior feminist studies majors. Enrollment limited to 20. *A. Arondekar*

194F. Chicana/Latina Cultural Production. *

Traces the intersection between Chicana studies and Latin American studies through transnational forms of cultural production, imaginaries, and empowerment. Analysis of theories of cultural production and discussion of the political salience of culture as a site for resistance, critique, and creativity. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 100. Enrollment restricted to seniors. Enrollment limited to 20. (General Education Code(s): E.) *F. Schaeffer-Grabiel*

194G. Images of Africa. *

Explores questions of colonialism, empire, race, gender, and geopolitics in the proliferating images—filmic, television, and media—of Africa in the United States. Facilitates the completion of a substantial research essay based on the study of popular culture. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 100; enrollment restricted to seniors. Enrollment by permission of instructor. Enrollment limited to 20. *G. Dent*

194I. Feminist Oral History and Memoir. W

Designed to train students in oral history and memoir writing. Emphasizes the specialness of transgressive voices; race, class, and sexuality, women's silence, erasure, censorship, and marginalization are addressed. The politics of memory, narratives, storytelling, and editorial judgment are considered. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 1 and 100. Enrollment restricted to senior feminist studies majors. Enrollment limited to 20. (General Education Code(s): W.) *B. Aptheker*

194J. Advanced Feminist Philosophy. *

Focuses on issues in epistemology and ontology: the construction of knowledge and objectivity, rationality and emotions, subjectivity and personal identity, and the body and sexuality. (Also offered as Philosophy 190T. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 168 or 100; and two from Philosophy 100A, 100B, and 100C. Enrollment limited to 20. *J. Hoy*

194M. Empire and Sexuality. S

Explores the production of sexualities, sexual identification, and gender differentiation within multiple contexts of colonialism, decolonization, and emerging neo-colonial global formations. (Formerly course 118.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 100 or 145. Enrollment restricted to senior feminist studies majors. Enrollment limited to 20. (General Education Code(s): E.) *A. Arondekar*

194N. Gender, Class, and Sex in Shanghai. *

Focusing on Shanghai, course examines issues of gender, class, and sex in modern urban Chinese history. Given Shanghai's history as a treaty port, particular attention paid to ways in which its semi-colonial status inflected the articulation of gender identities, class formations and issues of sexuality (particularly sexual labor). Also looks at Shanghai during the Maoist period and in the context of more contemporary economic reforms. (Also offered as History 194A. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; and History 40B, 140C, 140D, or 140E, or permission of instructor.

Restricted to junior and senior feminist studies majors. Enrollment limited to 20. (General Education Code(s): W.) *The Staff*

194O. The Politics of Gender and Human Rights. F

Examines human rights projects and discourses with a focus on the politics of gender, sexuality, race, and rights in the international sphere. Reading important human rights documents and theoretical writings, and addressing particular case studies, emphasizes the tensions between the ideals of the universal and the particular inherent in human rights law, activism, and humanitarianism. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; courses 1 and 100. Enrollment restricted to senior feminist studies majors. *N. Atanasoski*

194P. Religion, Gender, and Politics. *

Addresses the relationship between religious identities and movements, gender and sexuality, and feminism. Analyzes how media discourses, popular culture, and scholarly writing represent the role of religion and gender in shaping contemporary geopolitics. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; courses 1 and 100. Enrollment restricted to senior feminist studies majors. Enrollment limited to 20. *N. Atanasoski*

195. Senior Thesis or Project. F,W,S

The senior thesis/project which satisfies the major requirement. Course is for independent research and writing. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; students submit petition to sponsoring agency. May be repeated for credit. (General Education Code(s): W.) *The Staff*

198. Independent Field Study. F,W,S

Provides for individual study program off campus for which faculty supervision is not in person. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198E. Independent Field Study (2 credits). F,W,S

Provides for individual study program off campus for which faculty supervision is not in person. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual directed study for upper-division undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual directed study for upper-division undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

201. Topics in Feminist Methodologies. W

Explores feminist theorizing across disciplinary and cultural contexts for both methodology (theories about the research process) and epistemology (theories of knowledge). Goal is to orient students toward changes in organization of knowledge and provide them with different feminist methodologies in their pursuit of both an "object" of study and an epistemology. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *A. Arondekar*

203. Feminist Pedagogies. S

Examines feminist pedagogies as projects in transgressing traditional disciplinary boundaries. Examines historical examples of alternative pedagogies and contemporary models for creating communities dedicated to social jus-

ice. Designed to assist graduate students develop teaching strategies in multiple fields. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Aptheker*

205. Feminism, Nationalism, and Sexuality in the Third World. *

Focus on the historical construction and articulation of feminism in the Third World. Explores the relationship of feminist and nationalist movements, considering such questions as whether Third World women's political movements are necessarily "feminist," how these political movements define feminism, and the tensions between nationalisms and feminisms. Particular attention to issues of sexuality, the effects of colonial institutions and policies on sexual identities in Third World countries, the notions of womanhood and female sexualities articulated within nationalist ideologies and movements, the consequences of such constructions for women, and the formulation of sexual issues among feminists. Offered every two or three years. Enrollment restricted to graduate students. Enrollment limited to 15. *E. Honig*

206. Feminism and Psychoanalytic Theory. *

After studying essays by Freud, Lacan, and Melanie Klein which have been central to the construction of feminist theory, considers the writings of such feminist theorists as Jessica Benjamin, Judith Butler, Julia Kristeva, Juliet Mitchell, Jaqueline Rose, Carolyn Steedman, and Maria Torok. Enrollment restricted to graduate students or seniors with permission of instructor, based on narrative evaluations and sample essays. Enrollment limited to 15. *H. Moglen*

207. Topics in Queer/Race Studies. *

Explores the interrelated epistemological frameworks of critical race studies and queer studies. Through the study of a range of philosophical, scientific, literary, and cinematic texts, course historicizes and theorizes discourses of race and sexuality. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Arondekar*

211. Sexuality, Race, and Migration in the Americas. *

Analyzes the ways transnational processes intersect with changing notions of gender, sexuality, and race. Examines processes such as tourism, the Internet, capitalism, and labor spanning Brazil, the Dominican Republic, and the United States. Enrollment restricted to graduate students. Enrollment limited to 15. *F. Schaeffer-Grabiel*

212. Feminist Theory and the Law. *

Interrogation of the relationship between law and its instantiating gendered categories, supported by feminist, queer, Marxist, critical race, and postcolonial theories. Topics include hypostasization of legal categories, the contest between domestic and international human rights frameworks, overlapping civil and communal codes, cultural explanations in the law, the law as text and archive, testimony and legal subjectivity. (Also offered as History of Consciousness 212. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *G. Dent*

214. Topics in Feminist Science Studies. *

Graduate seminar on feminist science studies. Topics will vary and may include: the joint consideration of science studies and poststructuralist theory; the relationship between discursive practices and material phenomena; and the relationship between ontology, epistemology, and ethics. Enrollment restricted to graduate students. Enrollment limited to 15. *K. Barad*

225A. Theories of Slavery. *

Explores philosophical, legal, and socio-historical analyses of slavery. Focus on Atlantic slavery and the production of race and gender formations, complemented by discussion on contemporary forms of slavery. Impact of historical slavery on prevailing discourses and institutions. (Also offered as History of Consciousness 205A. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

225B. Theories of Slavery. *

Writing-intensive course based on readings in History of Consciousness 205A and Feminist Studies 225A. (Also offered as History of Consciousness 205B. Students cannot receive credit for both courses.) Prerequisite(s): course 225A or History of Consciousness 205A. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

232. Topics in Postcolonial Studies. *

Variable topics that could include postcolonial approaches to questions of epistemology and knowledge production, theories of nationalism and nation-state formation, subaltern historiography, analyses of modernization and developmental theory, postcolonial approaches to globalization, and transnationalism. Significant component of feminist contributions to these literatures. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Arondekar*

240. Culture and Politics of Human Rights. *

Examines cultural, philosophical, and political foundations for human rights and provides students with critical grounding in the major theoretical debates over conceptualizations of human rights in the Americas. Addresses the role of feminist activism and jurisprudence in the expansion of human rights since the Universal Declaration of Human Rights. Addresses challenges of accommodating gender rights, collective rights, and social and economic rights within international human rights framework. (Also offered as Latin American&Latino Studies 240. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *R. Fregoso*

251. Feminist Theory and Social Psychology. *

Course bridges feminist theory and social psychological research to explore connections between theory covered and empirical studies on various topics in social psychology. Seminar format allows students opportunity for extensive discussion. (Also offered as Psychology 251. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *A. Hurtado*

264. The Idea of Africa. *

Examines the position of Africa in cultural studies and the simultaneous processes of over- and under-representation of the continent that mark enunciations of the global and the local. Themes include defining diaspora, the West as philosophy, and Africa in the global economy. (Also offered as History of Consciousness 264. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *G. Dent*

268A. Science and Justice: Experiments in Collaboration. S

Considers the practical and epistemological necessity of collaborative research in the development of new sciences and technologies that are attentive to questions of ethics and justice. Enrollment by permission of instructor. Enrollment restricted to graduate students. (Also offered as Biomolecular Engineering 268A and Sociology 268A. Students cannot receive credit for three courses.) Enrollment limited to 10. *J. Reardon, K. Barad*

268B. Science and Justice Research Seminar. F

Provides in-depth instruction in conducting collaborative interdisciplinary research. Students produce a final research project that explores how this training might generate research that is more responsive to the links between questions of knowledge and questions of justice. Prerequisite(s): course 268A. Enrollment by permission of instructor. Enrollment restricted to graduate students. (Also offered as Biomolecular Engineering 268B and Sociology 268B. Students cannot receive credit for three courses.) Enrollment limited to 10. *The Staff*

297. Independent Study. F,W,S

Independent study and research under faculty supervision. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297F. Independent Study (2 credits). F,W,S

Independent study and research under faculty supervision. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Film and Digital Media

101 Communications Building
(831) 459-3204
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<http://film.ucsc.edu>

Faculty and Professional Interests**Professor**

SHARON DANIEL
Community-based public art in information and communications environments, social and political aspects of information technology, community networks, participatory culture, digital inclusion, net art, human-computer interface design

ELI E. HOLLANDER
Film and video directing; ethnographic documentary directing, editing, cinematography, and videography; digital image generation; screenwriting

CHARLES L. LORD, Professor Emeritus

MARGARET MORSE
Digital and electronic media theory and criticism, media art, media history, technology and culture, collaborative culture, sensory studies and art, film history and theory, feminist studies, German cinema, documentary media, science fiction, and silent comedy

SHELLEY STAMP
Film history, theory, and criticism; silent cinema; women's

filmmaking; film censorship; histories of moviegoing; feminist approaches to cinema

Associate Professor

LAWRENCE ANDREWS
Film, video, installation and media art

IRENE GUSTAFSON
Producing across the boundaries between "theory" and "practice," non-fiction media, experimental film/video, production design, gender and queer studies

AMELIE HASTIE
Film theory and history, feminist film and television studies, Chinese cinemas, issues of authorship, interdisciplinary approaches

L. S. KIM
Television history and theory, racial discourse, feminist criticism, Asian-American media production, industrial practices and social change in both mainstream Hollywood and alternative media

PETER LIMBRICK
International cinemas; intersections of race, gender, and sexuality; theories of globalization, transnationalism, and postcoloniality; queer theory

WARREN SACK
Software design and media theory

GUSTAVO VAZQUEZ
Film and video production, directing drama, documentary and experimental cross-cultural experiences in film, film curator

Assistant Professor

IRENE LUSZTIG
Film and video production, experimental documentary, ethnographic film, autobiographical film, editing

YIMAN WANG
Film history and theory; colonial/semi-colonial/postcolonial/postsocialist modes of media production and exchange; border-crossing film remakes; silent cinema; translation theory and cinema; acting theory/practice and ethnic star studies; transnational connections and ramifications of Chinese cinema and documentary; cybernetic fan culture

**Professor**

JULIANNE BURTON-CARVAJAL, Literature
Twentieth- and 21st-century Latin(o) American visual media, particularly film; melodrama as a transnational form; gender and authorship; history, cultures, and representations of California, particularly the Central Coast

TERESA DE LAURETIS, History of Consciousness
Semiotics, psychoanalysis, feminism, film theory, literary theory, queer studies

ROSA LINDA FREGOSO, Latin American and Latino Studies
Cultural studies, transnational feminist theories, Chicano/a and Latina/o cinema, issues of human rights and gender violence

HERMAN S. GRAY, Sociology
Cultural studies, media and television studies, black cultural politics, social theory

DONNA J. HARAWAY, History of Consciousness and Feminist Studies
Feminist theory, cultural and historical studies of science and technology, relation of life and human sciences, human-animal relations, and animal studies

B. RUBY RICH, Community Studies

Documentary film and video, post-9/11 culture, new queer cinema, feminist film history, Latin American and Latinx cinema, U.S. independent film and video, the essay film, the politics of film festival proliferation and the marketing of foreign films in the U.S.

Associate Professor**DAVID S. MARRIOTT, History of Consciousness**

Literary theory, psychoanalysis, black cultural theory and philosophies of race, literary and visual cultures of modernism

RENEE TAJIMA-PEÑA, Community Studies

Documentary film and video focusing on Asian American and immigrant communities, media, and social change

Assistant Professor**NEDA ATANASOSKI, Feminist Studies**

U.S. and Eastern European film and media; cultural studies and critical theory; war and nationalism; gender, ethnicity, and religion

Program Description

The film and digital media major at UCSC offers an integrated curriculum involving theory, criticism, and cultural analysis, as well as a production program in the aesthetics and techniques of film and digital media. This bachelor of arts degree program provides students with the critical skills, theoretical concepts, and historical knowledge necessary to conduct informed analysis of cinema, television, video art, and new media, along with the up-to-date technical knowledge, practical skills, and artistic contexts needed for the production of film, video, and digital media. The major provides a course of study that develops an understanding of moving image and digital media as essential tools of communication and artistic practice.

Students in the general film and digital media major develop an understanding of major movements in world cinema and different aesthetic approaches to the medium, while studying the cultural impact of television and the rise of video and digital art in recent decades. The critical studies concentration is designed for film and digital media majors who have a special aptitude for and interest in the history and theory of film, television, video, and digital media. This rigorous program can help prepare undergraduates for graduate work in critical studies. Students in the highly selective production concentration are encouraged to demonstrate technical proficiency and creative vision in film and digital media production while also studying the histories and theories of these media. The integrated critical practice concentration will serve students currently enrolled in the major who have a special aptitude for and interest in combining work in critical studies and production. The concentration provides them with a more rigorous pathway through the major and, in their senior year, allows them to work on a senior project that integrates creative and intellectual work.

Students in all facets of the major acquire skills in media analysis while maintaining a broadly based, liberal arts perspective. The UCSC program is interdisciplinary, combining theory and practice in film, video, and digital media with study in other areas of the arts, humanities, and social sciences that help students understand the role these media play in society.

As the technologies of film and video have merged with digital computer-based moving images and interactive media, and as digital media continues to expand into everyday experience, students in the major are uniquely positioned to excel in these fields. Graduates of the UCSC film and digital media program have enjoyed

considerable success both in the professional world and in gaining admission into top graduate schools in the field.

Students enrolled in film and digital media production classes have access to audio, video, and digital production and postproduction equipment. Facilities include a digital media lab; audio recording studio; sound stage with green screen; digital nonlinear editing rooms; video format conversion rooms; a computerized sound effects library; and student equipment checkout. Additionally, computer laboratories equipped for digital image manipulation, web authoring, and interactive interface design and viewing rooms are available. The critical studies facilities include classrooms equipped for high-end film, video, and data projection. The library holdings in film and video history, theory, and literature are complemented by a large collection of films, videos, laser disks, and DVDs, including a diverse range of international feature films, experimental film and video work, animation, silent films, and documentaries.

Some courses offered by the Film and Digital Media Department are restricted in enrollment; admission is based on completion of prerequisites and other specific written application requirements. Admission to advanced production courses is generally restricted to third- and fourth-year students and is based on the submission of a portfolio of work produced in the introductory production class (Film 170B) and other production workshops.

Upper-division digital media and production studio courses require coursework to be completed on computers. The department recognizes that students often purchase a new computer on their arrival at the university during their freshman year. It is strongly suggested that students who plan to apply for the production concentration wait until their second or third year of studies before making this investment. Delaying the purchase until this time allows a student to have the most up-to-date hardware and the fastest machine at the price they can afford at the moment they enter into the production concentration. Laptop computers are strongly encouraged for production students, and laptop computers may become required in the near future. Instruction in and software for production courses are based on the Apple OS X platform. Compatibility with the department's operating system for instruction is strongly advised. Students are encouraged to consult with the department office or the web site for list of recommended computers and software packages.

Declaring the Film and Digital Media Pre-Major

Students who have completed one lower-division course (20A, 20B or 20C) with a grade of B- or better may declare the film and digital media pre-major. Pre-majors are expected to complete the requirements to declare the major by the end of their second year. Transfer students must declare the pre-major no later than their second quarter in residence.

Declaring the Film and Digital Media Major

Prior to declaring the film and digital media major, students must complete FILM 20A, and either 20B or 20C, with a grade of B- or better. FILM 20A, 20B, and 20C must be taken for a letter grade by students intending to major in film and digital media. Students who have met the B- grade minimum for declaration of the major may choose to take FILM 20P as the third lower-division requirement.

20A The Film Experience**20B Introduction to Television Culture and Society****20C Introduction to Digital Media****20P Introduction to Production Technique**

Students are encouraged to complete the lower-division courses early in their studies so that the petition to major status is accomplished no later than the first quarter of the junior year. Acceptance into the film and digital media major does not constitute acceptance into any of the concentrations (production, critical studies, or integrated critical practice). Transfer students should consult the Transfer Student section for instructions about declaring the major.

Students who feel that there were extenuating circumstances which prevented them from meeting the requirements for declaring the major may appeal their denial by submitting a letter to the Film and Digital Media Department. The appeal must be filed no later than 15 days after the denial notification was mailed or the 10th day of classes in the quarter of the denial, whichever is later. For further information regarding this process, contact the Film and Digital Media Department.

Program of Study

The general film and digital media major requires three lower-division and nine upper-division courses in residence and satisfaction of the senior comprehensive requirement. Students must include among these 13 courses at least one upper-division, 5-credit course that focuses on diversity (i.e., non-Western; underrepresented ethnicity, gender, or sexual orientation). A list of courses satisfying the department's diversity requirement is available at the department office. Students in the general film and digital media major may apply for admission to the critical studies concentration (see Critical Studies Concentration below), to the highly selective and competitive production concentration (see Production Concentration below), or the more rigorous integrated critical practice concentration (see Integrated Critical Practice Concentration below) within the major.

Lower-Division Requirements

Students must take the lower-division classes 20A, 20B, and 20C for a letter grade, and they must earn a B- or better in two of these three lower-division classes (20A and either 20B or 20C) to petition for the major. A third lower-division course is required to satisfy major requirements.

20A The Film Experience

and two of the following three courses are required for all majors:

20B Introduction to Television Culture and Society**20C Introduction to Digital Media****20P Introduction to Production Technique** (cannot be used to satisfy the B- grade minimum)**General Film and Digital Media Major**

Students must complete the upper-division core curriculum by completing one course from each of the following five groups in film and digital media:

120 Introduction to Film Theory and Criticism**130 Silent Cinema or****132A International Cinema to 1960 or****132B International Cinema, 1960 to Present or****132C Gender and Global Cinema****134A American Film, 1930–60 or****134B American Film, 1960–Present****136A Experimental Film and Video or**

136B *History of Television* or
 136C *Visual Culture and Technology: History of New Media*

194A *Film Theory Seminar* or
 194B *Electronic Media Theory Seminar* or
 194C *New Media Theory Seminar* or
 194D *Film History Seminar* or
 194E *International Cinemas* or
 194F *Film and the Other Arts: Music and Dance* or
 194G *New(s) Media* or
 194S *Senior Seminar: Special Topics*

Five upper-division elective courses are to be chosen from the following:

- up to five additional upper-division history/critical studies courses in film and digital media
- up to two upper-division courses in film and digital media production (170A, 170B, one from the 171 series, 172, 173, 175, 176, 177, or one from the 178 series)
- Film 150 or 151
- up to two upper-division courses offered by other departments; course substitutions must be pre-approved by the Film and Digital Media Department

Film and Digital Media Major Planners

The following are two recommended academic plans for students to complete during their first two years as preparation for the film and digital media major. Plan One is a guideline for students who are committed to the major early in their academic career; Plan Two is for students who are considering the major.

Students who are interested in the production concentration, the critical studies concentration, or the integrated critical practice concentration should seriously consider Plan One to be better prepared for application to production studio classes or either the critical studies concentration or the integrated critical practice concentration in their junior year.

Plan One

| Year | Fall | Winter | Spring |
|------------|------------------------------------|--|--|
| 1st (frsh) | college core gen ed FILM 20A | low-div Fidm* req gen ed (declare pre-major) | low-div Fidm* req gen ed (declare major) |
| 2nd (soph) | FILM 120 gen ed | Fidm* critical studies core gen ed | Fidm* critical studies core gen ed |

Plan Two

| Year | Fall | Winter | Spring |
|------------|--|---------------------------------------|--|
| 1st (frsh) | college core gen ed | low-div Fidm* req gen ed | low-div Fidm* req gen ed (declare pre-major) |
| 2nd (soph) | low-div Fidm* req gen ed (declare major) | Fidm* critical studies core gen ed | Fidm* critical studies core gen ed |

*film and digital media

Critical Studies Concentration

The critical studies concentration provides a more rigorous pathway through the film and digital media major and offers classes specifically reserved for seniors who have exceptional abilities. Students are eligible to apply for the critical studies concentration in spring quarter of their junior year, provided they have completed FILM 120 and at least three other upper-division critical studies classes. Applicants must already be declared film and digital media majors in good standing.

Students will be asked to submit the following application materials:

- a completed application form
- a one-page statement of purpose
- a sample essay
- copies of narrative evaluations for all courses taken in film and digital media

Application materials and instructions are available at the Film and Digital Media Department office. Student application materials are reviewed by a committee of film and digital media critical studies faculty. Admission to the critical studies concentration will be granted to students who have overwhelmingly excellent evaluations, an outstanding writing sample, and a clear statement of purpose. Students may reapply a second time if not accepted, but not later than the first quarter of their senior year.

Requirements for the Critical Studies Concentration

The critical studies concentration curriculum adds the following requirements to those already established for the film and digital media major. Students are required to take two upper-division electives, rather than the five electives currently required for the film and digital media major. FILM 190, an *Advanced Critical Studies Seminar*, replaces the current requirement for one of the FILM 194 seminars, and serves as an exit requirement in the major.

Students in the critical studies concentration complete the following required upper-division core curriculum (9 courses):

120 *Introduction to Film Theory and Criticism*
 130 *Silent Cinema* or
 132A *International Cinema to 1960* or
 132B *International Cinema, 1960 to Present* or
 132C *Gender and Global Cinema*
 134A *American Film, 1930–60* or
 134B *American Film, 1960–Present*
 136A *Experimental Film and Video* or
 136B *History of Television* or
 136C *Visual Culture and Technology: History of New Media*
 165A *Film, Video and Gender* or
 165B *Race on Screen* or
 165C *Lesbian, Gay and Queer Film and Video* or
 165D *Asian Americans in Media*
 187 *Advanced Topics in Television Studies* or
 189 *Advanced Topics in Electronic and Digital Media Studies*
 190 *Advanced Critical Studies Seminar*
 191 *Critical Studies Thesis Preparation Seminar*
 192 *Student-Directed Seminar* or
 195 *Senior Thesis*

Two upper-division elective courses are to be chosen from the following:

- up to two additional upper-division history/critical studies courses in film and digital media
- one upper-division course in film and digital media production (150, 151, 170A, 170B, one from the 171 series, 172, 173, 175, 176, 177, or one from the 178 series)
- one upper-division course offered by other departments; course substitutions must be pre-approved by the Film and Digital Media Department

Production Concentration

Admission to the production concentration is highly selective, based on promise and accomplishment shown in the student's work. After completing FILM 170B, students may apply to the production concentration by submitting works created in FILM 170B to a portfolio review conducted at the end of each quarter. These student works are reviewed by a committee of film and digital media production faculty. Application materials and instructions for the portfolio review are available at the Film and Digital Media Department office. Students should note that production courses are in high demand and that faculty/student ratios and equipment resources limit the number of applicants accepted into the production concentration. Students may reapply a second time if not accepted. A student accepted into the production concentration who is unable to meet all the requirements for the concentration may instead be able to satisfy the graduation requirements of the general major. Application materials and instructions for all production courses are available each quarter online at slugfilm.ucsc.edu.

Requirements for the Production Concentration

Students in the production concentration complete the following required upper-division core curriculum (six courses):

120 *Introduction to Film Theory and Criticism*
 170B *Fundamentals of Film and Video Production*

two of the following production courses:

150 *Screenwriting*
 151 *Film Directing*
 170A *Fundamentals of Digital Media Production*
 171A *Special Topics Workshop: Sound*
 171C *Special Topics Workshop: Found Footage*
 171D *Social Information Spaces*
 171F *Autobiographical Film*
 172 *Film and Video Studio*
 173 *Narrative Workshop*
 175 *Documentary Video Workshop*
 176 *Experimental Video Workshop*
 177 *Digital Media Workshop: Computer as Medium*
 178A *Personal Computers in Film and Video*
 178B *Advanced Personal Computers in Film and Video*

and two critical studies courses—one each from two of the three following groups:

130 *Silent Cinema* or
 132A *International Cinema to 1960* or
 132B *International Cinema, 1960 to Present* or
 132C *Gender and Global Cinema*
 134A *American Film, 1930–60* or

134B *American Film, 1960–Present*

136A *Experimental Film and Video* or

136B *History of Television* or

136C *Visual Culture and Technology: History of New Media*

and four upper-division elective courses from the following:

- up to two upper-division courses in film and digital media production (150, 151, one from the 171 series, 172, 173, 175, 176, 177, or one from the 178 series)
- at least two upper-division film and digital media history/critical studies courses
- up to two upper-division critical studies elective courses from another department; course substitutions must be pre-approved by the Film and Digital Media Department.

and one course from the following:

194A *Film Theory Seminar*

194B *Electronic Media Theory Seminar*

194C *New Media Seminar*

194D *Film History Seminar*

194E *International Cinemas*

194F *Film and the Other Arts: Music and Dance*

194G *New(s) Media*

194S *Senior Seminar: Special Topics*

195 *Senior Thesis*

196A *Senior Project in Film and Video Production*

196B *Senior Project in Screenwriting*

196C *Senior Documentary Workshop*

197 *Senior Digital Media Workshop*

Integrated Critical Practice Concentration

The integrated critical practice concentration provides a more rigorous pathway through the film and digital media major and offers classes specifically reserved for seniors with exceptional abilities in both critical studies and production who seek to combine creative and scholarly work. Students are eligible to apply for the integrated critical practice concentration in the last quarter of their junior year, provided they have completed FILM 120 and at least three other upper-division critical studies classes. Students not already admitted to the production concentration should apply simultaneously to the production concentration. Acceptance into the production concentration is a necessary pre-condition for acceptance into the integrated critical practice concentration. Applicants must already be declared film and digital media majors in good standing.

Students will be asked to submit the following application materials:

- a completed application form
- a one-page statement of purpose
- a sample essay
- copies of narrative evaluations for all courses taken in film and digital media

Application materials and instructions are available at the Film and Digital Media Department Office. Student application materials are reviewed by a committee of film and digital media faculty. Admission to the integrated critical practice concentration will be granted to students with overwhelmingly excellent evaluations, an outstanding writing sample, and a clear statement of purpose outlining a senior project that integrates critical studies and production work. Students may reapply a

second time if not accepted, but not later than the first quarter of their senior year.

Requirements for the Integrated Critical Practice Concentration

The integrated critical practice concentration curriculum adds the following requirements to those already established for the film and digital media major. Students are required to take both 20A and 20P for their required lower-division courses, in addition to selecting a third lower-division class from either 20B or 20C. The minimum grade requirement for lower-division courses will apply (see Lower-Division Requirements). Students are required to take 170B as part of their core curriculum, and to complete six elective classes, rather than five. For the senior exit requirement students are required to complete one course (192, 195, 196A, 196B, 196C, or 197) which, combined with an independent study (199) taken either consecutively or simultaneously, will integrate critical studies and production work.

Students in the integrated critical practice concentration complete the following required upper-division core curriculum (6 courses):

120 *Introduction to Film Theory and Criticism*

130 *Silent Cinema* or

132A *International Cinema to 1960* or

132B *International Cinema, 1960 to Present* or

132C *Gender and Global Cinema*

134A *American Film, 1930–60* or

134B *American Film, 1960–Present*

136A *Experimental Film and Video* or

136B *History of Television* or

136C *Visual Culture and Technology: History of New Media*

170B *Fundamentals of Film/Video Production*

192 *Student-Directed Seminar* or

195 *Senior Thesis* or

196A *Senior Project in Film and Video Production* or

196B *Senior Project in Screenwriting* or

196C *Senior Documentary Workshop* or

197 *Senior Project in Digital Media*

Six upper-division elective courses are to be chosen from the following:

- two upper-division history/critical studies course in film and digital media (152, 160, 161, 162, one of the 165 series, 168, 180, one of the 185 series, 187, 189)
- three upper-division courses in film and digital media production (150, 151, 170A, one of the 171 series, 172, 173, 175, 176, 177, one of the 178 series)
- one senior seminar chosen from the 194 series
- graduate seminars, taken with permission of the faculty advisor, may substitute for one of the electives
- a maximum of two electives may be taken in another department if pre-approved by the Film and Digital Media department

Courses from the above core curriculum in excess of requirements may NOT count as electives.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) require-

ment. The DC requirement will be met by completion of FILM 120, *Introduction to Film Theory and Criticism*. For detailed information on this major's DC requirement, consult your major adviser.

Comprehensive Requirement

All seniors in the general film and digital media major or in the production concentration may select one of three options to satisfy the campus exit requirement.

- *Senior seminar*: The senior seminars (courses in the 194 series) are restricted to majors in their senior year and are writing intensive. Students in the general major are required to complete one senior seminar. Students in the production concentration may complete the senior seminar to satisfy the senior exit requirement or as an elective.
- *Senior thesis*: With prior faculty approval, a student may elect to do a senior thesis (FILM 195). The student must contact a faculty member at least one quarter in advance to submit a proposal and to obtain faculty approval for a senior thesis. The proposal may involve writing a screenplay; expanding on a paper from a previously completed upper-division critical studies course in film and digital media; or writing an original paper in a particular area resulting in a work of substantial research.
- *Senior project*: A limited number of students in the production concentration may participate in the senior project (FILM 196A, 196B, 196C, or 197) class. Admission is by application, with review of previous works and evaluation of the proposed final project by film and digital media production faculty.

Seniors in the critical studies concentration must complete the following to satisfy the campus exit requirement: FILM 190, *Advanced Critical Studies Seminar*.

Seniors in the integrated critical practice concentration must complete one course (192, 195, 196A, 196B, 196C, or 197) combined with an independent study course (199).

Transfer Students

All transfer students must enroll in at least one lower-division course (20A, 20B, or 20C) during their first quarter in residence. Transfer students are encouraged to enroll in 20A during the Summer Session preceding their first quarter in residence. After completion of one lower-division course (20A, 20B, or 20C) with a grade of B- or better, transfer students may declare the film and digital media pre-major.

All transfer students must earn a B- or higher in two 20-level courses, FILM 20A and either 20B or 20C (at least one must be taken at UCSC) to declare the major. Appeal procedures are the same as for non-transfer students. Three lower-division and ten upper-division courses are required for completion of the major. With some lower-division preparation, transfer students should be able to complete the upper-division coursework and the major within two years. As preparation, prospective transfer students are encouraged to fulfill at least one lower-division film and digital media major requirement (FILM 20 series) through UCSC Summer Session prior to their transfer. Transfer students must petition the department to have equivalent lower-division courses taken at their current institution count toward their UCSC major requirements provided they have earned a B- or higher in each course.

Students who have completed none of the lower-division major requirements prior to transfer to UCSC, students who are interested in graduating with a double major, and students who must finish general education requirements may need additional time to complete their studies.

Transfer students are strongly encouraged to speak with an academic adviser at the department office prior to enrolling in classes to determine their status and to begin the declaration of major process as soon as possible.

Honors

Honors in film and digital media are awarded to graduating seniors whose academic performance in their major coursework is judged by a faculty committee to be consistently excellent to outstanding. Students must also do excellent work on their senior exit requirement. Both narrative evaluations and letter grades will be considered; to be considered for Honors, students must have at least a cumulative GPA of 3.5 in the major or the relative equivalent in narrative evaluations, as determined by the faculty committee.

Minor Requirements

The minor in film and digital media offers a foundation in visual culture and contributes important scholarly techniques of value to other disciplines. Students earn a minor in film and digital media by completing eight courses: two lower-division courses as prerequisites for the minor and six upper-division courses including four from the core curriculum of the general major and two electives. There is no production component in the minor, nor is there a comprehensive requirement.

Lower-Division Requirements

Students must complete at least two lower-division courses prior to petitioning for the minor:

20A *The Film Experience*

and one of the following three courses:

20B Introduction to Television Culture and Society

20C Introduction to Digital Media

20P Introduction to Production Technique

Requirements for the Minor

Students in the minor must complete the upper-division core curriculum by completing one course from each of the following four categories in film and digital media:

120 *Introduction to Film Theory Criticism*

130 *Silent Cinema* or

132A *International Cinema to 1960* or

132B *International Cinema, 1960 to Present* or

132C *Gender and Global Cinema*

134A *American Film, 1930–60* or

134B *American Film, 1960–Present*

136A *Experimental Film and Video* or

136B *History of Television* or

136C *Visual Culture and Technology: History of New Media*

Two upper-division elective courses to be chosen from the following: any two additional upper-division film and digital media history/critical studies courses other than production studio courses (150, 151, 170A through 178A, and 178B) that have not been used to satisfy the above core curriculum. One of the electives may be substituted from another department or institution. Course substitutions must be approved by the Film and Digital Media Department.

Film and Digital Media Ph.D.

The Doctor of Philosophy (Ph.D.) program in film and digital media challenges the traditionally conceived borders between creative and critical practice. The program enables potential dialogue between creative practice and theoretical knowledge as related forms of intellectual work and provides the conditions for students to realize a wide range of possible projects, including those that exist across the traditional divides of critical studies and production. Focusing on a diverse range of cultural production that includes cinema, television, video art, and Internet-based media, Ph.D. program participants interrogate the historical, aesthetic, political, ideological, and technological aspects of these media forms across a range of international contexts, investigating their points of connection and convergence as well as their relationship to broader cultural and historical change. The program thus prepares students for intellectually informed creative practice as well as theoretical and critical production in a range of environments, not limited to traditional academic contexts.

The doctoral program in film and digital media prepares students to be artists and scholars who can situate their work within a larger historical framework of cultural and technological change, looking at the interrelationships of various media. The program is not divided into paths or specific fields of emphasis. As well as educating students in the intellectual histories of their field and working with them to facilitate new theoretical and critical interventions, we also expose students to fundamental and advanced aspects of media technologies that will illuminate their understanding of media production and reception.

Requirements

Normative Time for Completion

Normative time for completion of the program is six years. The first two years of the program are primarily devoted to coursework. Preliminary exams for the master's degree occur in the spring of the second year. By the end of the third year, students should have formulated a dissertation topic and proposal deriving from their work in that year and should have nominated a Ph.D. qualifying examination committee and dissertation committee. Qualifying examinations for advancement to Ph.D. candidacy occur in the fall of the fourth year.

Coursework

A minimum of 108 units of study in coursework at UCSC will be required for the Ph.D. degree. Doctoral students will be in residence for a minimum of six quarters. When in residence, students will take a minimum of 12 credits per quarter. Up to 10 transfer credits may be granted from another institution if approved by the faculty.

In their first year, doctoral students will be required to take the three foundational courses (200A-B-C) and the 2-credit colloquium series sequence.

They must then take two film and digital media graduate elective courses in the second year (for a total of five courses; three core and two electives). In addition, most students will take FILM 204A-B-C, a 2-credit colloquium every quarter.

In the third year, students take the three graduate courses in film and digital media, 295 (*Directed Reading*), 292 (*Seminar in Thesis Area*), and 297 (*Independent Study and Research*, leading to thesis proposal).

A student will thus take at least eight film and digital media graduate courses over the degree, for a total of

40 credits plus 12 credits of the colloquium series. The remaining elective courses may be selected from film and digital media or graduate or advanced undergraduate courses from other departments, subject to approval from the student's graduate adviser. If a student chooses to take an undergraduate course, they will be required to seek permission to enroll from the department, if approved by the faculty adviser. It is expected that students will carefully choose which courses to take, in consultation with their graduate adviser, so as to ensure a program of study that is intellectually rigorous and that reflects the student's eventual goals and aspirations.

Students are expected to complete at least one year of supervised teaching as part of the degree requirements.

Foreign Language Requirement

Students must demonstrate proficiency in a language other than English. This may include a computer programming language instead of a natural language when such a language is integral to the student's field of study. The language requirement may be satisfied in one of two ways:

- by passing an upper-division course in a language related to the student's research
- by passing a reading proficiency test administered by a faculty member in the relevant language department

A student must pass the language requirement before taking Ph.D. qualifying examinations. There are two exceptions:

- The "foreign" language requirement may be waived for a non-English native speaker who has passed the proficiency test in English required for admission (application must be made in writing at least two months prior to the qualifying examination).
- The requirement may be waived if a student has proof of proficiency in a language other than English in the form of a language major or minor from recent (within the last five years) undergraduate or master's level education or equivalent (accredited institution). Documentation must be received and approved by the Director of Graduate Studies at least two months before the qualifying examination.

Timeline: Course Sequence, Examinations, and Dissertation

During the first year of study in FILM 200B-C (a 2-quarter course), students will be introduced to the methodologies of developing, and the questions that surround a critical practice approach. This will occur while the student simultaneously strengthens, with the appropriate elective classes, areas of theory or practice that pertain to their focus but in which they are not fluent.

During the second year, the student will focus on selecting classes from the film and digital media elective series numbered 210–289. Of the 19 classes currently in this series, approximately one third embrace a strong mix of critical studies and media production. In these classes, students will be charged with producing and thinking about the relationship between the critical studies and media production. The remainder of the classes in this series fall on either side of the equation.

At the end of the second year, students take a preliminary examination which functions as the master's examination. In the winter quarter of the second year, a "call" is made for students to submit the critical or creative work they have produced from their first two years of coursework. Students prepare for the examination by talking to their graduate adviser about the work

they have done and how they might situate and respond to it. At this stage they also nominate faculty members whom they think would be suitable examiners. It is expected that these faculty would include at least one of the instructors of the courses already taken by the student. The graduate adviser and director of graduate studies will assemble the committee, taking into account the student's nominations. The written component of the examination consists of the coursework projects already submitted, which for some students will be a combination of written text and creative work; and, a statement about that work and its contexts, which will form the basis for oral examination questions by faculty members. At the oral examination, students will be questioned about their work, their relationship to it, and the way they might situate it. The goal is for students to be able to talk meaningfully about the connections and implications of their work and to place it within a wider critical, theoretical, and creative context. The graduate adviser will discuss the scope and format of the examination with the student before the examination date.

After the oral examination, the committee considers the student's performance and will recommend one of three grades: fail, pass, or pass with permission to proceed. Students who fail may retake the oral component of the examination one time. A student with a pass only may leave the program with the degree of Master of Arts (M.A.). These students must also meet the campus requirement of B or higher in their coursework and complete the units requirements of 72 credits. Students who pass with permission to proceed may enter the third year of coursework toward the Ph.D. The decision on permission to proceed will take into account the examination result and input from the faculty whose courses the student has completed.

The third year will be spent developing a dissertation topic in close consultation with faculty advisers and the FILM 290 series classes. A student's advisers over the program's duration will include both critical studies and production faculty depending on the research and the qualifying examination, and dissertation committees will reflect a balance between critical studies and production faculty appropriate to the student's research topic. In spring of the third year, students should, in consultation with their graduate adviser, suggest names of faculty to become members of the Ph.D. qualifying examination committee. This committee will be comprised of four faculty members, at least one of whom must be from another discipline at UCSC or from another campus. The committee shall have a tenured film and digital media faculty member as chair. Students should also begin assembling a dissertation committee. The 297 independent study course, taken in the spring, should result in a dissertation proposal, and the student will receive feedback on that during and at the end of quarter.

In fall of the fourth year, the student's Ph.D. qualifying examination committee will consider the work completed in the 292, 295, and 297 courses, including the student's dissertation proposal (which the student may choose to revise over the summer before submitting to the committee) and will then conduct an oral qualifying examination based on the proposal and other work. The aim of the examination is to test a student's readiness for advanced research and production of the Ph.D. dissertation, and to assess the student's abilities to advance themselves in their respective fields of inquiry. Advancement to candidacy is based on successful completion of the qualifying examination as well as completion with a B or better grade of the required coursework and assembly of a graduate division approved thesis committee. If a student fails the Ph.D. examination, he

or she may be permitted to take it a second time.

Completion of the Degree

Upon successful advancement to candidacy, students must then complete the following requirements for the Ph.D.

Dissertation: The dissertation, or Ph.D. thesis, is to be an original contribution of high quality to the field of film and digital media studies. If a student's thesis contains a substantial creative component, the thesis project must also include a written component of no less than 75 pages which contextualizes the work in relation to other scholarly and creative practices, and situates the work in relation to relevant aesthetic and cultural theory. The dissertation must be approved by a committee consisting of a minimum of three faculty members, at least two of whom must be from the film and digital media faculty. If the dissertation director does not hold a Ph.D. degree, then the majority of the remaining committee members must hold Ph.D.s. When the student has submitted the dissertation and the committee has approved it, the student is ready for the oral defense.

Oral Defense: Once the dissertation is approved, the student will present an oral summary before his or her dissertation committee and invited members of the academic community. The student will then answer questions posed by the faculty.

Sample Student Program for Each Year (Years 1-4)

Year 1: three core film and digital media courses; three electives

Fall

FILM 200A: *Introduction to Graduate Study*

FILM 204A: *Colloquium*

Elective (from Film and Digital Media or another department)

Foreign language

Winter

FILM 200B: *Theory and Praxis of Film and Digital Media, Part 1*

FILM 204B: *Colloquium*

Elective (from Film and Digital Media or another department)

Foreign language or teaching assistant

Spring

FILM 200C: *Theory and Praxis of Film and Digital Media, Part 2*

FILM 204C: *Colloquium*

Elective (from Film and Digital Media or another department)

Foreign language or teaching assistant

Year 2: two film and digital media electives; four other electives from film and digital media or another department

Fall

Film and digital media elective

FILM 204A: *Colloquium*

Elective (from Film and Digital Media or another department)

Teaching assistant or graduate student research assistantship

Winter

Film and digital media elective

FILM 204B: *Colloquium*

Elective (from Film and Digital Media or another department)

Teaching assistant or graduate student research assistantship

Student suggests M.A. examination committee; prepares for examination.

Spring

Elective (from Film and Digital Media or another department)

FILM 204C: *Colloquium*

Elective (from Film and Digital Media or another department)

Teaching assistant or graduate student research assistantship

Student takes M.A. examination. If successful, advances to third year.

Year 3: three required film and digital media courses, three electives from Film and Digital Media Department or another department

Fall

FILM 295: *Directed Reading*

FILM 204A: *Colloquium*

Elective (from Film and Digital Media or another department)

Teaching assistant or graduate student research assistantship

Winter

FILM 292: *Seminar: Developing a Thesis Area*

FILM 204B: *Colloquium*

Elective (from Film and Digital Media or another department)

Teaching assistant or graduate student research assistantship

Spring

FILM 297: *Independent Study and Research* (thesis proposal)

FILM 204C: *Colloquium*

Elective (from Film and Digital Media or another department)

Student assembles Ph.D. dissertation committee, nominates Ph.D. qualifying examination committee.

Year 4

Student takes Ph.D. qualifying examination. If successful, advances to candidacy and continues research and writing of dissertation.

Lower-Division Courses

20A. The Film Experience. F,W

An introduction to the basic elements, range, and diversity of cinematic representation and expression. Aesthetic, theoretical, and critical issues are explored in the context of class screenings and critical readings. Students are billed a course fee. Enrollment restricted to first-year students, sophomores, and juniors. (General Education Code(s): IM, IH, A.) *S. Stamp, G. Youmans*

20B. Introduction to Television Culture and Society. S

Introduction to the basic forms of televisual presentation, including differing narrative structure from movies and situation comedies to soap opera, plus modes of direct discourse in news, advertising, sports, music, television, and other genres. Alternative forms and modes in electronic media, such as independent video art and documentary, public television, cable, and electronic networks are explored, with their potential for expressing cultural diversity set in relation to social, cultural, and political conditions. Students are billed a course fee. Enrollment restricted to first-year students, sophomores, and juniors. (General Education Code(s): IM, IH, A.) *L. Kim*

20C. Introduction to Digital Media. F,S

Introduces fundamental features of digital media and examines the immense visual, social, and psychological impact of the "digital revolution" on our culture. Topics include the concepts and forms of the digital hypertext interface, Internet, and web, and the impact of digital media on conceptions of the self, body, identity, and community.

Students are billed a course fee. Enrollment restricted to first-year students, sophomores, and juniors. (General Education Code(s): IH, A.) *L. Kelley*

20P. Introduction to Production Technique. F,W

Introduction to production process with emphasis on low-budget, independent film and video making. Explores conceptualization, planning, shooting, editing of documentary, personal essay, and feature narrative works. Emphasis on visualization and shooting style, and script-writing, but not hands-on editing. Open to students of varied backgrounds and goals. Students are billed a course fee. (General Education Code(s): PR-C, A.) *I. Gustafson, J. Fankushen*

42. Student-Directed Seminar. F,W,S

Seminars on selected topics taught by upper-division students under faculty supervision (see course 192). Students submit petition to sponsoring agency. *The Staff*

80A. Technothrillers. *

Examination of recent films classified as "thrillers" that approach technology (computers, robotics, biotech, the Internet, etc.) through suspense, anxiety, and paranoia. It will also address how technologically produced popular culture negotiates attitudes towards technological change. Students are billed a course fee. (General Education Code(s): T5-Humanities and Arts or Social Sciences, A.) *The Staff*

80S. Special Topics in Film and Digital Media. F,S

Study of selected aspects of film, television, and/or digital media. Includes weekly screenings and historical/theoretical readings. May be repeated for credit. (General Education Code(s): IM, T5-Humanities and Arts or Social Sciences, A.) *S. Scott, J. Fankushen*

80X. Sex in the Cinema. *

Examines the historical representation of sexual difference, orientation, and politics in film and video using cultural studies, political and economic historiography, and feminist and queer theory and paying special attention to intersections of U.S. political movements with filmmaking and reception. (General Education Code(s): IM, T5-Humanities and Arts or Social Sciences, A.) *The Staff*

Upper-Division Courses

120. Introduction to Film Theory and Criticism. W

An introduction to classical and contemporary film theory and those theoretical paradigms and methods that have illuminated the media: formalism, realism, structuralism, semiotics, psychoanalysis, Marxism, feminism, and issues of identity and difference. Students are billed a course fee. Prerequisite(s): course 20A, satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to film and digital media majors, pre-majors, and minors during priority enrollment; may be opened if space allows. (General Education Code(s): W.) *A. Hastie*

130. Silent Cinema. *

Presents the development of silent film as a cultural form from the early period to the beginning of sound, addressing its historical evolution, technological development, aesthetic transformations, and varied cultural contexts. Students are billed a course fee. Usually offered in alternate academic years. Prerequisite(s): course 20A. *S. Stamp*

132A. International Cinema to 1960. W

A survey of significant developments in narrative film outside Hollywood from the advent of sound technology to the late '50s. Differing inter/national contexts, theoretical movements, technological innovations, and major direc-

tors are studied. Students are billed a course fee. Usually offered alternate academic years. Prerequisite(s): course 20A. (General Education Code(s): A.) *P. Limbrick*

132B. International Cinema, 1960 to Present. *

A survey of significant developments in narrative film outside Hollywood from 1960 to the present. Major film movements and directors from around the world are studied. Students are billed a course fee. Usually offered in alternate academic years. Prerequisite(s): course 20A. (General Education Code(s): A.) *P. Limbrick*

132C. Gender and Global Cinema. F

Offers students historical and critical tools to investigate global film through the framework of gender. Focused in particular on contemporary film (from 1960 to present), the class is structured both chronologically and via national industries. Students are billed a course fee. Prerequisite(s): course 20A. (General Education Code(s): E.) *Y. Wang*

134A. American Film, 1930–1960. W

A survey of American narrative cinema from 1930 to 1960. Examines developments in film style, film technology, and the film industry in relation to American cultural history. Students are billed a course fee. Prerequisite(s): course 20A or 20B. Offered in alternate academic years. *S. Stamp*

134B. American Film, 1960–Present. F

A survey of American narrative cinema from 1960 to the present. Examines developments in film style, film technology, and the film industry in relation to American cultural history. Students are billed a course fee. Prerequisite(s): course 20A or 20B. Offered in alternate academic years. *G. Youmans*

136A. Experimental Film and Video. S

A survey of various experimental styles and practices in film and video, addressing the historical developments of these media formats. The course situates experimental film and video work within the larger contexts of artistic traditions as well as networks of production and reception. Students are billed for a course fee. Prerequisite(s): course 20A. (General Education Code(s): A.) *G. Youmans*

136B. History of Television. *

Survey of the historical development of broadcast television from its origins to the present day phenomena of cable, satellite, and electronic networks. Examination of major genres, forms, and modes of production and consumption within cultural, social, and economic contexts. Offered every other year, alternating with course 136A. Students are billed for a course fee. Prerequisite(s): course 20B. (General Education Code(s): A.) *The Staff*

136C. Visual Culture and Technology: History of New Media. F

Explores the relationship between technology and change and surveys the history of various technologies of visual culture from print to computer based imagery and the Internet. Students are billed a course fee. Prerequisite(s): course 20C. *L. Kelley*

142. Beyond Cybernetics: Advanced Topics in New Media Technologies. *

Analysis of the effects of communication and information technologies on culture and cultural production through the study of systems and networks. Assignments may include papers, Internet presentations, development/participation in virtual communities, interactive multimedia. Emphasis on advanced critical and experimental approaches. Students are billed a course fee. Prerequisite(s): course 20C. Enrollment restricted to film and digital media majors. Enrollment limited to 40. *L. Andrews, S. Daniel*

150. Screenwriting. F

Problems in writing for film and television are explored through the writing of original material and analysis of existing works. Various film genres, conventions, and

styles, both fictional and nonfictional, are examined. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Admission by application process which may begin prior to start of quarter; application materials generally available final week of preceding quarter. See enrollment conditions section in quarterly *Schedule of Classes* for application dates and other application instructions that may apply. May be repeated for credit. (General Education Code(s): W.) *H. Dam*

151. Film Directing. *

Workshop that explores the director's involvement in film and video production. Topics will include the manipulation of time and space, continuity, script planning and blocking, and working with actors and crew. Students will participate in group and individual exercises in pre-production and scene direction. Prerequisite(s): courses 20A, 20P, and/or 170B are recommended. Admission by application process which may begin prior to the start of the quarter; application materials generally available final week of preceding quarter. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Enrollment limited to 30. (General Education Code(s): A.) *G. Vasquez*

152. Script Analysis. *

Students analyze diverse narrative techniques, dramatic structures, and genre forms to understand the craft of screenwriting and prepare for their own creative writing and filmmaking. Students read finished scripts and view films. Prerequisite(s): course 120. Enrollment restricted to film and digital media majors and film and digital media pre-majors. Enrollment limited to 25. *The Staff*

160. Film Genres. F,W

Concentrated study of films from one cinematic grouping with similar themes and narrative structures such as westerns, musicals, or science fiction, or a comparative study of different genres. History, theory, and criticism of the genre are covered. Students are billed a course fee. Prerequisite(s): course 132A, 132B, 132C, 134A or 134B. May be repeated for credit. (General Education Code(s): A.) *S. Stamp, G. Youmans*

161. Documentary Film and Video. S

Explores the category of nonfiction through a historical and theoretical study of documentary in film and video. Addresses ethnographic film, Soviet and Griersonian documentary, cinema verité and/or other selected documentary texts and the issues of representation they raise. Students are billed a course fee. Prerequisite(s): course 20A or 20B. Offered in alternate academic years. *I. Gustafson*

162. Film Authors. S

Intensive critical study of the work of one film auteur (director, screenwriter, actor, cinematographer). Themes, style, and structure are explored using various critical modes of analysis. Students are billed a course fee. Prerequisite(s): course 120. May be repeated for credit. *L. Kelley*

165A. Film, Video, and Gender. W

A study of texts, theories, and issues of gender in film and/or video. Changing focus on one or more topics, including production and authorship, representation, reception, theories of identification, sexual preference, and related issues. Students are billed a course fee. Usually offered in alternate academic years. Prerequisite(s): course 20A or 20B. (General Education Code(s): A.) *I. Gustafson*

165B. Race on Screen. S

Review of historical and critical tools to interpret representations of race on cinematic, television, and computer screens. Class will consider the place of race in theoretical and historical scholarship and examine the debates about

race produced within and across film and digital media. Students are billed a course fee. Usually offered in alternate academic years. Prerequisite(s): course 20A or 20B. (General Education Code(s): E.) *Y. Wang*

165C. Lesbian, Gay, and Queer Film and Video. *

An overview of homosexuality in American film. Explores a baseline Hollywood homophobia and the formal and historical attempts to change it. Recent independent queer film and video discussed. Topics include authorship, spectatorship, genre and genre reappropriation, historical gender constructs, the "art" film, mainstream vs. independent production, the relationship of film to popular music. Students are billed a course fee. Usually offered in alternate catalog years. *I. Gustafson*

165D. Asian Americans and Media. *

Examines media representations about, as well as by, Asian Americans. Using critical essays on film theory, racial studies, feminist criticism, and independent cinema, students develop the skills necessary to conduct critical analysis of Asian Americans in film and television. Students are billed a course fee. Enrollment restricted to juniors and seniors. (General Education Code(s): E.) *The Staff*

168. National Cinema and Culture. F

Study of a specific cinematic or other media tradition of a region, nation, language, diasporic collectivity or other unifying cultural entity. Not a survey, this course selects one focus or offers a comparative of cross-cultural framework. Students are billed a course fee. Prerequisite(s): course 130, 132A, 132B, or 132C. May be repeated for credit. *J. Todd*

170A. Fundamentals of Introduction to Digital Media Production. F,W

Introduction to the conceptual and technical fundamentals of making digital media. Covers principles of digital image manipulation, basic web authoring, and interface design through projects that introduce production techniques and methods. Students are billed for a materials fee. Prerequisite(s): course 20C Enrollment limited to 20. (General Education Code(s): A.) *M. Haughwout*

170B. Fundamentals of Film and Video Production. F,W,S

An introduction to the art and craft of making films and videos. Covers principles of cinematography, videography, editing, production planning, and lighting involving both production techniques and methods. Students are billed a materials fee. Prerequisite(s): course 20A or 20B and one other film/video and digital media critical studies or history course required. Completion of additional upper-division film and digital media critical studies or history courses improves students' ability to be admitted to this course. Admission by application and entrance essay. The online application process begins several weeks prior to the start of the quarter. See enrollment conditions section in quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Enrollment limited to 24. (General Education Code(s): A.) *J. Fankushen, K. Herold, L. Andrews*

171. Special Topics Workshops.

Study of selected aspects of film, video, and/or digital media production. *The Staff*

171A. Sound. W

The cinematic equation equals images plus sound. What are sound-specific properties? What is the relationship between sound and image? Examines these and other questions through the creation of audio and audiovisual pieces. Students are billed a materials fee. Prerequisite(s): priority given to students who have been accepted into the production concentration. Admission is by an online ap-

plication process which begins several weeks prior to the start of the quarter. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170A or 170B may apply by submitting an application and sample of production work at first class meeting; these applications will be considered on a space-available basis. Enrollment limited to 20. *L. Andrews*

171C. Special Topics Workshop: Found Footage. S

Students will consider the practice of "recycling" images perhaps not intended by the original "owner" or "creator." In addition to assigned readings and technical workshops, students produce three video projects and give a presentation on a specific issue or artist/group. Prerequisite(s): course 170A or 170B; priority given to students who have been accepted into the production concentration. Admission is by an online application process which begins several weeks prior to the start of the quarter. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170A or 170B may apply by submitting an application and sample of production work at first class meeting; these applications will be considered on a space-available basis. Enrollment limited to 20. *The Staff*

171D. Social Information Spaces. S

Investigates how information spaces can be designed to be inhabited, socially navigable spaces. Emphasizes the social navigation of information spaces, a set of techniques and ideas from computer-supported cooperative works, human-computer interaction, and architecture. Prerequisite(s): course 170A. Enrollment limited to 20. *M. Haughwout*

171F. Special Topics Workshop: Autobiographical Film. F

Students explore autobiography as a filmmaking genre and practice, using experimental, fictionalized, documentary, and hybrid forms. Readings and screenings provide a theoretical context for production work. Topics include: strategies of (self) representation, reenactment, performance, portraiture, memoir, confession, and diaristic film. Prerequisite(s): course 170B. Enrollment by interview only; priority given to application process/production concentrators. Students are billed a materials fee. Enrollment limited to 20. *K. Herold*

172. Film and Video Studio. F,W,S

Intermediate workshop in film and video production concentrating on narrative production, development of critical standards, and technical methods. Topics include cinematography, sound, and non-linear digital editing techniques. Each student is responsible for the completion of short narratives from assignments. Students must bear the cost of materials and are billed a materials fee. Prerequisite(s): priority given to students who have been accepted into the production concentration. Admission is by an online application process which begins several weeks prior to the start of the quarter. See enrollment conditions section in quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170A or 170B may apply by submitting an application and sample of production work at first class meeting; these applications will be considered on a space-available basis. Enrollment limited to 20. *G. Vazquez, E. Hollander*

173. Narrative Workshop: Reconfiguring Narrative within the Digital Realm. *

Analysis of cinematic codes and narrative structure through digital video, Internet and interactive multimedia projects. Required readings address contemporary research in narratology and hyper-media, exploring the potential of digital technology to reconfigure the role of both author and audience. Students billed a course fee. Prerequisite(s): course 170A. Enrollment limited to 20. *L. Andrews, G. Vazquez*

175. Documentary Video Workshop. F

Workshop in documentary video production, development of critical standards, ethical issues, and technical methods. Each student is responsible for the completion of short documentaries from assignments. Students must bear the cost of materials and are billed a materials fee. Prerequisite(s): priority given to students who have been accepted into the production concentration. Admission is by an online application process which begins several weeks prior to the start of the quarter. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170A or 170B may apply by submitting an application and sample of production work at first class meeting; applications will be considered on a space-available basis. Enrollment limited to 20. *E. Hollander*

176. Experimental Video Workshop. S

Introductory workshop in video production (non-narrative, experimental). Topics include a survey of non-narrative experimental video from a historical/theoretical perspective and an introduction to videography, fundamentals of video editing, and sound. Students complete several short projects and are billed a materials fee. Students must bear the cost of all materials. Prerequisite(s): course 170B; priority given to students who have been accepted into the production concentration. Admission is by an online application process which begins several weeks prior to the start of the quarter. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170B may apply by submitting an application and sample of production work at first class meeting; these applications will be considered on a space-available basis. Enrollment limited to 20. (General Education Code(s): A.) *G. Vazquez*

177. Digital Media Workshop: Computer as Medium. W

Introduction to the computer as a medium as well as a tool. Students explore art practice within digital imaging and information and communications environments through projects, readings, and "screenings." Assignments may include designing virtual communities and/or interactive, multimedia web works. Students are billed a course fee. Prerequisite(s): course 170A. Enrollment limited to 20. *M. Haughwout*

178A. Personal Computers in Film and Video. S

Introduction to the specific applications of computers for film and video. By using computer-generated, enhanced and imported graphics, animation, text, sound, and moving video, students create still and time-based works in a computer environment. Prerequisite(s): course 170B; priority given to students who have been accepted into the production concentration. Admission is by an online application process which begins several weeks prior to the start of the quarter. See enrollment conditions section in quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170B may apply by submitting an application and sample of production work at first class meeting;

these applications will be considered on a space-available basis. Students are billed a materials fee. Enrollment limited to 20. *The Staff*

178B. Advanced Personal Computers in Film and Video. *

Study of advanced computer tools in digital media, including exploration, creation, and manipulation of sound with the same level of complexity as required in composing the moving image. Students produce a final project that demonstrates skills learned. Prerequisite(s): course 170A; priority given to students who have been accepted into the production concentration. Admission is by an online application process which begins several weeks prior to the start of the quarter. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions that may apply. Students who are not in the production concentration and who have completed course 170A may apply by submitting an application and sample of production work at first class meeting; these applications will be considered on a space-available basis. Enrollment limited to 20. *The Staff*

180. Writing About Film, Television, and Digital Media. *

Improves students' ability to write and edit, and invites students to explore different kinds of writing related to film, television, and digital media including historical, theoretical, cultural criticism, popular reviews, grant proposals, online forums, and publishing. Prerequisite(s): course 20A, 20B, or 20C. Enrollment restricted to sophomore and junior film and digital media majors. Enrollment limited to 20. *L. Kim*

185. Special Topics in Film and Video.

Study of selected aspects of film and/or video history, theory, or criticism. Students are billed a course fee. *The Staff*

185D. Sound and Image in Theory and Criticism. *

Explores theories and critiques of sound in culture and analyzes sound in relation to media images in film, video, digital media, and music/image practices such as Vjaying. Voice, noise, and music are addressed (but not scores). Students are billed for a course fee. Prerequisite(s): courses 20A and 120. Enrollment restricted to film and digital media majors and minors during priority enrollment; may be opened if space allows. (General Education Code(s): A.) *The Staff*

185E. Chicana/o Cinema, Video. *

Examines emergence of Chicana/o cinema and video from a place of social displacement, resistance, and affirmation. Looks at Chicana/o representation and spectatorship as it pertains to ethnicity, class, gender, and the beginning of a new Chicana/o film aesthetic. Students are billed for a course fee. Prerequisite(s): course 20A. Enrollment limited to 60. (General Education Code(s): E.) *The Staff*

185R. The Film Remake. *

History and theory of the remake through case studies across cultural, gender, and genre boundaries. Examines changing cultural, social, stylistic, and technical values and explores notions of originality, repetition, homage, allusion, quotation, and intertextuality from Feuillade and Hitchcock to Raimi and Johnny To. Students are billed a materials fee. Prerequisite(s): courses 20A and 120. Enrollment restricted to film and digital media majors and minors during priority enrollment; may be opened if space allows. *The Staff*

185S. Advanced Topics in Film Studies. F

Study of a selected aspect of film history, theory, or criticism. Includes weekly screenings and historical/theoreti-

cal readings. Usually offered in alternate academic years with rotating topics. Students are billed a materials fee. Prerequisite(s): courses 20A and 120. Enrollment restricted to film and digital media majors and minors. May be repeated for credit. *Y. Wang*

185X. EyeCandy Seminar. W

Seminar and workshop on writing, producing, and publishing a journal. Students engage in assignments and exercises directly and indirectly related to the production of a web launch as well as a print copy of *EyeCandy*. Permission of instructor required based upon student's participation in *EyeCandy* in fall and winter quarters. Preference given to film and digital media majors and minors; others may apply based on qualifications and as space allows. Students are billed a materials fee. May be repeated for credit. *J. Fankushen*

187. Advanced Topics in Television Studies. W

Study of a selected aspect of television history, television criticism, or national television. Includes weekly screenings and historical/theoretical readings. Usually offered in alternate academic years, with rotating topics. Students are billed a course fee. Prerequisite(s): course 20B. Enrollment restricted to junior and senior film and digital media majors and minors. May be repeated for credit. *A. Hastie*

189. Advanced Topics in Digital and Electronic Media Studies. S

Study of a selected aspect of digital and/or electronic media history and criticism. Topics can include virtual environments, electronic networks, video installations, computer games, and hyper-media. Usually offered in alternate academic years. Students are billed a course fee. Prerequisite(s): course 20C. Enrollment restricted to junior and senior film and digital media majors and minors during priority enrollment; may be opened if space allows. May be repeated for credit. *S. Scott*

190. Advanced Critical Studies Seminar. *

Intensive research and writing on a changing topic chosen to demonstrate critical mastery in a specific area of film and/or digital media studies. Prerequisite(s): course 120. Enrollment restricted to senior film and digital media majors accepted into the critical studies concentration. Enrollment limited to 15. *A. Hastie*

191. Critical Studies Thesis Preparation Seminar. *

Intensive seminar prepares students for writing a critical studies thesis. Designed to be taken prior to enrolling in course 195, seminar guides students through the process of choosing a thesis topic, preparing a bibliography, and drafting a detailed outline. Prerequisite(s): course 190. Enrollment restricted to senior film and digital media majors accepted into the critical studies concentration. Enrollment limited to 15. *S. Stamp*

192. Directed Student Teaching. F,W,S

Teaching a lower-division course under faculty supervision (see course 42). Proposal supported by a faculty sponsor and department. *The Staff*

194A. Film Theory Seminar. W,S

Advanced senior seminar examining classical and contemporary film theory and those theoretical paradigms and methods that have illuminated the medium: formalism, realism, structuralism, semiology, psychoanalysis, Marxism, feminism, and phenomenology. Primary texts are read. Students are billed a course fee. Prerequisite(s): course 120. Enrollment restricted to senior film and digital media majors. Enrollment limited to 20. *S. Scott, A. Hastie*

194B. Electronic Media Theory Seminar. F

Study of the major theoretical approaches to electronic media and their critical application to texts from televi-

sion, independent video art and documentary, and electronic networks. Readings include a range of theoretical approaches selected from semiotic, ideological, feminist, cultural studies, reception theory, postmodernist, and other critical traditions. Students are billed a course fee. Prerequisite(s): courses 20B and 120. Enrollment restricted to senior film and digital media majors. Enrollment limited to 20. *L. Kim*

194C. New Media Theory Seminar. *

Study of theories of emerging genres of electronic culture, with emphasis on the discourse about computer-assisted and computer-generated forms of art and mass culture such as digital imagery, virtual environments, telematics, hyper- and multimedia, and electronic networks. Students are billed a course fee. Prerequisite(s): courses 20C and 120. Enrollment restricted to senior film and digital media majors. Enrollment limited to 20. *The Staff*

194D. Film History Seminar. *

In-depth study of film history investigating developments in cinematic style, technological innovation, and industrial practice against the broad canvas of cultural history. Students will acquire the basic tools necessary to conduct informed film historical research. Students are billed a course fee. Prerequisite(s): course 120 and either 130 or 134A or 134B. Enrollment restricted to senior film and digital media majors. Enrollment limited to 20. *S. Stamp*

194E. International Cinemas. S

In-depth study of the history and theory of international cinemas with changing topics such as globalism and resistance, postcolonial theory, international productions and querying race, the "national," and cinema. Students are billed a course fee. Prerequisite(s): course 120 and either 132A, 132B, or 132C. Enrollment restricted to senior film and digital media majors. Enrollment limited to 16. *P. Limbrick*

194F. Film and the Other Arts. *

Examines the use of artistic media within films and of films that thematically are about other media. What do other art forms allow for—in terms of the story, the film's meaning, the gaze, and the spectator? Students are billed a course fee. (Formerly *Film and the Other Arts: Music and Dance*.) Prerequisite(s): course 120. Enrollment restricted to senior film and digital media majors. Enrollment limited to 16. *L. Kim*

194G. New(s) Media. *

Addresses the role of new media technologies in the production, distribution, and reception of the news, especially international news. Examines software and network technologies as amplifying, filtering, extending, and countering the forces of media. Students are billed a course fee. Prerequisite(s): courses 20C and 120. Enrollment restricted to senior film and digital media majors. Enrollment limited to 16. *W. Sack*

194S. Special Topics Seminar. W

Intensive research and writing on a changing topic chosen to demonstrate critical mastery in a specific area of film and digital media studies, for example, film adaptations and their literary sources, documentary/reality shows, or networked new media texts. Students are billed a materials fee. Prerequisite(s): course 120. Enrollment restricted to senior film and digital media majors. Enrollment limited to 20. May be repeated for credit. *G. Youmans*

195. Senior Thesis/Project. F,W,S

An individually supervised course, with emphasis on independent research, to culminate in a senior thesis/project/production. Proposals should be submitted to adviser one quarter in advance. Petition required, approved by instructor and department; thesis petitions available in the department office. *The Staff*

196A. Senior Project in Narrative Production. W,S

Students accomplish a range of production work focused on narrative production including script development, casting, and rehearsing to shooting and post-production work. Students are billed a materials fee. Admission by application during the preceding quarter. Students may apply a maximum of two times. See the enrollment conditions section in the quarterly *Schedule of Classes* for application dates and other application instructions. (Formerly *Senior Project in Film and Video Production*.) Enrollment limited to 20. *C. Archer, G. Vazquez*

196B. Senior Project in Screenwriting. W

Students write a full-length (75–100 page) screenplay in this seminar while studying structural concepts and character development in selected films. Scheduling, outlining, pitching ideas, and critique are all part of the workshop format of the class. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 150 or another screenwriting course. Interview only; petition required; special application should be submitted to adviser one quarter in advance; see department office for more information. Enrollment restricted to senior film and digital media majors. Enrollment limited to 16. (General Education Code(s): W.) *H. Dam*

196C. Senior Documentary Workshop. W

Students are responsible for producing short documentaries (up to 12 minutes). In class, students discuss each other's work as well as view and discuss other documentary films. Admission by application during the preceding quarter. Enrollment restricted to senior film and digital media majors. Students are billed a materials fee. Enrollment limited to 20. *E. Hollander*

197. Senior Digital Media Workshop. *

Independent projects using the computer as a medium as well as a tool. Students will design and implement projects in digital imaging, information, and communications environments. Students' projects may include designing virtual communities, building collaborative networks, and/or interactive, multimedia web works. Students are billed a course fee. Admission by application during winter quarter. See department office for more information. Enrollment limited to 20. *W. Sack*

198. Independent Field Study. F,W,S

Provides for department-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Students engaging in field study must complete application procedures for such study by the fifth week of the previous quarter. Field study may not be used to satisfy major requirements. Petition required, approved by instructor and department; petitions available in the department office. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Provides for department-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Students engaging in field study must complete application procedures for such study by the fifth week of the previous quarter. Field study may not be used to satisfy major requirements. Petition required, approved by instructor and department; petitions available in the department office. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual study in areas approved by sponsoring instructors. Tutorial may not be used to satisfy major requirements. Petition required, approved by instructor and department; petitions available in the department office.

May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual study in areas approved by sponsoring instructors. Tutorial may not be used to satisfy major requirements. Petition required, approved by instructor and department; petitions available in the department office. May be repeated for credit. *The Staff*

Graduate Courses**200A. Introduction to Graduate Study.** F

Introduces graduate study in the critical practice of film and digital media. Conducted as a pro-seminar, with faculty presentations and discussion. Enrollment restricted to graduate students. Enrollment limited to 15. *P. Limbrick*

200B. Theory and Praxis of Digital Media 1. W

Investigates methods for rhetorical production of written and visual/aural texts. Emphasizes questions about delineation between theory and practice, and provides groundwork in theories relevant to key areas in film, television, and digital media studies. Enrollment restricted to graduate students. Enrollment limited to 15. *L. Kim*

200C. Theory and Praxis of Film and Digital Media 2. S

Investigates methods for rhetorical production of written and visual/aural texts. Emphasizes interwoven practices of the artist/researcher/teacher, formal and expressive possibilities of "hybridized" research, and cultural issues raised by integrated methods of inquiry. Students are billed for a materials fee. Enrollment restricted to graduate students. Enrollment limited to 15. *I. Gustafson*

222. Critical Methodologies in Film and Television. W

Core course introduces graduate students to critical methodologies in media studies and offers sustained examination of theoretical approaches to media studies. Methodologies may include (but not limited to) contemporary theory (semiotic, psychoanalytic, ideological), cultural studies, intertextuality, feminist film, and television theory. Enrollment restricted to graduate students. Enrollment limited to 14. *A. Hastie*

223. The Film/Video Essay. *

Focuses on "essayistic" approaches to scholarship and production, emphasizing relationships between theory and praxis that this mode of production requires. Enrollment restricted to graduate students. Enrollment limited to 15. *I. Gustafson*

224. Mediating Difference. *

Considers theoretical and strategic, situated "difference" in the era of (semi-)colonialism, post-colonialism, and globalism, examining theoretical writing alongside media works on the topic. Enrollment restricted to graduate students. Enrollment limited to 15. *Y. Wang*

225. Software Studies. *

Today, our lives are woven into vast software systems that facilitate our family communications, personal relations, jobs, and cultural, economic, political, and social institutions. Course examines these conditions of life and thought using insights from the arts and humanities. Enrollment restricted to graduate students. *W. Sack*

226. Queer Theory and Global Film and Media. *

Examines queer subjectivities, practices, and theories in relation to globalization, transnationalism, and postcoloniality, focusing on film/media produced outside the United States. The course addresses representation and also uses queer theoretical work to engage wider contexts of film/media production, distribution, and exhibition. Enrollment restricted to graduate students. *P. Limbrick*

283. New Media Art and Digital Culture. *

A study of new media art in the context of digital culture. Electronic, digital and online technology art are set in critical relation to discourse on history, aesthetics, hypermedia, the interface, hacks, embodiment, robotics, artificial life and other topics. Students are billed a course fee. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Morse*

284. Film, Culture, and Modernity. S

Traces the rise of motion picture culture from the late 19th century through the end of the 1920s, looking at film's emerging visual and narrative grammar, its changing cultural status, and its engagement with shifting registers of class, ethnicity, gender, and sexuality. Enrollment restricted to graduate students. Enrollment limited to 15. *S. Stamp*

297. Independent Study. F,W,S

Either study related to a course being taken or a totally independent study. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. May be repeated for credit. *The Staff*

French

Language Program
218 Cowell College
(831) 459-2054
<http://language.uwc.edu>

Faculty and Professional Interests**Professor**

CARLA FRECCERO (Literature)
Renaissance studies, French and Italian language and literature, early modern studies, postcolonial theories and literature, contemporary feminist theories and politics, queer theory, U.S. popular culture

PASCALE GAITET (Literature)
Nineteenth- and 20th-century French literature, sociolinguistics, political history, Celine, Genet

SHARON KINOSHITA (Literature)
Intercultural relations in 12th- and 13th-century literature, Mediterranean studies, globalism, postcolonial theory, world literature and cultural studies

RICHARD TERDIMAN (Literature)
Nineteenth- and 20th-century French and European literature and culture, literary and cultural theory, contemporary critical theory, cultural globalization

Lecturer

ANGELA ELSEY
Francophonie, 19th-century French history and civilization, French and Francophone cinema

GRETA HUTCHISON
Foreign language pedagogy, second language acquisition, medieval French literature, and 19th-century literature and art

NORA MEGHARBI
Second and foreign language acquisition, applied linguistics, pedagogical grammar, technology and multimedia, sociolinguistics, TA training, course supervision, business French, scientific French, francophone literature, translation

Program Description

Students interested in acquiring proficiency in French can enroll in language courses from beginning to

advanced levels. In addition, students may select from among the following programs: a major in language studies, a major in literature with an emphasis in French literature, or a major in global economics.

Lower-division courses 1-6 are taught entirely in French and prepare students for advanced study either on campus or abroad. They are designed to develop proficiency in aural comprehension, speaking, reading, and writing skills, and to introduce student to French and Francophone cultures.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

The UC Education Abroad Program (EAP) offers both semester and one-year programs in many regions of France, including Bordeaux, Lyon, Grenoble, Toulouse, and Paris. With the approval of an adviser, some French courses taken abroad may be applied to major requirements. For more information on the program, see UC Education Abroad Program.

Lower-Division Courses

1. Instruction in the French Language. F,W,S

Introduction to French language and culture with practice in all four language skills: listening, speaking, reading, and writing. Intended for students with no previous study of French. *The Staff*

2. Instruction in the French Language. F,W,S

Further development of cultural competence and basic French language skills, both written and spoken. Students learn past tenses in this course. Prerequisite(s): course 1 or placement by interview. *The Staff*

3. Instruction in the French Language. F,W,S

Final quarter of first-year sequence. Students complete study of French language basics, including the future tense and the conditional and the subjunctive moods, while continuing to learn about French and Francophone cultures. Prerequisite(s): course 2 or placement by interview. *The Staff*

4. Intermediate French. F,W,S

First course in intermediate sequence. Students review and expand upon their previous study of the language through short literary readings, vocabulary building, grammar study, composition, and discussions. Prerequisite(s): course 3 or placement by interview. (General Education Code(s): CC, IH.) *The Staff*

5. Intermediate French. F,W,S

Further development of intermediate-level oral and written skills through study of vocabulary and structures. Students also read and discuss a French or Francophone play. Prerequisite(s): course 4 or placement by interview. (General Education Code(s): CC, IH.) *The Staff*

6. Intermediate French. F,S

Final course of intermediate sequence includes grammar study, vocabulary building, extensive writing, and discussion. Reading of a French or Francophone novel is an integral part of course. Prerequisite(s): course 5 or placement by interview. (General Education Code(s): CC, IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

111. Stylistics. W

Intensive work in French composition with the aim of attaining grammatical correctness and excellence of expression while developing literary appreciation. May be repeated for credit with consent of instructor. Prerequisite(s): course 6. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. *The Staff*

125A. French Civilization: 19th Century. S

Survey of the important historical events, social changes, and artistic movements contributing to the development of French culture during the 19th century. Prerequisite(s): course 6. *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Geology and Geophysics

See Earth and Planetary Sciences, page 189.

German

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Associate Professor

ZSUZSANNA ABRAMS
Applied linguistics, language pedagogy, second language acquisition, intercultural communication, discourse analysis, computer-mediated communication

LOISA NYGAARD (Literature)
Eighteenth- and early 19th-century German literature; romanticism; aesthetics and politics of landscape; military theory

Assistant Professor

A. HUNTER BIVENS (Literature)
Twentieth- and 21st-century German literature and film, Marxism and critical theory, psychoanalysis, lyric poetry, literary realism, the novel

Lecturer

WALTER CAMPBELL
Language teaching, 18th- and 19th-century German literature, history of German

Program Description

Students interested in acquiring proficiency in German can enroll in language courses from beginning to advanced levels. In addition, students may select from among the following programs: a major or minor in language studies, a major in German studies, a major in literature with an emphasis in German literature, or a major in global economics.

The sequence of lower-division courses 1-6 is aimed at enabling students to gain proficiency in aural comprehension, speaking, reading, and writing. Another sequence of lower-division courses, equivalent to levels 1, 2, and 3, is courses 1A and 1B, offering accelerated German language instruction. Courses 1A and 1B are taught sequentially, winter and spring quarters. Instruction takes place almost exclusively in German.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

The University of California offers Education Abroad Program (EAP) opportunities in Berlin, Potsdam, and Göttingen. Students may spend fall or spring semesters or a full academic year in Berlin (Berlin European Studies (BEST) or regular course of study), a spring semester in Potsdam (beginning German language program or intermediate German language and culture program), or a semester or year in Göttingen (graduate study). Language requirements for admission to these programs range from little or no German required (BEST program in Berlin and beginning German program in Potsdam) to one year of college-level German required (intermediate German language and culture program in Potsdam) to two years of college-level German required (regular course of study in Berlin). The Potsdam program courses may also be used to fulfill the language requirement for the year-long program in Berlin. Selected students may continue directly from the spring semester in Potsdam to the one-year program in Berlin. Academic and professional internship opportunities are also available to all EAP students in Germany.

Students may apply to any of these programs at any point in their student career. For the year-long programs, students generally apply in their sophomore year for a junior year abroad. As an exception, some students apply in their junior year for a senior year abroad; such students must sometimes spend an additional quarter at UCSC in order to satisfy all requirements for their major. Courses taken abroad can, with approval of an adviser, be applied to major requirements.

For more information on these programs, see UC Education Abroad Program. For information on credit applied to a major, contact the appropriate department.

Lower-Division Courses

1. Instruction in the German Language. F

Teaches beginning-level competence in speaking, reading, writing, and listening comprehension. Elementary sequence (1-2-3) starts in fall quarter only. (An accelerated sequence, course 1A-1B, begins winter quarter.) Not all levels are available each quarter. Check the quarterly *Schedule of Classes* for exact quarter(s) of offering. *The Staff*

1A. Intensive Elementary German. W

Accelerated instruction in elementary German language. Taken in conjunction with German 1B, the two courses are equivalent to levels 1-2-3. Accelerated pace allows a more rapid acquisition of reading, writing, listening, and speaking skills. *The Staff*

1B. Intensive Elementary German. S

Sequential to course 1A, completes the equivalent instruction offered through German 1-2-3. Prerequisite(s): course 1A or 2, or placement by interview. For students completing course 2, course 3 is preferable. *The Staff*

2. Instruction in the German Language. W

Teaches beginning-level competence in speaking, reading, writing, and listening comprehension. Not all levels are available each quarter. Check the quarterly *Schedule of Classes* for exact quarter(s) of offering. Prerequisite(s): course 1 or 1A; or placement by examination. Students interested in a course who have not taken the prerequisites should meet with the instructor prior to the first class meeting. *The Staff*

3. Instruction in the German Language. S

Teaches beginning-level competence in speaking, reading, writing, and listening comprehension. Not all levels are available each quarter. Check the quarterly *Schedule of Classes* for exact quarter(s) of offering. Prerequisite(s): course 2; or placement by examination. Students interested in a course who have not taken the prerequisites should meet with the instructor prior to the first class meeting. *The Staff*

4. Intermediate Studies in German Language. F

Intermediate composition and conversation based on the reading of selected prose and related cultural material. Speaking, reading, writing, and listening comprehension skills are developed by extensive use of media materials. Conducted entirely in German. Not all levels are available each quarter. Check the quarterly *Schedule of Classes* for the exact quarter(s) of offering. Prerequisite(s): course 1B or 3; or placement by examination. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. (General Education Code(s): CC, IH.) *The Staff*

5. Intermediate Studies in German Language. W

Intermediate composition and conversation based on the reading of selected prose and related cultural material. Speaking, reading, writing, and listening comprehension skills are developed by extensive use of media materials. Conducted entirely in German. Not all levels are available each quarter. Check the quarterly *Schedule of Classes* for the exact quarter(s) of offering. Prerequisite(s): course 4; or placement by examination. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. (General Education Code(s): CC, IH.) *The Staff*

6. Intermediate Studies in German Language. S

Intermediate composition and conversation based on the reading of selected prose and related cultural material. Speaking, reading, writing, and listening comprehension skills are developed by extensive use of media materials. Conducted entirely in German. Not all levels are available each quarter. Check the quarterly *Schedule of Classes* for the exact quarter(s) of offering. Prerequisite(s): course 5; or placement by examination. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. (General Education Code(s): CC, IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor.

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses**194. Group Tutorial. F,W,S**

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

German Studies

Department of History
201 Humanities
(831) 459-2982
<http://germanstudies.usc.edu/>

Faculty and Professional Interests**Program Faculty**

ZSUZANNA ABRAMS, Associate Professor of Languages
Applied linguistics, language pedagogy, second language acquisition, intercultural communication, discourse analysis, computer-mediated communication

AMY BEAL, Associate Professor, Music
American music, 20th-century music, experimental and improvisatory performance practices, postwar and Cold War culture, German new music festivals and radio stations, piano performance, contemporary music ensemble

A. HUNTER BIVENS, Assistant Professor in Literature
Twentieth- and 21st-century German literature and film, Marxism and critical theory, psychoanalysis, lyric poetry, literary realism, the novel

WALTER CAMPBELL, Lecturer in German Language
Language teaching, 18th- and 19th-century German literature, history of German

MARK CIOC, Professor of History
German history, modern European history, environmental history

JOCELYN HOY, Lecturer, Philosophy
Feminist philosophy, 19th- and 20th-century continental philosophy

DONNA HUNTER, Associate Professor of History of Art and Visual Culture
European painting (especially French) from 1600 to the 1960s; German art and visual culture between the two world wars; art as social practice, portraiture

VIRGINIA JANSEN, Emerita, History of Art and Visual Culture

MARGARET MORSE, Professor, Film and Digital Media

Digital and electronic media theory and criticism, media art, media history, technology and culture, film history and theory, German cinema, documentary, science fiction, and silent comedy

LOISA NYGAARD, Associate Professor of Literature
Eighteenth- and early 19th-century German literature; romanticism; aesthetics and politics of landscape; military theory

Program Faculty Advisers

MARK CIOC, Professor of History

LOISA NYGAARD, Associate Professor of German Literature

A. HUNTER BIVENS, Assistant Professor of German Literature

Program Description

German studies is a transnational and transdisciplinary major that deals with the various German-speaking regions of central Europe. Whether one thinks of philosophy, music, art, education, religion, or political and social history, German culture has exercised a profound and often decisive influence on Europe. Some of the most important ideological debates in Western culture have arisen in the German-speaking area, and changes in German culture and society have sometimes had devastating effects on world history. Events and political developments of recent years—such as the unification of East and West Germany and the emergence of the German-speaking region of Europe as a major player in world affairs—have had important impacts.

A German studies major provides students with an intellectually diverse program—covering history, history of art and visual culture, literature, and philosophy—in which students and faculty come together in exciting and demanding pursuits.

The German studies major is administered by the History Department. For additional information on curriculum and advising, go to <http://history.usc.edu>.

Major Requirements

German language level 5 or the equivalent is a prerequisite for the German studies major and all upper-division courses taught in German. Students are encouraged to take German 1 through German 5 as early as possible in their academic program. All students are required to take a total of 11 courses, including a minimum of five courses in German literature and German history. No more than two of the 11 required courses may be lower-division courses and no more than three may come from the Germany in a European or World Context list. A minimum of five of the 11 required courses must be taught in German or principally through German-language texts. Regular consultation with a program faculty adviser is required.

Comprehensive requirement. All students must complete an approved senior seminar in German literature or German history. The senior seminar is one of 11 courses required for the major. Consult the annual German studies course list for available seminar courses, published online at <http://germanstudies.usc.edu>.

It is strongly recommended that students spend time in residence in Germany through the University of California Education Abroad Program (EAP) to further enrich their program of study and ensure a command of the language. Students are allowed to transfer up to five courses taken at German universities toward the requirements for the major. However, the five core courses in

German literature and history must be taken at UCSC.

Disciplinary Communication (DC) Requirement.

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC Requirement in German Studies is fulfilled by completing History 196G or History 196P. Please refer to updated information at <http://reg.usc.edu/catalog/html/disciplinarycommunicationchart.html>.

Honors in the German Studies major. All students who announce candidacy during the academic year are reviewed for honors or highest honors in the major. The German studies faculty advisers determine honors based upon narrative evaluations in courses applied towards the German studies major. Performance in courses taken elsewhere and being transferred toward the major will be considered when applicable. The minimum standard applied is excellence in most courses for honors, and excellence in all courses for highest honors. Summer graduates are reviewed for honors in fall quarter.

Global Economics

Students wishing to pursue a course of study in global economics should consult the global economics major under Economics, page 200.

Greek

Language Program
218 Cowell College
(831) 459-2054
<http://language.usc.edu>

Faculty and Professional Interests

Professor

KAREN BASSI (Literature)

Greek and Latin literatures, Greek drama, Hellenistic poetics, feminist interpretation, literary and cultural theory, pre- and early modern studies, historiography

MARY-KAY GAMEL (Literature)

Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and Roman texts and artifacts, film, feminist approaches to literature and performance

CHARLES W. HEDRICK JR. (History)

Greek and Roman history, epigraphy, historiography, political theory

JOHN P. LYNCH (Literature), Emeritus

DANIEL SELDEN (Literature)

Afroasiatic languages and literatures, Greek and Latin, Hellenistic culture, the classical tradition, history of criticism, literary theory

Lecturer

GILDAS HAMEL (History)

History of Judaism and Christianity; Hebrew and Greek Bible; classical languages

JENNIFER LYNN

Later Roman Republic and Principate; Homeric epic; Hellenistic and Augustan poetry; Cicero

Program Description

The Language Program offers instruction in elementary ancient Greek. It consists of a two-course sequence, Greek 1 and Greek 2, that begins in the fall quarter only. Students interested in Greek literature should see the course listings under Literature. Those interested in classical studies should see program description for classical studies.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Lower-Division Courses

1. Elementary Ancient Greek. F

Instruction in the grammar of Attic Greek, together with readings from ancient authors, designed to prepare for the study of classical literature. The sequence begins in the fall quarter only. *The Staff*

2. Elementary Ancient Greek. W

Instruction in the grammar of Attic Greek, together with readings from ancient authors, designed to prepare for the study of classical literature. Prerequisite(s): course 1, or permission of instructor *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Greek Literature

Students wishing to pursue a course of study in Greek literature should consult the concentration under national/transnational literatures under Literature, page 361.

Hebrew

Language Program
218 Cowell College
(831) 459-2054
<http://language.usc.edu>

Faculty and Professional Interests

Lecturer

TAMMI ROSSMAN-BENJAMIN

Hebrew language and culture, biblical Hebrew syntax and semantics, the Hebrew Bible, Jewish thought, psycholinguistics, second-language acquisition and bilingualism

Program Description

Students interested in acquiring proficiency in Hebrew can enroll in language courses from beginning to intermediate levels. In addition, credits from these courses may be counted toward the minor in Jewish studies. Lower-division courses are aimed at enabling students to gain proficiency in aural comprehension, speaking,

reading, and writing. Attention is also given to developing an understanding of the culture, history, and religion that have been expressed through the Hebrew language from antiquity until today. Some instruction takes place in Hebrew from the beginning level.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Lower-Division Courses

1. Instruction in the Hebrew Language. F

Speaking, listening comprehension, reading, and writing fundamentals. The use of Modern Hebrew is encouraged through classroom practice supplemented by language laboratory work. Elementary sequence (1-2-3) begins in fall quarter only. *The Staff*

2. Instruction in the Hebrew Language. W

Speaking, listening comprehension, reading, and writing fundamentals. The use of Modern Hebrew is encouraged through classroom practice supplemented by language laboratory work. Prerequisite(s): course 1. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. *The Staff*

3. Instruction in the Hebrew Language. S

Speaking, listening comprehension, reading, and writing fundamentals. The use of Modern Hebrew is encouraged through classroom practice supplemented by language laboratory work. Prerequisite(s): course 2. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. *The Staff*

4. Intermediate Hebrew. F

Development of the students' familiarity with the spoken and written language through grammar review, discussions, and vocabulary building. Varied readings on literary and cultural topics related to modern Israel. Prerequisite(s): course 3. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. (General Education Code(s): IH.) *The Staff*

5. Intermediate Hebrew. W

Development of the students' familiarity with the spoken and written language through grammar review, discussions, and vocabulary building. Varied readings on literary and cultural topics related to modern Israel. Prerequisite(s): course 4. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. (General Education Code(s): IH.) *The Staff*

10. Introductory Yiddish.

Introduces the Yiddish language. Students learn to speak and to ask others in Yiddish about themselves and about common situations (the classroom, work, family), and learn to read and write simple Yiddish texts. *The Staff*

80. Introduction to Biblical Hebrew. W

Introduces students to the basic lexicon and grammatical structures of biblical Hebrew, with an emphasis on the development of a set of useful translation strategies. Throughout the course, students will be applying their emergent skills to translating a variety of biblical texts. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***106. Israel's Struggle for Identity as Seen Through Israeli Cinema. S**

Examines, through the medium of film, Israel's struggle for identity since its founding as a modern state. Taught in English with a weekly discussion section in Hebrew. Readings in English and Hebrew; writing, film analysis, cultural commentary, and other assignments in Hebrew. Students may not receive credit for this course and Languages 80F. Prerequisite(s): course 5 (or equivalent). May be repeated for credit. (General Education Code(s): ER, E.) *T. Rossman-Benjamin*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. Enrollment limited to 10. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

History

201 Humanities
(831) 459-2982
<http://history.ucsc.edu>

*Faculty and Professional Interests***Professor**

JONATHAN F. BEECHER, Emeritus

ROBERT F. BERKHOFER JR., Emeritus

EDMUND BURKE III, Emeritus

MARK CIOC

German history, modern European history, environmental history

NATHANIEL DEUTSCH

Hebrew Bible; rabbinic literature; Jewish mysticism; Hasidism; Eastern European Jewish life; ethnography

DANA FRANK

Late 19th- and 20th-century U.S. social history; women's, labor, and working-class history; race and ethnicity; post-WWII Central America; U.S. history in transnational perspective

LISBETH HAAS

U.S.-Mexico borderlands, Chicano and Native American history; visual culture; the U.S. West, California, and the colonial Americas; historical memory, theory, and historical methodology

CHARLES W. HEDRICK JR.

Greek and Roman history

GAIL B. HERSHATTER

Modern Chinese social and cultural history; labor history; gender history; history of sexuality; feminist theory; history, memory, and nostalgia

EMILY HONIG

Gender, sexuality, and ethnicity in modern Chinese history; comparative labor history; Chicana history, nationalism, and sexuality in the Third World; oral history

PETER KENEZ, Emeritus

BRUCE LEVINE, Emeritus

RICHARD MATHER, Emeritus

GARY B. MILES, Emeritus

BUCHANAN SHARP, Emeritus

DAVID G. SWEET, Emeritus

MARK TRAUOGOTT

Social and economic history, 19th-century France, French revolutions, European working class, historical methods, workers' autobiographies

MARILYN J. WESTERKAMP

Colonial and revolutionary America; early modern cultural and religious history; U.S. religious history; gender studies

Associate Professor

DAVID HENRY ANTHONY III

African and African American history, art, music, literature, and cinema; eastern and southern Africa; African languages; Indian Ocean world; African and African American linkages; Islamic civilization; African diaspora studies; world history

DILIP K. BASU

Modern South Asia, modern China, world history: colonial and post-colonial; film and visual culture

PEDRO G. CASTILLO

Chicanola history and culture; American social and urban history; race, class, and gender in California history, immigration history

BRIAN A. CATLOS

Pre-modern Mediterranean; medieval Iberia and Europe and the Islamic world; Christian-Muslim-Jewish relations, ethnicity, minorities, social, and economic history; world history

ALAN S. CHRISTY

Early modern and modern Japan; history of social sciences, colonialism, nationalism

MARIA ELENA DIAZ

Atlantic world, Colonial Latin America and the Caribbean, Cuba; social and cultural, global and local histories; colonialism, slavery and freedom, race/ethnicity, gender and class; legal, political, popular, and religious culture

MATTHEW D. O'HARA

Colonial and modern Latin America; Mexico; religion, spirituality, and ritual; race, ethnicity, and identity; political culture

CYNTHIA POLECRITTI

Medieval, Renaissance, and Modern Italy, Mediterranean urban and cultural history, ritual and popular devotion

ALICE YANG

Historical memory, Asian American history, gender history, race and ethnicity, 20th-century U.S., oral history

Assistant Professor

NORIKO ASO

Japanese social and cultural history, women's history, race and ethnicity, colonialism, nationalism, Korean history

MINGHUI HU

Early Modern China (1600-1900)

CATHERINE A. JONES

U.S. civil war and Reconstruction; slavery and emancipation; the American South; history of children; history of education; women and gender

GREGORY O'MALLEY

Colonial British America and the Caribbean; the Atlantic World; slavery and the slave trade; race, ethnicity, and identity; revolutionary America; colonization and intercultural contact

Lecturer

GILDAS HAMEL

History of Israel, Hellenistic and Roman Palestine, and Christianity; Hebrew and Greek bible; classical languages; Celtic cultures

MATTHEW LASAR

U.S. and international telecommunications; political, social, and economic history

JENNIFER K. LYNN

Later Roman Republic and Principate; Homeric epic; Hellenistic and Augustan poetry; Cicero

BRUCE THOMPSON

European intellectual and cultural history, French history, Jewish intellectual and cultural history, British and Irish history, history of cinema, history of espionage, environmental history

**Professor**

BETTINA APTHEKER (Feminist Studies)

Women's history, feminist oral history and memoir; feminist pedagogy; African-American women's history; queer studies; feminist Jewish studies; feminist critical race studies

RAOUL BIRNBAUM (History of Art and Visual Culture)

Buddhist studies, especially Chinese practices from medieval times to the present; religion and visual culture in China

CHRISTOPHER CONNERY (Literature)

World literature and cultural studies, globalism and geographical thought, the 1960s, Marxism, pre-modern and modern Chinese cultural studies, cultural revolution

JOHN DIZIKES, EMERITUS (American Studies)

BARBARA L. EPSTEIN (History of Consciousness)
Social movements and theories of social movements, 20th-century U.S. politics and culture, Marxism and related theories of social change

JOHN HAY (History of Art and Visual Culture)

Visual and conceptual representation in pre-modern China, especially landscape painting; Asian art history

VIRGINIA JANSEN, Emerita (History of Art and Visual Culture)

Medieval visual culture, urbanism, and secular building; Gothic architecture; campus planning and architecture

SHARON KINOSHITA (Literature)

Intercultural relations in 12th- and 13th-century literature, Mediterranean studies, globalism, postcolonial theory, world literature and cultural studies

PAUL M. LUBECK (Sociology)

Political sociology; political economy of development, globalization, labor and work; logics of methodology; religion and social movements; Islamic society and identities; information and networks

JOHN P. LYNCH (Literature), Emeritus

DANIEL SELDEN (Literature)

Afroasiatic languages and literatures, Greek and Latin, Hellenistic culture, the classical tradition, history of criticism, literary theory

JUDY YUNG, Emerita (American Studies)

Associate Professor

GABRIELA ARREDONDO (Latin American and Latino Studies)

U.S. social and cultural history; Chicano/a history; critical race and ethnicity theories; immigration history; Latin/a/os in the U.S.; Chicana feminisms; "borderlands" studies, modern Mexico history

DAVID T. BRUNDAGE (Community Studies)

American working-class and immigration history, history of U.S. social movements, Irish history and politics

BERNARD L. ELBAUM (Economics)

Economic history

PAUL ORTIZ (Community Studies)

African American history, U.S. social and political history, social documentary, oral history, subaltern studies and theories of resistance, U.S. South, Latino studies, social movements, working-class history; history of farm labor, African diaspora

Program Description

History is the attempt to understand the meanings of the human life experience, not generally and abstractly, but in terms of specific individuals, events, and circumstances. Consequently, of all academic pursuits, it is the one best equipped to help us locate phenomena in their specific contexts, whether we are concerned with political events, social changes, the production of art, the development of technologies, scientific discoveries, or life stories. In this sense, the study of history can also be an invaluable complement to any other major.

The history program at UCSC is designed to bring about an understanding of the ideas, experiences, and events that have shaped this country and the world at large. The program's main emphases are in social and cultural history, with additional strengths in intellectual and political history.

A degree in history opens up a wide range of career possibilities. Some careers fall within the historical profession, including teaching at the university, college, and high school levels and working in various areas of public and applied history, such as historic preservation, archives, libraries, and museums. For careers in fields as diverse as law, business, government, foreign service, publishing, journalism, and communications, a degree in history lays the foundation in research, analytic, and writing skills upon which later professional training can be built.

Requirements for the Major

A minimum of 12 courses is required for the major. No more than four of the minimum 12 courses may be lower division. The history major does not require an examination for entrance and does not limit the number of students accepted into the program. It is strongly advised that students complete at least one introductory history course before declaring the major.

At UCSC, the history curriculum offers three broad, geographically defined regions of concentration:

- the Americas and Africa
- Europe
- Asia and the Islamic World

Course requirements. Each history major selects one of the three regions of concentration listed above. History majors are required to take at least one lower-division survey course within their chosen region of concentration.

- Americas/Africa: History 10A, 10B, 11A, 11B, or 30
- Asia/Islamic World: History 40A, 40B, 41, or 43
- Europe: History 65A, 65B, 70A, 70B, or 70C

Transfer coursework may or may not apply toward the survey course requirement; consult the History Department.

In consultation with the history undergraduate program coordinator and a faculty adviser, the student plans a program of study that will also fulfill the following distribution of courses:

- five courses in the chosen region of concentration, one of which must be the lower-division survey course; three of the remaining courses must be upper-division;
- two courses from each of the remaining two regions of concentration;
- two upper-division history electives based in any of the regions of concentration;
- one comprehensive exit requirement (see below) in the student's chosen region of concentration.

Students often choose to satisfy the history major course requirements listed above according to some general theme of special interest to them. Faculty and staff advisers will assist the students who choose this option with their course selection.

In addition to all coursework, history majors must complete a senior check and exit survey in the first quarter of their senior year. For details, see the department web site, <http://history.ucsc.edu>.

Distribution requirements. Among the 12 courses required for the major, at least three must meet chronological distribution requirements. One must be set before 600 A.D., and two must be set in periods prior to the year 1800 A.D.

Interdisciplinary coursework. The History Department encourages its majors to take upper-division courses in disciplines related to history, including sociology, literature, community studies, American studies, politics, Latin American and Latino studies, and others. Students who wish to substitute one or two such appropriate upper-division courses for history electives must obtain approval from the History Department. These courses are subject to the limitations described below under the "Transfer credits and substitutions" section.

Comprehensive requirement. A comprehensive exit requirement in the student's chosen region of concentration can be fulfilled by completing an exit seminar (one quarter: 190-series, 194-series, or 196-series) or a thesis (two quarters: courses 195A and 195B). Please consult the department web site for a more detailed description of these courses.

Disciplinary Communication (DC) requirement. Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. History students can fulfill the upper-division Disciplinary Communication (DC) Requirement by completing a comprehensive exit requirement in their chosen region of concentration. Students may complete an exit seminar (one quarter: 190 series, 194 series, or 196 series) or a thesis (two quarters: courses 195A and 195B). Please consult the department web site for a more detailed description of these courses and refer to updated

DC information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

Honors in the history major. All students who announce candidacy during the academic year are reviewed for honors or highest honors in the major. The History undergraduate education committee determines honors at the end of each quarter. Performance in history courses taken elsewhere and being transferred toward the major will be considered when applicable. The minimum standard applied is excellence in most history courses for honors, and excellence in all history courses for highest honors. Summer graduates are reviewed for honors in fall quarter.

Language recommendation. Proficiency in a foreign language is strongly recommended for all history students and is essential for those who plan to pursue graduate studies in history. Many doctor of philosophy (Ph.D.) programs in history require applicants to read one or two languages besides English. The University of California Education Abroad Program (EAP) is appropriate for history majors as a means to both enhance language skills and take history courses elsewhere.

UC Education Abroad Program. Subject to the limitations described below under "Transfer credits and substitutions," up to three courses in history completed through EAP may be applied toward major requirements. Consult the History Department web site, and speak with the undergraduate program coordinator for further details.

Transfer credits and substitutions. A minimum of five regularly scheduled history courses plus the comprehensive requirement must be taken from members of the UCSC history faculty. Subject to the limits indicated in parentheses, courses from the following categories may also be applied to the history major:

Transfer courses taken at another institution (limit of 3)

Education Abroad Program (limit of 3)

UCDC (limit of 2)

UC in Sacramento (limit of 2)

Related upper-division courses taken in another UCSC department (limit of 2)

Independent and field studies (limit of 2)

Requirements for the Minor

Students whose major area of interest is not history may nonetheless find that a minor in history makes an invaluable contribution to their studies. For the minor in history, eight history courses, four of which must be upper division, are required. There is no senior comprehensive requirement for the minor.

Graduate Program

The Ph.D. program in history at UCSC emphasizes an interdisciplinary and cross-cultural approach to historical studies. The History Department offers a rigorous program of instruction and independent work that trains students in the techniques of original historical research and equips them to teach university-level courses in history. The department only admits those highly motivated students who are most qualified to pursue advanced studies in history. The department also only admits those applicants who can best benefit from the specific strengths of our faculty.

Just as the work of most professional historians centers around research and teaching, training in these areas constitutes the two essential poles of the graduate program in history.

Research and Teaching

In preparing graduate students for research and teaching at the university level, the department offers training in four geographically and chronologically defined fields: U.S. history, European history since 1500, East Asian history since 1600, and world history since 1500. U.S., European, and East Asian history are defined as primary teaching fields; each graduate student is required to choose one. Students of U.S. history may incorporate Latin American history in their coursework, while students of European history might include the history of European colonialism and imperialism. Every year the faculty in each field offer introductory readings seminars and, when possible, classes on more specific topics (see below for information about course offerings). Each graduate student also prepares a second teaching field different from the primary field and can choose from among U.S., European, East Asian, or world history. Students may also petition the graduate committee to prepare a secondary teaching field in African or Latin American history.

Research Clusters

The History Department has created a series of thematic research clusters to coordinate the training of graduate students in historical research. Each research cluster is composed of History Department faculty and graduate students as well as faculty outside the department who share broad scholarly interests. The clusters serve as a way to coordinate the research of faculty and graduate students whose work encompasses different geographic regions and chronological periods. Although the nature and number of the research clusters may change over time, the department currently offers two basic groupings: 1) colonialism, nationalism, and race; and 2) the history of gender.

The faculty of each cluster provide at least one research seminar every other year in addition to readings courses. All the affiliated graduate students must take at least one research seminar during their first two years; they are encouraged to take more than one.

Faculty and graduate students also participate in interdisciplinary forums outside the department. These include programs sponsored by the Chicano/Latino Research Center, the Pre- and Early Modern Studies Group, the Center for Cultural Studies, and the UCSC Institute for Humanities Research. Advanced graduate students may also have the opportunity to work in programs sponsored by the University of California Humanities Research Institute at UC Irvine. Finally, multi-campus groups in which students and faculty are involved include the Bay Area Seminar in Early American Studies, the Bay Area Pre- and Early Modern Studies Group, and the French Studies Group at Stanford.

Courses

Until they pass the qualifying examination and are formally advanced to candidacy for the Ph.D. degree, students must be in residence at UCSC and are expected to complete a minimum of 12 credits each quarter to maintain normal academic progress. Completion of a minimum of 12 courses of 5 credits each (in addition to History 280A, 280B, and 280C) is required for advancement to candidacy. Courses taken are graduate seminars, independent study courses, and most upper-division undergraduate courses.

Students are required to take the following before advancing to candidacy:

- one research seminar during the first four quarters: History 204A, 204B, or 204C;
- second teaching field: two courses in American, European, East Asian or world history;
- outside courses: two quarters of graduate coursework outside the History Department;
- readings courses in the appropriate field: East Asia—History 230A, 230B, 230C (China) or History 242, 243, 244 (Japan); Europe—History 250A, 250B; U.S.—History 210A, 210B.

Graduate students in East Asian history specialize in either modern Chinese or modern Japanese history, but all students in the East Asian program will be prepared to teach both. The core curriculum for East Asian history consists of three China reading seminars (courses 230A, 230B, 230C) and three Japan reading seminars (courses 242, 243, 244) taught in sequence over three years, covering such topics as foundational historiographies, gender, social movements, and transnational circulation of people, commodities, and ideas. Over the course of the three years to the qualifying examination, China students will be expected to take all three China seminars and at least two of the three Japan seminars. Japan students will be expected to take all three Japan seminars and at least two of the three China seminars. Additional coursework in research methods as well as occasional independent studies will also be available, and students are encouraged to take classes that have a wide range of faculty in other departments across the campus.

Foreign Language Requirement

No prior foreign language preparation is required for admission with a primary teaching field in U.S. history. Two to three years of college work, or its equivalent, in at least one foreign language is required for admission to the European program. Students who choose East Asian history as their primary teaching field will be required to have completed at least three years of college-level Chinese or Japanese prior to admission; more years are recommended. Depending upon the student's intended field of research, Japanese language study may also be required of China specialists as part of the graduate program of study.

Students with a primary teaching field in U.S. history are expected to demonstrate a reading competency in at least one foreign language prior to taking the Ph.D. qualifying examination. Students in all other teaching fields must demonstrate a reading competency in at least two foreign languages prior to taking the Ph.D. qualifying examination; competency in one of the languages must be demonstrated by the end of the sixth quarter of enrollment. Usually, competency will be demonstrated by passing a reading examination administered by a member of the history faculty. Students who believe that they have already demonstrated competency through previous coursework or through their performance on a standardized test should petition the graduate director.

M.A. Degree

The master of arts (M.A.) degree is awarded to all Ph.D. students after two years in residence, successful completion of 12 courses of 5 credits each, demonstrated competency in one foreign language (for those in primary teaching fields other than U.S. history), removal of all Incomplete notations (I) on record, and approval of a substantial essay of 25-30 pages.

The M.A. Essay

Students are required to produce a substantial research essay grounded in original research in primary histori-

cal documents. A successful essay will reflect a general understanding of the field of inquiry along with a critical grasp of the scholarship that currently defines the field; deep knowledge of the specific subject under investigation; the application of appropriate analytical models; and a well-supported interpretation of the materials explored. This essay could (but need not) be a segment of a larger project; but it must be a complete, self-contained essay in and of itself.

Students enroll in course 201, *Directed Research Colloquium*, the winter quarter of their second year. While taking course 201, students work intensively with a faculty reader in the preparation, crafting, and revising of the essay. The final draft, approved by the reader, must be submitted to the graduate committee by the spring quarter deadline (usually mid-April). The deadline will be noted in the department's call for M.A. essays.

Qualifying Examination

The qualifying examination (QE) emphasizes field mastery, integration of material from different fields, and focused preparation for dissertation research. The QE is a three-hour meeting during which a student presents and discusses a dossier that has been submitted to the student's committee at least three weeks in advance. The examination is normally taken by the spring quarter of the third year, but no later than the end of the 10th quarter of residency. Prior to taking the QE, all incomplete notations (I) must be cleared from the student's record. Additionally, the student must be registered the quarter the examination is taken.

The four examination fields are designed in consultation with the student's QE committee members. Students prepare for the examination through regularly offered courses and independent readings courses sponsored by the examiners. Students are required to take at least two courses in each of the four fields. The fields are as follows:

- *Primary Field of Concentration.* One of three fields: American history; European history 1500 to the present; East Asian history 1600 to the present.
- *Research Field.* Normally a subfield of the primary field with a focus on the student's specific area of research interests. This field is most closely connected to the student's work in a specific research cluster.
- *Second Teaching Field.* Chosen from the above list of primary fields, with the addition of world history, or, where appropriate, a comparative, thematic field such as gender, colonialism, etc.
- *Outside Field.* One field outside history, such as American studies, anthropology, literature, feminist studies, politics, sociology, or history of consciousness. Students select a field of topical, thematic, or methodological relevance to their dissertation. The student's faculty adviser must approve the outside field.

The four examination fields must be defined and preliminary reading lists (see below) filed with the department no later than the student's eighth quarter of residency.

A pass or fail will be given after the examination based on the student's knowledge and research preparation as demonstrated by his or her dossier. All areas must receive passing marks from all members of the committee. Immediately following the exam, the QE committee will complete and submit to the History

Department the Report on Qualifying Examination form. If a student does not pass the QE the first time, they may retake only those sections not passed. No one will be permitted to take the QE more than twice.

Qualifying Examination Dossier Requirements

The QE dossier includes four parts, each of which should be prepared in consultation with the student's primary academic adviser and with the advice of the examiners. The examination will focus upon the dossier. All examiners, including the examiner from outside the department, will participate in all segments of the examination.

The dossier includes:

1. An essay (20-page limit) reviewing the state of the scholarship in the student's primary field of concentration. This essay should reflect the student's general, broad competence in his or her field as well as a mastery of the theoretical issues and historiographic debates in four to five areas that represent their primary area of expertise. The essay may reflect the thematic focus of a research cluster as well as work completed in an outside field (literature, anthropology, etc.).
2. One syllabus or, at most, two syllabi (the number to be decided in discussion with the student's primary adviser) that demonstrates the student's preparation to teach across the breadth of their primary field at the introductory level. The syllabus should be annotated to show how each class session would be prepared: principal sources for lectures, principal questions for discussion, reasons for assigning particular readings, etc.
3. A syllabus (annotated in the same fashion as described in section number 2 above) in the student's second teaching field, accompanied by a brief (three- to five-page) statement of principal issues. The exact content of these items will be decided in consultation with the examiner in the secondary teaching field.
4. A 10- to 15-page research prospectus that includes an evaluative survey of the literature relevant to the student's proposed research topic, a detailed discussion of the archival resources, and a consideration of the theoretical issues to be engaged.

Note:

- Although no specific segment of the dossier focuses upon the coursework completed outside the History Department, it is expected that this work will be incorporated into different sections of the portfolio, particularly the research prospectus.
- Complete bibliographies must be appended to each piece of the QE dossier.

Dissertation

Students are required to prepare a dissertation prospectus within one year after the qualifying examination. Ideally, the prospectus will be completed by the end of the next quarter. The prospectus must be approved by the dissertation reading committee and placed on file with the department. The prospectus lays out, in reasonable detail, the direction of research the student intends to pursue for the dissertation. The prospectus includes the following information:

- title page with signatory lines for the dissertation committee members and the graduate director
- three- to four-page description of the overall argument of the project, including a discussion of the research base and the appropriate methodological/theoretical models
- two- to three-page outline, tracking the research and analysis chapter by chapter
- substantive bibliography with complete citations

The dissertation represents an extensive, book-length project grounded in research in original historical documents. A successful dissertation will reflect a broad and deep understanding of the field of inquiry, a mastery of the scholarship that currently defines the field, detailed knowledge of the subject of study growing out of dedicated research, and the incorporation (and explicit rejection of) appropriate interpretive models.

M.A. in History (Terminal)

The Department of History offers an M.A. degree in history for those individuals who are interested in post-graduate work, but who are not planning to complete a Ph.D. It is a degree program that can fulfill in-service education requirements for current teachers as well as for future teachers earning a single-subject credential in social studies. Part-time enrollment is allowed.

Each student will be required to choose one of four areas of specialization (U.S., Europe, East Asia, world) and select one of two topical research areas—colonialism, nationalism, and race, or history of gender. To complete the degree, each student must pass a total of 12 courses of 5 credits each and six courses of 2 credits each including courses 280A, 280B, and 280C. Students must also write an M.A. paper of 25-30 pages. For students specializing in Europe, U.S., and East Asia, the curriculum will be nearly identical to that taken by Ph.D. students in their first two years, except that there will be no language requirement. Those specializing in world history will take History 204A and 204C (or other seminars approved by the department) instead of the corresponding courses in other fields (courses 250A, 250B, and so on), but otherwise their curriculum will be the same as that of a typical incoming Ph.D. student.

Course Requirements

- History 200 (year 1, fall quarter); History 201 (year 2, winter quarter)
- one research seminar during the first four quarters: History 204A, 204B, or 204C
- six courses of 2 credits each including History 280 (year 1), 280B (year 1 or 2), 280C (year 1 or 2)
- seven electives of 5 credits each, two of which must be taken outside the History Department. Courses taken are graduate seminars, most upper-division undergraduate courses, and independent study courses.
- two reading seminars in the area of specialization:
 - U.S.: History 210A, 210B
 - Europe: History 250A, 250B
 - World: History 204A, 204C or other seminars approved by the department
 - East Asia: History 230A, 230B; 230C, 242

The History Department does not normally provide financial support to students pursuing the M.A. degree;

however, students may apply for available teaching assistantships. Admission to the M.A. program does not constitute admission to the Ph.D. program. Students must reapply for the Ph.D. program.

Further details about the graduate program are available from the Department of History web site: <http://history.ucsc.edu>.

Lower-Division Courses

1. Theories of History/Theories of Society. W

European social thought understands society to be the product of the historical process. Readings from early-modern natural law thinkers (Hobbes, Lock, Rousseau), 19th-century theorists of the democratic and industrial revolutions (Tocqueville, Marx), and 20th-century social scientists (Weber, Braudel), explore the nature of this fertile connection. (General Education Code(s): TA, IH.) *M. Traugott*

2A. The World to 1500. F

Surveys the rise of complex societies: the formation of classical civilizations in Afroeurasia and the Americas, post-classical empires and cross-cultural exchange, technology and environmental change, the Mongol Empire, and oceanic voyages and the origins of the modern world. (General Education Code(s): CC, IH.) *B. Catlos*

2B. The World Since 1500. *

Examines major world issues over the past 500 years. Topics include European expansion and colonialism, the Muslim empires, East Asia from Ming to Qing, the Americas, Africa, the scientific-technological revolution, decolonization, and modern environmental problems. Designed primarily for first- and second-year students, it provides a time frame for understanding events within a global framework. (General Education Code(s): CC, IH.) *G. O'Malley*

5A. Early Muslim World. *

Surveys the history of the Muslim world from its beginnings through the Caliphate period. Islam is approached as a religious, social, political, and cultural phenomenon. Special emphasis on understanding Islam in the context of contemporary developments in the Near East, Europe, Africa, and Central Asia. (General Education Code(s): CC, IH, E.) *B. Catlos*

5B. Early Christianity: First to Fourth Century A.D. S

Christianity from its origins as a Jewish messianic movement, its expansion in multiple forms in the Greco-Roman world and the East, to its transformation into the major religion of the Roman and Byzantine empires. (General Education Code(s): CC, IH.) *G. Hamel*

7. Archives and Public History. *

Through readings on local history topics and bi-weekly field expeditions, students discover different types of archives and historical repositories, the diversity of sources that they contain, and the varied uses to which they can be put. Course also explores the range of career opportunities open to history majors (sometimes loosely grouped together under the rubric "public history"). Students are billed a materials fee. Enrollment limited to 35. *M. Traugott*

10A. United States History to 1877. S

A survey of the political, social, and cultural history of the U.S. from the founding of the North American colonies to 1877. Satisfies American History and Institutions Requirement. (General Education Code(s): IH.) *C. Jones*

10B. United States History, 1877 to 1977. W

A survey of the political, social, and cultural history of the

U.S. from 1877 to 1977. Satisfies American History and Institutions Requirement. (General Education Code(s): IH.) *L. Haas*

11A. Latin America: Colonial Period. F

Introduces the social, cultural, economic, and political history of the New World through a close examination of the process of European "conquest" in the 16th century and its consequences for both native and settler peoples. Medieval and Renaissance European and African backgrounds; Inca, Maya, Aztec, plains, woodland, and tropical rainforest native American societies; processes of military and cultural conquest; epidemics and ecological changes; native resistance and the establishment of the fundamental institutions of colonial society. (General Education Code(s): CC, IH, E.) *M. Diaz*

11B. Latin America: National Period. S

An introduction to the study of Latin American history from the Independence Wars in the early 19th century to the present. Topics include changing economic models of development, U.S. role, rural and urban life, women, nationalisms, populism, revolution, the military in politics, and the problem of democracy. (General Education Code(s): CC, IH, E.) *M. O'Hara*

13. Introduction to American Religious Culture. W

Introduction to the many communities found within the American religious landscape, balancing extraordinary diversity characterizing American pluralism against the dominant religious culture. Proceeds historically, engaging major problems and developments including utopianism, the rise of evangelicalism, religion and reform, manifest destiny, secularization and modernity, and the intersection of politics and religion. (General Education Code(s): TA, IH.) *M. Westerkamp*

14. Race and Ethnicity in the U.S. *

An introductory course on the racial/ethnic history of the U.S. Of central concern are issues of race, ethnicity, oppression, resistance, mass migrations, city life in urban America, and power and protest in modern America. Priority enrollment to freshmen and sophomores. (General Education Code(s): ER, IH, E.) *P. Castillo*

30. The Making of Modern Africa. *

Examines the loss and re-assumption of local and state autonomy in Africa during the 19th and 20th centuries. Delineates the modalities of the colonial state and society, modes of resistance to alien occupation, and the deformation of social, class, and gender relations. (General Education Code(s): IH, E.) *D. Anthony*

40A. Early Modern East Asia. F

Surveys the history of East Asia from 1500 to 1894. Covers political, social, economic, and cultural histories of China, Japan, and Korea with the goal of perceiving a regional history that encompassed each society. (General Education Code(s): CC, IH, E.) *M. Hu*

40B. The Making of Modern East Asia. *

A broad introductory survey of the political, social, economic, philosophical, and religious heritage of modern China, Japan, and Korea. Emphasis on the historical foundations of modern nationalism, the colonial experience, and revolutionary movements. (Formerly course 40.) (General Education Code(s): CC, IH, E.) *G. Hershatter, N. Aso*

41. The Making of the Modern Middle East. *

History of the modern Middle East from 1800 to the present, with special reference to the 20th century and forces which have shaped the area. The impact of imperialism, nationalism, and revolution in the area, with

particular attention to the history of four countries: Turkey, Iran, Egypt, Israel. (General Education Code(s): CC, IH, E.) *E. Burke*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

43. Traditional India. W

A survey of the early histories of Indus Valley, Vedism, the epics, Buddhism, Jainism, with an exploration among original sources: archaeological, visual, ritual, literary, and epic texts. Thematic focus on communities, social systems, elite and popular cultures, and their mutual interaction. (Formerly *Histories of Traditional India*) (General Education Code(s): CC, IH, E.) *D. Basu*

45. Japanese Pop Culture. *

Introduction to Japanese popular culture from the Tokugawa era to the present. Pursues the role of mass media on Japanese society through analyses of popular movies, animation, comic books, music, and other artifacts in historical context. (General Education Code(s): CC, E.) *N. Aso*

62A. Classical World: Greece. *

An overview of Greek history from the beginnings through the Hellenistic period, with emphasis on the Archaic and Classical periods (ca. 800 B.C. through 323 B.C.). (General Education Code(s): CC, IH.) *J. Lynn*

62B. Classical World: Rome. *

A lecture course offering an overview of Roman history and civilization from the legendary founding of Rome in 753 B.C. to the collapse of the Roman Empire's central administration in the West in 476 A.D. (General Education Code(s): CC, IH.) *G. Devore*

65A. Medieval Europe: 200-1000. F

A survey of Europe from the third through 10th centuries. Emphasizes cultural conflict and assimilation (Roman and Germanic, pagan and Christian, East and West). Topics include the rise of Christianity, Germanic migrations, Byzantium and Islam, the cult of saints and relics, Vikings, and gender roles. (General Education Code(s): CC, IH.) *C. Polecristi*

70A. Modern European History, 1500-1789. *

A survey of economic, social, and political history of Europe since the late 15th century: 1500-1789. A is not prerequisite to B, nor B to C. (Formerly *Modern European History*.) (General Education Code(s): CC, IH.) *B. Sharp*

70B. Modern European History, 1789-1914. S

A survey of the political, social, and cultural history of Europe from the era of the French Revolution to the outbreak of the first World War: 1789-1914. Course 70A is not prerequisite to 70B, nor 70B to 70C. (General Education Code(s): CC, IH.) *The Staff*

70C. Modern European History: 1914 to Present. W

A survey of the economic, social, and political history of Europe since the outbreak of the first World War: 1914-present. Course 70A is not prerequisite to 70B, nor 70B to 70C. (General Education Code(s): CC, IH.) *B. Thompson*

74. Introduction to Jewish History and Cultures. F

Surveys 3,000 years of Jewish history. Themes include origins of the Jews in the ancient world, formation and persistence of the Jewish diaspora, coherence and diversity of Jewish experience, Jewish narrative and textual traditions, interaction between Jews and other cultures, productive tensions between tradition and modernity in Jewish

history and literature. (General Education Code(s): ER.) *B. Thompson*

75. Film and the Holocaust. *

Examines a series of distinguished documentary and feature films about the destruction of European Jewry. Each film is placed in its historical context, and wherever possible, the readings include the original documents on which films were based. Emphasis is placed on the strategies the filmmakers used to address the problem of representing genocide without succumbing to mere melodrama. (General Education Code(s): ER, E.) *B. Thompson*

80H. Class, Gender, and Community in China, 1700-Present. *

Examines gender, sexuality, and family across classes in late imperial China, and the transformation of all three by revolution (and vice versa). Concentrates throughout on gender as a category of historical analysis that has remained largely invisible in the construction of conventional Chinese history. (General Education Code(s): CC, T4-Humanities and Arts, E.) *G. Hershatter*

80K. Spies: History and Culture of Espionage. *

Examines the "golden age" of espionage during the early 20th century, the Second World War, and the Cold War, emphasizing not only the origins and development of intelligence agencies but also images of spies in modern popular culture. (General Education Code(s): T4-Humanities and Arts.) *B. Thompson*

80N. Gender, Labor, and Feminist Productions. *

Examines how constructions of gender and intersecting constructions of race, class, and sexuality define the power of women differentially in the world of work. Beginning with the history of emancipation, traces the broader constructions of paid and unpaid labor in the 20th-century U.S. Traces the specific histories of transgender women workers, specific regional and industrial histories, and those marked by the meaning given to African, Asian, Euro-, indigenous, and Mexican descent in the construction of gender and work. Uses feminist methodology and contemporaneous visual and written work by women artists and filmmakers. (Formerly *Topics in U.S. Women's History: Women at Work*.) (General Education Code(s): CC, T4-Humanities and Arts.) *L. Haas*

80W. The Holocaust: The Destruction of European Jewry. W

Focus is on the destruction of the Jews of Europe by Nazi Germany. Issues are historically grounded, and include works of literature, social sciences, philosophy, and film. (Also offered as Literature 80L. Students cannot receive credit for both courses.) (General Education Code(s): ER, T4-Humanities and Arts, E.) *N. Deutsch, M. Baumgarten*

80Y. World War II Memories in the U.S. and Japan. S

Examines how the meaning of such issues as war origins, war responsibility, the atomic bomb, reparations, and racism have been subjects of contention in postwar U.S. and Japan. Students explore the relations between history, memory, and contemporary politics. (General Education Code(s): CC, T4-Humanities and Arts, E.) *A. Christy*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

100. Historical Skills and Methods. W

Designed to train students in the fundamental skills required for advanced historical research. Students read

historical theory and learn the basics of historical analysis, research, and disciplinary writing. Recommended to majors but open to all interested students. (General Education Code(s): TA.) *M. O'Hara*

101A. The Making of the Modern World, 1400-1750. *

Focuses on the transformation of many different societies of Asia, Africa, and the Americas from 1400 to 1750 through case histories and the comparative study of European colonial hegemony, labor systems, global economic exchange, missions, and warfare. (General Education Code(s): CC, E.) *E. Burke*

101B. The Making of the Modern World, 1750-1950. W

The history of the world from 1750. Focuses on the liberal project (the industrial and democratic revolutions) and its impact on the world—slavery and abolition, self-strengthening movements, race and class, imperialism, colonialism, and nationalism. (General Education Code(s): CC, E.) *E. Burke*

102A. The Crusades, 1000-1300. *

Examines history of Middle East and Latin Europe from 1000-1300, in particular, Latin Crusade and colonization and Muslim response. Format is chronological; topics such as acculturation, Holy War, and ethnicity examined through lectures and writing. (General Education Code(s): CC.) *B. Catlos*

102C. The Mediterranean in the Modern Era, 1730-1930. *

The cultural transformation of the Mediterranean region in comparative historical perspective from the rise of the Hapsburg and Ottoman empires to modern times. Topics include orientalism, political and economic transformations, social movements, cultural change, gender, colonialism, and imperialism. (General Education Code(s): CC.) *E. Burke*

103. Medieval Spain, 600-1500. F

History of the Iberian Peninsula and Northwest Africa from the Visigoths through the reign of the Catholic Monarchs. Political and economic history form the basis, with special attention paid to religious and social history, particularly the interrelation between the peninsula's ethno-confessional groups. Prerequisite(s): one history course; course 65A and/or course 65B recommended. (General Education Code(s): CC.) *B. Catlos*

106A. Vietnam War Memories. *

Compares memories and interpretations of war in Southeast Asia by diverse groups in France, America, and Vietnam. Topics include war origins, military strategies, propaganda, combat, civilians, media, activism, MIAs, refugees, mixed race children, memorials, textbooks, films, music, literature, and art. (General Education Code(s): CC, E.) *A. Yang*

106B. Asian and Asian American History, 1941-Present. W

Analyzes immigration, race relations, war, gender ideology, family life, acculturation, political activism, interracial marriage, multiracial identity, and cultural representations between 1941 and the present. Emphasis on discussion, writing, research, and group presentations. (General Education Code(s): E.) *The Staff*

107. Religion and Modernity. *

Explores the impact of modernity on a variety of religious traditions. Examines the rise of secularism and the phenomenon of disenchantment; the "invention" of religion; and the emergence of fundamentalism in the modern period. (General Education Code(s): CC.) *N. Deutsch*

108. Social Movements in Historical Perspective. F Readings examine 18th- through 20th-century social movements and related phenomena in Europe/America: examples include Tulipomania; revolutionary action in France; U.S. Civil Rights movement; and the environmental and feminist movements. Lectures focus on social science frameworks used to explore the social base, tactics, success or failure, and inter-relationships of social movements as a distinctive mode of social change. *M. Traugott*

109A. Race, Gender, and Power in the Antebellum South. F

Examines how ideologies of race and gender shaped the development of slavery and empire in the American South from European colonization to the eve of the American Civil War. (General Education Code(s): ER, E.) *C. Jones*

110A. Colonial America, 1500-1750. F

Explores the social, economic, cultural, and political development of British North America from the first European/Amerindian contacts in the late 16th century through the establishment of a provincial British colonial society. Course 110A is not a prerequisite to course 110B. (Formerly *Colonial and Revolutionary America*.) Satisfies American History and Institutions Requirement. (General Education Code(s): ER.) *M. Westerkamp*

110B. Revolutionary America, 1740-1815. *

Explores the political, social, economic, and cultural development of British North America from the first stirrings of resistance to the establishment of the U.S. Course 110A is not a prerequisite to course 110B. (Formerly *Colonial and Revolutionary America*.) Satisfies American History and Institutions Requirement. *G. O'Malley*

110D. The Civil War Era. *

Social, political, and economic history of the American Civil War and Reconstruction, focusing on the war's changing nature and significance, emancipation, and the postwar struggle over the future of the South and the nation. (Formerly *The Second American Revolution: The Civil War and Reconstruction*.) *C. Jones*

110E. What Is a Nation? The U.S. from 1877 to 1914. *

History of the U.S. during what was perhaps its most socially turbulent era, the period following Reconstruction through the First World War. What did it mean to be a nation in the post-Reconstruction era? How did a country that had only recently unified itself under one system of labor now resolve the question of national identity? Was America truly a nation by 1914? *M. Lasar*

110F. Crossroads for American Capitalism: The U.S., 1914 to 1945. W

Between the First and Second World Wars, American society accepted the need for a regulatory state to save capitalism from itself. Takes an in-depth look at many aspects of U.S. politics and culture during these years. *M. Lasar*

110G. The U.S. After the Second World War. S

From the Good War to the Cold War, the Sixties to the rise of the New Right, the post-1945 American experience has been one of extremes. This survey course looks for evidence of commonality during those times. *M. Lasar*

111. Popular Conceptions of Race in U.S. History, 1600-Present. *

Explores how race has been constructed and perceived, examining Americans' use of race to describe themselves and to label others. Particularly concerned with ordinary people and how and why their ideas of race have changed over time. (General Education Code(s): ER, E.) *G. O'Malley*

112. American Feminist Thought, 1750-1950. *

Traces history of feminist thought in the United States from the 18th century Enlightenment to the mid-20th century. Focusing on questions of social identity, gender difference, and legal/political status, examines writings of philosophers, activists, novelists, and ordinary women that challenged religious, political, and scientific beliefs underlying gender inequality. *M. Westerkamp*

113C. Women and American Religious Culture. *

Historical introduction to religious culture of U.S. as experienced and created by women. Explores religious ideas about women, the treatment of women by mainstream institutions and religio-social communities, and female religious leaders and followers. Takes an explicitly feminist analytical approach and uses a variety of "texts," including historical and literary scholarship, sacred texts, fiction, autobiography, material artifacts, visual art, and music. *M. Westerkamp*

114. Market Revolution in Antebellum U.S.. *

Examines the cultural, political, and environmental upheaval associated with antebellum market revolution. Topics include: markets and U.S. territorial expansion; reform movements that coalesced around disputes over what should, and should not be sold (e.g., antislavery activism; anti-prostitution reform movements). *C. Jones*

115A. U.S. Labor History to 1919. F

Explores the history of work, working-class people, and the labor movement in the U.S., with attention to race and gender dynamics as well as to the development of workers' organizations. (Formerly *U.S. Labor History, Colonial Period to 1919*.) Satisfies American History and Institutions Requirement. (General Education Code(s): ER.) *D. Frank*

115B. U.S. Labor History, 1919 to the Present. *

Explores the history of work, working-class people, and the labor movement in the U.S. in global perspective with attention to race and gender dynamics and political-economic changes. Satisfies American History and Institutions Requirement. (General Education Code(s): ER.) *D. Frank*

115C. Learning from the U.S. Great Depression. *

Examines U.S. society, politics, and culture during the 1930s, with emphasis on the relationship between social movements and public policy, and dynamics of race, ethnicity, immigration, and gender, and dynamics between labor, business, and the state. *D. Frank*

117. Wired Nation: Broadcasting and Telecommunications in the US from the Telegraph to the Internet. *

Explores the history of telecommunications systems in the US starting with the telegraph, the telephone, wireless telegraph, radio, television and the Internet. Students learn about the development of these systems and the cultures that they foster. *M. Lasar*

121A. African American History to 1877. *

A survey of pre-contact Africa, indigenous social structures, class relations, the encounter with Europe, forced migration, seasoning, resistance, Africa's gift to America, slavery and its opponents, industrialization, emigration vs. assimilation, stratification, Convention Movement, Black feminism, Civil War, and Reconstruction. (General Education Code(s): ER, E.) *D. Anthony*

121B. African American History: 1877 to the Present. *

A survey of the period from 1877 to present, highlighting Jim Crow, Militarism, Black feminism, WWI, New Negro, Garveyism, Harlem Renaissance, Black

Radicalism, Pan Africanism, Depression, WWII, Desegregation Movement, Black Power, 1960s, Reaganism. Cultural and economic emphases. (General Education Code(s): ER, E.) *D. Anthony*

124. American Empire. S

Examines U.S. expansion and subsequent ascent to global power. In tracing the presence of the U.S. in different areas of the world during the 20th century, course considers the ideas, politics, gender, and social relations that have influenced imperial aspirations. *L. Haas*

125. California History. *

California had a multi-ethnic indigenous society for centuries. Course traces its persistent multi-ethnic quality of native, as the region becomes part of the Spanish empire, Mexico, and the United States. Considers the many diasporas that have shaped California's steady connection to the world, especially to Mexico and other nations that border the Pacific. (Formerly *California History*.) (General Education Code(s): ER.) *L. Haas*

126. From Indigenous Colonial Borderlands to the U.S.-Mexico Border. *

Examines the interactions and integration of indigenous people and settlers in the Southwest U.S. and Northern Mexico from a region defined by its indigenous colonial borderlands to national borders. Explores the connections between the U.S. and Mexico. Within the deeply cross-cultural region studied, also examines the particular histories of states, indigenous peoples, and Mexican-origin groups and regions. (Formerly *History of the Southwest: Colonial Period to 1920*.) (General Education Code(s): ER, E.) *L. Haas*

127. Race and the American City. S

History of racial and ethnic minorities in the American city in the 19th and 20th centuries. Examines the experiences of several non-white groups, with analyses of race, class, culture, gender, acculturation, and implications for social policy in the urban environment. Satisfies American History and Institutions Requirement. (General Education Code(s): ER, E.) *P. Castillo*

128. Chicana/Chicano History. F

A survey course on the social history of the Mexican (Chicana/o) community and people in the U.S. through the 20th century. Themes include resistance, migration, labor, urbanization, culture and politics. Satisfies American History and Institutions Requirement. (General Education Code(s): ER, E.) *P. Castillo*

130. History of Modern Cuba. S

Covers from the Cuban sugar revolution (late 18th century) to the socialist revolution and its aftermath (1959–present). It is intended to be not only a modern history of Cuba but also a broader history of Latin America through the case of Cuba. (General Education Code(s): E.) *M. Diaz*

131. Women in Colonial Latin America. W

Introduction to the social history of Latin America through a focus on the inflections of class and ethnicity on gender in this region. First six weeks focuses on the colonial period. The last three weeks covers the 19th and 20th centuries. (Formerly *Women in Latin America*.) *M. Diaz*

132. History of the Caribbean: Colonial Period. *

A study of the Caribbean from the conquest to the abolition of slavery in the 19th century. Focus on the Greater Antilles, particularly the Spanish Caribbean. Emphasis on economic and social issues such as colonialism and the role of sugar production, slavery, and race/ethnicity in these multicultural societies. (General Education Code(s): E.) *M. Diaz*

133. Topics in Colonial Latin American History, Early and Middle Period. S

Studies Pre-18th century colonial Latin America, with particular emphasis on Peru and Mexico. Topics include: strategies of colonization; cities and urban life; and knowledge, technology, and the professions (ethnographic projects, indigenous intellectuals, schools and universities, medicine and hospitals, the law and the courts). (General Education Code(s): E.) *M. Diaz*

134A. Colonial Mexico. *

Covers the social, cultural, economic, and political history of colonial Mexico (New Spain). Special attention paid to colonial identity formation, religion, and labor systems. Begins by examining indigenous societies prior to the arrival of Europeans and concludes with Mexico's independence movement in the early 19th century. (Formerly *History of Mexico, 1500–1850*.) (General Education Code(s): ER, E.) *M. O'Hara*

134B. History of Mexico, 1850 to Present. F

Social, cultural, economic, and political history from the triumph of Liberalism to the present day, focusing on four key periods: the dictatorship of Porfirio Diaz (1900–1910), the armed phase of the Revolution (1910–1920), the consolidation of revolutionary programs and a "single-party democracy" (1920–1940), and the developmentalist counter-revolution since 1940. Provides background for understanding the Mexican diaspora to the U.S. (General Education Code(s): CC, E.) *M. O'Hara*

137A. Africa to 1800. *

Introduction to history of Africa. Topics include states and "stateless" societies, culture, society and economy in the pre-modern era, stratification, oral traditions, long distance trade, the coming of Islam, and the evolution of the South Atlantic system and its social, political, and other consequences. Some background knowledge of Africa helpful. (General Education Code(s): CC, E.) *D. Anthony*

137B. Africa from 1800 to the Present. *

How Africa lost its continental, regional, and local autonomy in the era of European imperialism. The components of European hegemony, Christian proselytization, comparative colonial strategies and structures, nationalism, decolonization and independence and the disengagement from neo-colonial patterns and the colonial legacy. Case studies from northern and sub-Saharan Africa. Some background knowledge of Africa helpful. (General Education Code(s): CC, E.) *D. Anthony*

137C. African Cinema. F

Historical study of modern African cinematography from the emergence of film as a tool of social control in the imperial and colonial periods to its theoretical and practical transformation by African cineastes in the post-independence era. Films and videos from northern, eastern, western, central/equatorial, and southern Africa viewed. Prerequisite(s): course 30 or 137A or 137B, or by permission of instructor. (General Education Code(s): CC, E.) *D. Anthony*

140B. History of Qing China, 1644-1911. F

Introduces students to how Qing China arose, expanded, and struggled to enter the modern world. Focuses on what the Qing empire had in common with other agrarian empires across Eurasia, commercialization and communication networks, elite mobility and peasant revolts, political legitimacy of the alien rule, maintaining social order (such as merchants' control and gender segregation), massive population growth and internal migration, as well as its conflicts with the industrial West. (General Education Code(s): CC.) *M. Hu*

140C. Revolutionary China 1895-1960. W

Explores history of China from the late 19th century to the early years of the People's Republic, focusing on the end of imperial rule, the sources and development of revolution, and early attempts at socialist transformation. (General Education Code(s): CC, E.) *E. Honig*

140D. Recent Chinese History. S

Explores history of China from establishment of the People's Republic of China to the present, focusing on competing strategies of socialist transformation, urban/rural relations, and the effects of the post-Mao economic reforms. (General Education Code(s): CC, E.) *G. Hershatter*

141B. Classical Chinese Culture and Literature, Sixth Century through 16th Century. S

Survey of writing and culture from the Tang through early Ming dynasties (sixth century C.E. through 16th century C.E.). Themes include literary, religious, and philosophical innovation; courtly life; cultural contacts with non-Chinese people; and transformations of state and society. Satisfies the Pre- and Early Modern and World Literature concentrations; also satisfies the Global, Poetry, and Pre- and Early Modern distribution requirements. (Also offered as World Lit & Cultural Studies 136. Students cannot receive credit for both courses.) (General Education Code(s): E.) *C. Connery*

142. World History of Science. *

Searches for a common ground in which historians and scientists can communicate with each other from a global perspective, first situating the modern world in a long span of human history to reveal our time as a distinct stage of global development. Science and technology, the focus of this course, play a crucial role in the formation of the modern world. (General Education Code(s): SI.) *M. Hu*

145. Gender, Colonialism, and Third-World Feminisms. *

Introduces the history of feminism in the third world, focusing on the ways in which colonialism (and post-colonialism) has shaped gender relations and on the feminist movements that have emerged in response to the impact of colonialism. (General Education Code(s): E.) *E. Honig*

147A. History of Premodern India. W

A study of religions (Vaisnavism, Tantrism, Islam, Sikhism), art, literature, and social movements in their historical contexts from 1000 A.D. to 1800. (General Education Code(s): CC, E.) *D. Basu*

147B. Political and Social History of Modern South Asia. *

Social, political, and religious movements in the colonial and postcolonial contexts of the 19th and 20th centuries in modern and contemporary South Asia. (General Education Code(s): CC, E.) *D. Basu*

148. Cinema and History: Film Author Satyajit Ray. S

Satyajit Ray is widely acclaimed as a master of world cinema. Course considers his work to examine "authorship" at multiple levels: the cultural, historical, social, and familial contexts and the relationship of his film to fiction, the politics and poetics of his vision, and its relationship to colonial, nationalist, and postcolonial India. Also studies the question of gender and the underclass. (General Education Code(s): E.) *D. Basu*

150A. Ancient Japan. F

Surveys the history of the peoples of the Japanese islands from prehistorical migrations through the 15th century. Emphases include examination of social structures,

political formations, cultural production, and religion. (General Education Code(s): CC.) *N. Aso*

150B. Tokugawa Japan. F

Surveys the history of the peoples of the Japanese islands from the middle of the 15th century to the middle of the 19th century. Focus is on the era of civil war, the formation of the early modern federated state, social structure, and cultural production. *A. Christy*

150C. Modern Japan. S

Surveys the history of the peoples of the modern Japanese nation from the Meiji Restoration to the present. Focuses on the formation of the modern state, empire, social movements, and cultural production. (General Education Code(s): CC, E.) *N. Aso*

151B. Traditional Japanese Culture in a Modern Context. *

Examines traditional Japanese cultures from a critical perspective, for example, by looking at the gendered nature of tradition in modern Japan. Students learn to separate history from myth, and how to think critically about historical and cultural notions. (General Education Code(s): E.) *The Staff*

154A. Classic Islamic Civilization. *

The civilization of Islam to 1258 A.D. Origins and early florescence, an international civilization, the coming of the steppe peoples. (Formerly course 161.) Enrollment limited to 35. (General Education Code(s): E.) *E. Burke*

155. History of Modern Israel. *

The conflict between Israelis and Palestinians is one of the most intractable disputes in our troubled world. Course begins with a glimpse of Palestine in the late 19th and early 20th centuries, surveys the rise and fall of utopian Zionism, pays especially close attention to the events of 1948 and 1967, and concludes by analyzing the collapse of hopes for peace after Oslo and Camp David meetings. (General Education Code(s): CC, E.) *B. Thompson*

160A. Athenian Democracy. *

Athenian democracy from foundation to the fourth century B.C., with emphasis on its practices and ideologies. Readings from ancient sources and modern theory. Topics to include foundations and development; Athenian concepts of freedom, equality, law, citizenship. Lectures and discussion. (General Education Code(s): CC.) *C. Hedrick*

161B. Topics in Roman History. *

Detailed consideration of some specific topic or period in Roman history, varying from year to year. Examples include Roman religion, Augustus and the Roman Empire, Julio-Claudian emperors and the principate, Roman slavery, and Christianity and Rome. Enrollment restricted to history and classical studies majors or minors, or by permission of instructor. May be repeated for credit. *C. Hedrick*

161C. Age of Augustus. *

Surveys Rome's transition from Republic to Empire, and the politics, people, and literary and material culture of the principate. Enrollment restricted to history and classical studies majors and minors, or by permission of instructor. *J. Lynn*

163A. A History of Sin. F

Ancient and modern conceptions of sin, and remedies offered for it. Course is not a theology of sin and redemption, but an invitation to reflect on ways sin and fault have been imagined and formulated. (Formerly course 163.) *G. Hamel*

163B. Genesis: A History. *

Introduction to historical, textual, source, and redaction criticism of the book of Genesis and to exegesis as science

and ideology. Texts, history, and iconography of neighboring traditions (Mesopotamian, Ugaritic, Egyptian, Greek) are also studied when appropriate. Course 44, Literature 80A, or some basis in Hebrew or Greek is strongly suggested. (General Education Code(s): CC.) *G. Hamel*

164A. Late-Medieval Italy, c. 1200-1400. W

Italy from the birth of the commune to the early Renaissance in Florence. Topics include urban life and social conflict, gender roles, St. Francis, the Black Death, female mystics, Dante, Boccaccio, humanism, artistic developments from Giotto through Donatello. Requires viewing several films outside of class. *C. Polecristi*

164B. Renaissance Italy, c. 1400-1600. S

Italy from the Florentine Renaissance through the Reformation. Topics include social change and political consolidation, the rise of the papacy, court life, witch hunting, Machiavelli, artistic developments from Donatello through late Venetian Renaissance. Requires viewing several films outside of class. Course 164A recommended as preparation. *C. Polecristi*

165. The Power of Writing: Books and Libraries 600-1500. *

Surveys how books were made and used in Europe from 600-1500. Focuses on the relationship between book production and the development of libraries. Meets in Special Collections, McHenry Library. Exhibition as class project. Enrollment limited to 25. *E. Remak-Honnef*

168. Rise of the Dutch Republic. *

Focuses on the origin of the Republic in the revolt against Spanish overlordship, and its political, social, and economic development in the 16th and 17th centuries. *B. Sharp*

170A. French History: Old Regime and Revolution. W

French history from the Middle Ages through the Revolution. Focus on the rise and fall of "absolute" monarchy, the nature of Old Regime society, the causes and significance of the French Revolution. Attention to those who endured as well as to those who made events. *J. Beecher*

170B. French History: The 19th Century. *

Social, political, and cultural history of France from the Revolution to WWI. Focus on the Revolutionary tradition, the Napoleonic myth, the transformation of Paris, and the integration of the peasantry into the national community. Readings may include novels by Stendhal and Balzac. *J. Beecher*

171. Revolutions in France. *

Examines the political/social upheaval in 1789, 1830, and 1848 in light of the sweeping changes brought to 19th-century France by those other great "revolutions" of the age, the democratic and the industrial. Students' written work focuses on the comparative analysis of revolution. Offered in alternate academic years. *M. Traugott*

172A. German History. F

The development of German civilization, including philosophy and literature as well as politics and diplomacy in the nineteenth and twentieth centuries. *The Staff*

172B. German Film, 1919-1945. *

Introduction to German films from 1919 to 1945. Through combination of movies and documentaries, gain insight into political, economic, social, and cultural conditions of Weimar and Nazi Germany. *M. Cioc*

175A. Medieval Russia. *

Medieval Russia. *P. Kenez*

175B. Russian History. S

Imperial Russia. *P. Kenez*

175C. Russian History. *

Twentieth-century Russia. *P. Kenez*

175D. History of Soviet Film. *

Does not stress questions of aesthetics or technical aspects of film making, but the changing ideology inherent in Soviet films. The goal of examining cinema is to enrich our understanding of Soviet history. Readings include works of famous directors and theorists—Eisenstein, Vertov, Pudovkin, and Kuleshov—in addition to secondary works by Denise Youngblood, Richard Taylor, Josephine Woll, and Anna Lawton. *P. Kenez*

178A. European Intellectual History: The Enlightenment. *

Study of European thought and literature from Hobbes and Swift to Rousseau and Goethe. Focuses on relation of ideas to their social and cultural context. Special attention to traditions of religious conflict and criticism rising from the Protestant Reformation; to the discovery of the world beyond Europe; and to the intellectual and cultural roots of the French Revolution. (Formerly *European Intellectual History*.) *J. Beecher*

178B. European Intellectual History: The 19th Century. *

Study of European thought and literature from Blake to Nietzsche. Focuses on relation of ideas to their social and cultural context. Special attention to the rise and fall of the Romantic movement, to changing conceptions of history, and to the development of socialist and aesthetic critiques of industrial civilization. (Formerly *European Intellectual History*.) *J. Beecher*

178C. European Intellectual History, 1870-1970. *

Drawing on experiments in autobiography, the arts, and social theory, this course focuses on ideas and images of modernity in European culture. It also highlights the role of the intellectual as politically engaged or disillusioned witness in a violent century. Offered in alternate academic years. (General Education Code(s): CC.) *B. Thompson*

178D. Russian Intellectual History. F

Focus on the emergence in 19th-century Russia of a westernized intelligentsia; its effort both to assimilate western ideas and to define the destinies of Russia; the shaping of the Russian revolutionary movement. Readings in Dostoyevsky, Turgenev, Herzen, and representative Russian Slavophiles, Populists, and Nihilists. *J. Beecher*

178E. Modern Jewish Intellectual History. *

Surveys European Jewish intellectual history from the Enlightenment to the present. Major themes include emancipation and assimilation, the flowering of Yiddish literature, the rise of Zionism, new variations on the messianic idea, and Jewish contributions to the culture of urban modernism. Offered in alternate academic years. (General Education Code(s): ER.) *B. Thompson*

180A. English History. W

Emphasis on the interaction between social, economic, religious, and political developments. An attempt to place these phenomena in the context of the wider European and world scene. The period from 1485 to 1689. *B. Sharp*

180B. English History. S

Considers how Britain became the pacemaker of modernity in the 18th and 19th centuries; how national, regional, class, and gender identities formed and altered; and how Britain coped with loss of global power in the 20th century. *B. Sharp*

183A. Nineteenth-Century Italy. *

Italian politics, culture, and society from the Napoleonic

era through early leftist movements. Central emphasis on the Risorgimento and Unification. Other topics include: north-south conflict; banditry; urban change; growth of tourism; popular religion; family structures and gender; visual arts and opera. *C. Polecristi*

183B. Fascism and Resistance in Italy. *

Examines Italian politics, society, and culture (c. 1900-1950), emphasizing the Fascist regime; interdisciplinary focus emphasizing history, literature, and film. Course 183A recommended as preparation. (Formerly course 183.) *C. Polecristi*

185A. Conflict of Interest: War, Holocaust, and Industry in the Lodz Ghetto. *

Examines how Nazi war machine exploited Jewish slave labor in the Lodz ghetto industrial complex while a state apparatus systematically exterminated the workers. Includes a visit from a survivor of ghetto factories and graphics from ghetto workshops. Prerequisite(s): one upper-division history course. Enrollment restricted to juniors and seniors. (General Education Code(s): ER, E.) *M. Thaler*

185B. Rethinking the Holocaust: Bioscience, Race Theory, and Genocide. *

Traces the Nazi "Superstate" project from its origins at the conjunction of bioscientific theory and racialist ideology to its conclusion in the Holocaust, providing a historical perspective for social and political dilemmas raised by contemporary biomedical advances. (General Education Code(s): ER, E.) *M. Thaler*

185D. Jewish Social Movements. W

Jewish social movements of the late 19th and 20th centuries, in Europe (Eastern and Western) and the U.S.: the confrontation between Hasidism and Haskalah, tensions between socialism and Zionism, between religiosity and secularism, the mutual influences among these tendencies. (Also offered as History of Consciousness 118. Students cannot receive credit for both courses.) Enrollment restricted to juniors and seniors. Enrollment limited to 20. (General Education Code(s): E.) *B. Epstein*

185E. The Historiography of the Holocaust. *

Offers a comprehensive historiography of the Holocaust, distinct from the narrowly focused perspectives generally presented in Holocaust studies, to familiarize students with the origins, evolution, and major developments in the Nazi genocide and its historical consequences. Enrollment restricted to juniors and seniors. (General Education Code(s): ER, E.) *M. Thaler*

185F. Private Lives, Family Histories, and the Holocaust Experience. *

Holocaust historiography has surveyed the broad landscape of genocide or focused narrowly on individual experience. Course examines the middle ground of family and its role in resistance during the destruction of communal existence and survival in the aftermath. (Formerly course 196Q.) Prerequisite(s): two upper-division history courses or permission of instructor. Enrollment restricted to junior and senior history, German studies, and classical studies majors. Enrollment limited to 20. (General Education Code(s): ER, E.) *M. Thaler*

190. Advanced Research and Reading Seminars. *

An opportunity for advanced students to focus on specific research problems resulting in a substantial research paper of 25 pages, or discussion of assigned readings resulting in a series of short papers totaling 25 pages. Courses must be taken in area of concentration in order to count towards the major. *The Staff*

190A. Slavery and Race in Latin America. F

Covers comparative history of slavery in Latin America

with questions of race in the colonial and national periods and key moments and debates in the historiography of slavery and its relation to ideologies of the past and the nations. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *M. Diaz*

190B. Race and the Nation in Latin America. *

Focuses on the ways in which nation and race have been thought about in Latin America throughout the 19th and 20th centuries. These concepts were closely intertwined, albeit in differing and changing ways, since the wars of independence from Spain and Portugal (1810-1825). Compares the ways in which "black," "Indian," and "racially mixed" ("mulatto" or "mestizo") have been socially constructed, ideologized, and contended in different countries, including Brazil, the Spanish-speaking Caribbean, Mexico, Peru, and Argentina. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *M. Diaz*

190C. Race, Class, and Gender in California History. W

The study of the social history of racial minorities and women in the historical development of California society. Emphasis on racial, class, and sexual conflict within the context of the history of California since 1848. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. Offered in alternate academic years. (General Education Code(s): W, E.) *P. Castillo*

190D. Tale of Two Cities. *

A comparative study of the social, economic, cultural, political, and geographical development of Los Angeles and Mexico City in the 20th century. Emphasis on the diverse peoples, changing physical environment and various images/interpretations of these two world cities. (Also offered as Latin American & Latino Studies 194P. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history and Latin American and Latino studies majors. Enrollment limited to 25. (General Education Code(s): W, E.) *L. Haas*

190E. Topics in Chicana/o History. *

A seminar on the history of Chicanos/Mexicans in the United States, 1848 to the present. Topics include Chicana/o labor, family, social, urban, cultural, and political history. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *P. Castillo*

190F. Research Seminar in the Americas. *

Students learn how to conduct research and write history. Primary and secondary sources are extensively read. Research sources include a rich array of government documents, newspapers, memories and diaries, visual material and film. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. En-

rollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *L. Haas*

190G. History and Theory. *

Each year students study one or more theorists or schools of philosophy and history. Themes vary by year and include: Walter Benjamin, Hayden White, Agnes Heller, the Frankfurt School, and the Subaltern School. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior history majors. *L. Haas*

190I. California and the Borderlands. *

Complete original research in California and borderlands history in this senior research seminar. Focus on selected problems and themes. Assignments and discussions help students frame their research and edit their writing. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *L. Haas*

190J. Diaspora and Migration in World History. *

Diaspora studies recently have included a range of movements and people in colonial, post-colonial, and national dilemmas. Diaspora studies share historical themes with migration studies, and include the study of forced exile and situations of genocide and femicide experienced by indigenous and national minorities. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. *L. Haas*

190K. Wired Planet: Readings on the Global History of Broadcasting and Telecommunications. *

Locates common themes in the history of broadcasting and telecommunications throughout the world. Why do certain strategies for developing broadcasting and telecommunications systems succeed or fail? Why do some nations outstrip other nations of comparable development in the growth of their communications systems? Why do national or regional communication systems suddenly become more or less open—or more or less centralized? Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Lasar*

190L. Personal Politics in the New South. *

Examines the tensions between movements for political reform and reaction in the southern United States between Reconstruction and the second world war. Students develop a research paper grounded in primary research that addresses these questions. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; two upper-division history courses or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *C. Jones*

190M. History of Children and Culture of Childhood in the 19th Century. *

Explores the lives of children and the functions of the literary figure of the child in the cultural politics of the 19th century in the United States. Examines the historically contingent nature of childhood through historical, literary, and visual sources. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and two upper-division history courses. Enrollment restricted

to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *C. Jones*

190N. Topics in African History. *

Examines contemporary crises in Africa: the new South Africa, refugees, HIV/AIDS, children of war, blood or conflict diamonds, civil war, and genocide in Rwanda. Seminar format where students will be prepared to undertake studies on specific subjects and two rounds of 15–20 page papers. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *D. Anthony*

190O. African American Historiography. F

Major themes in contemporary African American historiography on a topical basis. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *D. Anthony*

190P. Early American Society and Culture. *

Explores subjects and themes in the political, social, and cultural history of early U.S. history from the colonial period through 1850. Includes critical reading of current scholarship and research in primary texts. The focus of this course is the production of a 25-page research paper. Recommended for senior history majors. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Westerkamp*

190Q. The Novel and History. *

Explores major questions, theories, and methods in 19th-century U.S. women's history. Readings include key texts by feminist scholars around such themes as sexuality, religion, domesticity, slavery, and biography in an effort to understand the lives of 19th-century women as well as the ways that historians have written about those lives. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and two upper-division history courses or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Westerkamp*

190R. Research in the History of American Religions. *

Readings and research in the history of religions in the United States. Readings focus on topics including the rise of evangelicalism; gender and religion; class, race, and religious diversity; and modernity. Students produce papers that culminate in a 25-page research project. Prerequisite(s): Satisfaction of the Entry Level Writing and Composition requirements and two upper-division history courses. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *M. Westerkamp*

190S. Women and Social Movements in the U.S. W

Examines history of women and social movements in the U.S., such as abolitionism, anti-lynching, Chinese and Jewish garment workers, Chicana farm labor activism, the American Indian Movement, the Ku Klux Klan, and the Civil Rights movement. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor.

Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *D. Frank*

190T. Latin America in the Cold War. S

Writing-intensive seminar on Latin America during the Cold War. Particular attention given to U.S.-Latin American relations, including moments of covert or direct interventions. Students pursue advanced research using primary and secondary sources. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and two upper-division history courses. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. O'Hara*

190U. Power and Culture in the U.S. *

Students read historical monographs that explore, from a variety of race, class, and gender perspectives, how U.S. culture and thought have changed over time. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Lasar*

190V. The Corporation and Its Critics. *

Studies transformation of the U.S. corporation from limited tool in hands of state government to the central organizational unit of capitalism and crucial focus of American politics. Readings include influential histories of the corporation from Republic's early years through 1970s. Students debate impact of the corporation from Marxist, free market, anti-colonialist, and feminist perspectives. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Lasar*

190X. History of the Atlantic World, 1492-1824. *

Explores the transatlantic societies created by Europeans' colonization of the Americas, and their exploitation of African slaves. Questions whether the cultural, economic, and political links across the ocean integrated the adjacent lands into a fundamentally "Atlantic World." Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and two upper-division history courses. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *G. O'Malley*

190Y. The Atlantic Slave Trade. *

Before 1800, far more Africans than Europeans colonized the Americas, arriving unwillingly in the slave trade. Course examines the captives' experiences; the trade's organization and significance in the Atlantic economy; and the eventual movement to abolish the traffic. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and two upper-division history courses. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *G. O'Malley*

192. Directed Student Teaching.

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Students submit petition to sponsoring agency. *The Staff*

193. Field Study.

To allow promising, well-qualified undergraduates to pursue directed programs of archival or archaeological study in the field under supervision of the UCSC history faculty, concentrating their work within a single given quar-

ter. Students may take two or three courses concurrently. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Advanced Research and Reading Seminars. *

An opportunity for advanced students to focus on specific research problems resulting in a substantial research paper of 25 pages, or discussion of assigned readings resulting in a series of short papers totaling 25 pages. Courses must be taken in area of concentration in order to count towards the major. *The Staff*

194A. Gender, Class, and Sex in Shanghai. *

Focusing on Shanghai, course examines issues of gender, class, and sex in modern urban Chinese history. Given Shanghai's history as a treaty port, particular attention paid to ways in which its semi-colonial status inflected the articulation of gender identities, class formations and issues of sexuality (particularly sexual labor). Also looks at Shanghai during the Maoist period and in the context of more contemporary economic reforms. (Also offered as Feminist Studies 194N. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; and course 140C, or 140D, or 140E, or permission of instructor. Restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *E. Honig*

194B. Okinawan History. W

Examines the history of Okinawa with particular attention paid to the modern era. The goal is to give students a solid foundation in the historiography of major themes in the study of Okinawan society. (Formerly course 196X.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements two upper-division history courses, or permission of instructor. Enrollment limited to 20. (General Education Code(s): W.) *A. Christy*

194E. Women in Japanese History. *

Examines through both primary and secondary sources such issues as work, sexuality, education, class, and ethnicity in relation to constructions of female gender in Japanese society over the past several centuries, particularly focusing on the modern era. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *N. Aso*

194G. China Since the Cultural Revolution: Histories of the Present. F

Explores the rapid and often destabilizing shifts that have taken place in China since the late 1970s (the "reform era"), tracing the effects of China's earlier experiment with revolutionary socialism on the market-driven present. Examines how various meanings of reform are negotiated; changes in rural and urban environments; and class, gender, and ethnic differences. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *G. Hershatter*

194H. Gender, Family, and State in China: 1600-Present. *

Explores gender, family, and state power in China from 1600 to present, examining gendered norms, education, political movements, revolutionary practice, sexuality and sex work, and state interventions in contemporary families. Responses to reading and a research paper required. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history

courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *G. Hershatter*

194M. Literati, Samurai, and Yangban: Comparative History of State and Elite in East Asia, 1600-1900. S

Critically examines the formation of political elites in East Asia. Compares literati in Ming and Qing, China; samurai in Tokugawa, Japan; and yangban in Joseon, Korea. Each group occupied specific roles and functions in their state and society but differed in scale and character. Students cannot receive credit for this course and course 294M. Prerequisite(s): course 40A or 140B, and one additional upper-division history course or permission of instructor, and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Hu*

194N. Comparative Studies in Modern Asian History. F

Seminar on cultural and social changes in Asia, mainly in the 19th and 20th centuries. Topics include colonial encounters, cities, narratives of ordinary persons, nationalism and identity, visual cultures, and Orientalism. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *D. Basu*

194R. Cairo: The City Victorious, 1750-2000. *

The modernization of a world city from 1750 to the present. Cairo's social and cultural history (literature, film, music) against the background of its changing political and economic contexts. Topics include: orientalism, nationalism, imperialism, minorities, women, migration, urbanism, popular culture, tourism. Prerequisite(s): Two upper-division history courses; and course 41 or 101A or 101B; and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *E. Burke*

194S. Comparative Studies in World History. *

Explores a broad topic in world history (varies from year to year) such as settler colonial nationalism, mission, involuntary labor, pre-political resistance, or defensive modernization in comparative historical perspective. (Formerly course 196W.) Enrollment limited to 20. May be repeated for credit. (General Education Code(s): W.) *The Staff*

194U. The Cold War and East Asia. W

Considers through primary and secondary sources the events and aftermath of the Cold War in East Asia in terms of state formation, domestic and foreign policy, and protest movements in China, Taiwan, Korea, and Japan with reference to Vietnam. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *N. Aso*

194X. The Cold War in the Mediterranean, 1942-1991. *

Writing-intensive course on the Mediterranean. Topics include: U.S. relations with the region (including direct and indirect intervention), local responses, and cultural transformations. Students pursue advanced research using primary and secondary sources. Prerequisite(s): satisfaction of the Entry Level Writing and Composition require-

ments and two upper-division history courses. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *E. Burke*

194Y. Memories of WWII in the U.S. and Japan. S

Research seminar comparing U.S. and Japanese memories of World War II. Topics include war origins, total war, the atomic bomb, war responsibility, reparations, memorials, museums, and monuments. Primary work devoted to research in original texts and documents. Prerequisite(s): two upper-division history courses or permission of instructor; satisfaction of the Entry Level Writing and Composition requirements; course 80Y recommended. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W, E.) *A. Yang*

195A. Thesis Research.

Prerequisite(s): petition on file with sponsoring agency (students should have completed two upper-division courses, preferably in their area of concentration). *The Staff*

195B. Thesis Writing.

Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; petition on file with sponsoring agency (students should have completed two upper-division courses, preferably in their area of concentration). (General Education Code(s): W.) *The Staff*

196. Advanced Research and Reading Seminars.

An opportunity for advanced students to focus on specific research problems resulting in a substantial research paper of 25 pages, or discussion of assigned readings resulting in a series of short papers totaling 25 pages. Courses must be taken in area of concentration in order to count towards the major. *The Staff*

196A. Is British History Possible?. *

An examination of the possibilities and problems of producing a history that is genuinely British: one that pays due attention to the histories of the four modern peoples or nations of the British archipelago. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *B. Sharp*

196B. Social Protests in Late Medieval and Early Modern England. *

Explores the social, cultural, economic, and political context of popular protest in England from 1347 through 1631. An important dimension of that exploration is an examination of official government responses to riot and rebellion. Two courses in medieval or early modern European history recommended as preparation. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; two upper-division history courses. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *B. Sharp*

196C. Modern Italian Culture. F

Developments in Italian culture and society from the postwar to the present. Topics include north-south divisions, family and gender; cinema and modernity, urbanization, mafia, and terrorism. Prerequisite(s): course 164A or 164B or 183A or 183B, or permission of instructor and one upper-division history course; and satisfaction of the Entry Level Writing Requirement. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *C. Polecristi*

196E. Modern Irish History. *

Aims to illuminate major themes and turning points of

modern Irish history: the causes and consequences of the famine; the development of Irish nationalism; revolution, civil war, and partition; and the recent economic boom. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *B. Thompson*

196G. Modern Germany and Europe. S

A senior reading and research seminar that explores the major historiographic debates in German history during the 19th and 20th centuries. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *The Staff*

196I. The French Revolution. *

Students conduct original research on the French Revolution of 1789 based on mix of primary and secondary courses. Classroom discussions focus on interpreting contemporary documents and addressing historiographical issues. Seminar format with significant written requirements. Presumes familiarity with the period. Prerequisite(s): course 70B or 170A or 171. Students who have taken course 70B must also have taken one upper-division history course. Enrollment restricted to history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Traugott*

196J. Autobiography and History. F

Students prepare research papers using a combination of sources, both primary (the autobiographies, diaries, or memoirs of historically relevant figures) and secondary (chronologically and thematically appropriate works of synthesis that help contextualize the lives of their subjects). Seminar format with significant written requirements. Prerequisite(s): satisfaction of the Entry Level Writing requirement; Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *M. Traugott*

196K. Studies in European Intellectual History. *

Topics in European intellectual history from the French Revolution to World War I. Readings exemplifying approaches from history of ideas and intellectual biography to recent studies of rhetoric and political culture. Preparation and presentation of research paper. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *J. Beecher*

196M. Shtetl: Eastern European Jewish Life. *

For several centuries, the shtetl functioned as the center of Jewish life in Eastern Europe. Alternately mythologized and pathologized, the shtetl continues to exist as an imaginary space that defines and distorts the historical image of Eastern European Jewish life. Students cannot receive credit for this course and course 257. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and two upper-division history courses. Enrollment restricted to junior and senior history and Jewish studies majors. Enrollment limited to 20. (General Education Code(s): W.) *N. Deutsch*

196N. Eastern European Jewish Social History. *

Study of 19th- and 20th-century Eastern European and Russian Jewish social history. Prerequisite(s): satisfaction of the Entry Level Writing and Composition require-

ments, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history, German studies, and Jewish studies majors. Enrollment limited to 20. (General Education Code(s): W, E.) *P. Kenez*

196O. Russian Revolution, 1917-1932. *

Study of the major political, social, and intellectual conflicts and transformations of the period. Topics include February and October revolutions, Civil War, NEP, rise of Stalinism, and collectivization. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *P. Kenez*

196P. Hitler and Stalin. *

A discussion of 20th-century totalitarianism. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history, German studies, and Jewish studies majors. Enrollment limited to 20. (General Education Code(s): W.) *P. Kenez*

196R. Social World of Roman Palestine. S

Inquiry into the structures of Roman Palestine on the basis of parables from the synoptic Gospels, the Dead Sea Scrolls, Josephus, inscriptions, and archaeological discoveries. Physical, social, economic, and ideological conditions are researched in an ethnographic fashion. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses. Enrollment restricted to junior and senior history, classical studies, and Jewish studies majors. Enrollment limited to 20. (General Education Code(s): W.) *G. Hamel*

196S. Special Topics in Ancient History. *

Seminar focuses on different topics in ancient history. In addition to assigned readings, the student is expected to do additional research that culminates in a 20-page paper on a topic of the student's choice. General topics for the course will vary from year to year. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, two upper-division history courses, or permission of instructor. Enrollment restricted to junior and senior history majors and classical studies majors. Enrollment limited to 20. (General Education Code(s): W.) *C. Hedrick*

196U. Topics in Medieval History. W

Addresses contemporary and modern interpretations of the events relation to medieval history. Through critical discussion and debate, assesses the value and limitations of various historical sources, as well as developing skills in research, presentation-making, and writing. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, course 102A or 103, and one upper-division history course, or by permission. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): W.) *B. Catlos*

196Y. Saints and Holiness in Medieval Europe. *

Examines popular religious belief and practice, including conversion, the cult of the saints, relics, pilgrimage, miracles and visions. Emphasis on Medieval Europe, but some attention also paid to modern patterns of devotion. Prerequisite(s): two upper-division history courses; satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior history majors. Enrollment limited to 20. (General Education Code(s): W.) *C. Polcrutti*

198. Independent Field Study.

Student's supervision is conducted by a regularly appointed officer of instruction by means other than the usual supervision in person (e.g., by correspondence) or student is doing all or most of the coursework off campus. May be repeated for credit. *The Staff*

199. Tutorial.

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits).

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Methods and Theories of History. F

An overview of theories, methods, and philosophies concerning the nature and production of history. Topics vary with instructor. Enrollment restricted to graduate history students and others by permission of instructor. Enrollment limited to 20. *M. Traugott*

201. Directed Research Colloquium. W

Having already prepared a bibliography and research prospectus in a graduate research seminar, students will undertake further research on their projects, write a 25–30 page research paper, and present their work to their fellow students. Prerequisite(s): history graduate research seminar. Enrollment restricted to graduate history students. Enrollment limited to 15. *A. Yang*

204A. History of Gender Research Seminar. S

Introduction to theories and methods employed in gendered historical research. Readings are drawn from a range of chronological, national, and thematic fields and explore the intersection of gender analysis with such historical problems as the body and sexuality, modernity, national identity, and production/consumption. Enrollment restricted to graduate history majors. Enrollment limited to 15. *M. Westerkamp*

204B. Approaches to Social and Cultural History. *

Graduate reading course focusing on both classic and contemporary approaches to social and cultural history. Readings include: Bakhtin, Benjamin, Foucault, Auerbach, and Berlin, and a variety of more recent studies in social, cultural, and intellectual history. Course not limited to graduate students in History. (Formerly *Society and Culture Research Seminar*.) Enrollment restricted to graduate students. Enrollment limited to 15. *J. Beecher*

204C. Colonialism, Nationalism and Race Research Seminar. *

Research seminar introducing theories and methods of the comparative histories of race, ethnicity, colonialism, and nationalism. Enrollment restricted to graduate history students. Enrollment limited to 15. *M. O'Hara*

205. Diaspora and World History. *

Examines the histories and historiography concerning diaspora. This area of study includes populations from Asia, Africa, Europe, and the Americas. Students study the histories of diasporic populations, and the questions, theory, and methods that scholars use to approach the subject. Enrollment limited to 10. *L. Haas*

210A. Readings in U.S. History. *

Introduction to major themes and controversies in the interpretation of U.S. history. Readings cover both chronological eras and topical subjects, often in a comparative context: colonial and early national periods. Enrollment restricted to graduate history majors. Enrollment limited to 15. *M. Westerkamp*

210B. Readings in U.S. History. W

Introduction to major themes and controversies in the interpretation of U.S. history. Readings cover both chronological eras and topical subjects, often in a comparative context: 19th century. Enrollment restricted to graduate history majors. Enrollment limited to 15. *D. Frank*

215A. Topics in American History: U.S. Labor and Working Class History. *

Addresses topics in history of working people, the labor movement broadly defined, and political-economic change in the U.S. Topics include race, ethnic and gender dynamics, and U.S. labor and working-class history in global context. Enrollment limited to graduate students. Enrollment limited to 15. *D. Frank*

215B. Visions of Progress. *

Explores the emergence of the welfare/regulatory state in the United States from the 1870s to World War I, examining different schools of historical thought about this period. Enrollment limited to 15. *M. Lasar*

215C. U.S. Immigration and Ethnic History. *

Introduces key issues and debates in United States immigration and ethnic history. Topics include causes of immigration; constructions of race, gender and ethnicity; assimilation; transnationalism; and forces shaping immigration policy. Enrollment restricted to graduate students. Enrollment limited to 10. *D. Brundage*

220. The Atlantic World, 1500-1800. *

Explores the economic, social, and cultural history of early America in terms of its Atlantic connections and intersection with the cultures of early modern Europe, Africa, and Latin America. Builds upon previous work in early America and early modern Europe, challenging students both to work comparatively and to break out of traditional geographic models. (Formerly *Topics in American History: The Atlantic World 1500–1800*.) Enrollment restricted to graduate students. Enrollment limited to 15. *M. Westerkamp*

221. Empires and New Nations in the Americas. *

Compares the history of the colonial and 19th-century Americans through a world-history perspective. Focuses on the interrelated themes of indigenous histories, slavery and other forms of servitude, commodity production, and the meaning of equality and freedom in new nations. Enrollment restricted to graduate students. Enrollment limited to 15. *L. Haas*

225. Spanish Colonialism. *

Reading-intensive graduate seminar with emphasis on theoretical and historiographical questions regarding the field of Spanish colonialism in the Americas. Students encouraged to engage in discussions of comparative colonialisms. Enrollment restricted to graduate students. Enrollment limited to 10. *M. Diaz*

230A. Readings in Late Imperial China. W

Survey of the major works on and historiographical controversies about Qing Dynasty (1644–1911) China. Enrollment restricted to graduate students. Enrollment limited to 20. *M. Hu*

230B. Engendering China. *

Reading seminar on the history of Chinese gender, focusing on the Qing dynasty (1644–1911) to the present. Topics include marriage and family, sexuality, work, the gendered language of politics, and major reform movements. Enrollment restricted to graduate students. Enrollment limited to 20. *G. Hershatter*

230C. Readings in 20th-Century China. *

A survey of major Western-language works and historiographical controversies in Chinese history from 1900 to the present. Weekly readings emphasize particular social

and political movements as well as long-term changes in urban and rural society. Enrollment restricted to graduate students. Enrollment limited to 20. *E. Honig*

238A. Research Methods: China. *

An introduction for graduate students to the use of major research tools and sources in Chinese history since 1600, with a focus on 20th-century materials. Students complete a series of bibliographical exercises and prepare a research prospectus. (Formerly course 228A.) Enrollment restricted to graduate students. Enrollment limited to 20. *G. Hershatler*

238B. Research Methods: China. *

Building on the research and bibliographic skills developed in course 228A, students develop a research topic and write a paper of 20–30 pages using primary sources as appropriate in English, Chinese, and/or Japanese. (Formerly course 228B.) Enrollment restricted to graduate students. Enrollment limited to 20. *G. Hershatler*

242. Readings in Modern Japan. *

A graduate course intended to give students a fundamental understanding of the major themes in the study of modern Japanese history. Central themes include modernity and modernization, colonialism, postwar recovery, gender, race, and nationalism. (Formerly course 210.) Enrollment restricted to graduate students. Enrollment limited to 15. *N. Aso*

243. Transnational Japan. *

Examines how "Japanese" history has been forged across, outside, and beyond the boundaries of the modern nation-state of Japan. Considers how Japan has transformed the world. Students debate how the world made Japan and how Japan re-made the world. Enrollment restricted to graduate students. Enrollment limited to 10. *A. Christy*

244. Gender and Japanese History. F

Examines—through primary and secondary sources—constructions of gender (masculine, feminine, and transgender) in Japanese society over the past several centuries, focusing on the modern era. Enrollment restricted to graduate students. Enrollment limited to 15. *N. Aso*

250A. Readings in European Social and Cultural History. *

A readings seminar that introduces beginning graduate students to some of the major conceptual and methodological approaches to early modern European social and cultural history, 1400–1789. (Formerly course 205A.) Enrollment restricted to graduate students. Enrollment limited to 20. *B. Sharp*

250B. Readings in European Social and Cultural History. *

A readings seminar that introduces beginning graduate students to some of the major problems in modern European social and cultural history, 1789 to the present. (Formerly course 205B.) Enrollment restricted to graduate students. Enrollment limited to 20. *P. Kenez*

256. Nationalism, Anti-Semitism, and Jewish Resistance in World War II. *

Jewish resistance to Nazism during World War II, in Eastern Europe, and its historical context. Includes the pre-war rise in nationalism and anti-Semitism in Poland and Lithuania, Jewish integration in the Soviet Union, and the consequences for wartime resistance. (Also offered as History of Consciousness 243A. Students cannot receive credit for both courses.) Enrollment restricted to seniors and graduate students. Enrollment limited to 15. *B. Epstein*

257. Shtetl: Eastern European Jewish Life. *

For several centuries, the shtetl functioned as the center

of Jewish life in Eastern Europe. Alternately mythologized and pathologized, the shtetl continues to exist as an imaginary space that defines and distorts the historical image of Eastern European Jewish life. Students cannot receive credit for this course and course 196M. Enrollment restricted to graduate students. Enrollment limited to 20. *N. Deutsch*

280A. History Graduate Proseminar: Teaching Pedagogy (2 credits). F

Devoted to professionalism and socialization of history graduate students. Includes formal and informal meetings with faculty and other graduate students. Topics include TAships, designing course syllabi, pedagogy, teaching technologies, and teaching in different venues. This course is required for first-year students; however, it is open to all other history graduate students as needed. Enrollment restricted to graduate history majors. May be repeated for credit. *C. Jones*

280B. History Graduate Proseminar: Research Presentations and Grant Writing (2 credits). *

Devoted to professionalism and socialization of history graduate students. Topics include discussion of researching grants; effective CV writing; successful grant applications and publication proposals; and conference paper and panel proposals. Required for first-year graduate students; however, open to all history graduate students as needed. This course is required for first-year students; however, it is open to all other history graduate students as needed. Enrollment restricted to history graduate students. May be repeated for credit. *B. Carlos*

280C. History Graduate Proseminar: Job Market (2 credits). S

Devoted to professionalism and socialization of history graduate students. Includes formal and informal meetings with faculty and other graduate students. Topics include researching position; preparing a CV and the job-application letter; preparing for an interview; practice interview; preparing a job talk and/or teaching presentation; and practice job talk. This course is required for first-year students; however, it is open to all other history graduate students as needed. Enrollment restricted to graduate history majors. May be repeated for credit. *C. Jones*

283. Foreign Language Preparation (2 credits). F,W,S

Independent study course in which history graduate student reads selected texts to fulfill foreign language requirement. Student meets with instructor to discuss readings, deepening his knowledge of the foreign language. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

284. Qualifying Examination Preparation (2 credits). F,W,S

Independent study course designed to help students prepare for qualifying exams. Students meet on regular basis with one or more members of qualifying examination committee to monitor preparation for exam. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

285. Readings in Research Field (2 credits). F,W,S

Independent study focusing on selected texts or authors in history or historical theory. Students meet on regular basis with instructor to discuss readings and deepen their knowledge of a particular author or historical theory. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

286. Research Colloquium on Colonialism, Nationalism, and Race (2 credits). F,W,S

Acquaints students with the department's thematic research clusters in their field to coordinate training in historical research. Students meet on a regular basis with a faculty member of a particular cluster to discuss most important readings in the field. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

287. Research Colloquium on Gender (2 credits). F,W,S

Acquaints students with the department's thematic research clusters in their field to coordinate training in historical research. Students meet on a regular basis with a faculty member of this cluster to discuss most important readings in their field. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

288. Teaching Assistant Preparation (2 credits). F,W,S

Independent study designed to help history graduate students prepare to teach in an area of history outside their specialization. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

289. History Colloquium (2 credits). F,W,S

Independent study designed to foster departmental and cross-disciplinary participation in campus talks, colloquia, conferences, and events. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

294M. Literati, Samurai, and Yangban: A Comparative History of State. *

Critically examines the formation of political elites in East Asia. Compares literati in Ming and Qing China; samurai in Tokugawa, Japan; and yangban in Joseon, Korea. Each group occupied specific roles and functions in their state and society but differed in scale and character. Students cannot receive credit for this course and course 194M. Enrollment restricted to graduate students. Enrollment limited to 20. *M. Hu*

297. Independent Study.

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research.

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

History of Art and Visual Culture

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havic@ucsc.edu
http://havic.ucsc.edu

Faculty and Professional Interests

Professor

HARRY BERGER JR., Emeritus

MARTIN A. BERGER

Gender, race, and representation in U.S. culture

RAOUL BIRNBAUM

Buddhist studies, especially Chinese practices from medieval times to the present; religion and visual culture in China

CAROLYN DEAN

Cultural histories of the native Americas and colonial Latin America

JOHN HAY, Emeritus

VIRGINIA JANSEN, Emerita

JASPER A. ROSE, Emeritus

CATHERINE M. SOUSSLOFF, Emerita

Associate Professor

ELISABETH CAMERON, Patricia and Rowland Rebele Chair in History of Art and Visual Culture (2008-2013)

Visual cultures of central Africa, issues of gender, post-colonialism, and iconoclasm

JENNIFER A. GONZÁLEZ

Contemporary theories of visual culture, semiotics, critical museum studies, photography, public and activist art in the U.S.

DONNA M. HUNTER

European painting (especially French) from 1600 to the 1960s; German art and visual culture between the two world wars; art as social practice; portraiture; monuments, counter-monuments, and anti-monuments

STACY L. KAMEHIRO

Visual cultures of Oceania; colonial cultures; visual culture and identity; gender studies; museums and collecting; material culture

Assistant Professor

MARIA EVANGELATOU

Medieval visual culture with emphasis on Byzantium and its periphery; manuscript illumination, Marian cult and iconography; ancient Greek and Roman visual culture; Islamic visual culture; gender studies

BORETH LY

Visual cultures of Southeast Asia and its diaspora: religions and materiality, theory of visual narrative, the politics of cultural translation; (post) colonial and cultural studies; issues of gender, sexuality, race, and trauma

DANIELA SANDLER

Modern and contemporary architecture and urbanism; visual and cultural studies; social inequality in space; architectural preservation; history and memory in the built environment; architecture and visual culture in Latin America and Europe, with foci on Brazil and Germany



Professor

JOHN DIZIKES, Emeritus (American Studies)

SHELLY ERRINGTON (Anthropology)

Globalization of folk art, visual and social semiotics, photography, film, the Internet and digital media, Southeast Asia, and Latin America

Program Description

The study of visual culture encompasses the production, use, form, and reception of images past and present. It incorporates the painting, sculpture, and architecture traditionally defined by art history, and extends throughout the fields of visual imagery beyond the conventional boundaries formerly drawn by the academy. The History of Art and Visual Culture Department offers courses covering a wide variety of representations from the cultures of Africa, the Americas, Asia, Europe, and the Pacific Islands, including areas as diverse as

ritual, performative expression, bodily adornment, landscape painting, installation art, and video games.

Students of visual culture at UC Santa Cruz (UCSC) investigate complex questions concerning the social, political, economic, religious, and psychological impact of images from the perspective of their producers, users, and viewers. Images play a central role in the formation of values and beliefs, including the perception of gender, sexuality, ethnicity, race, and class. Through attentive historical study and close analysis, students are taught to recognize and assess these systems of value, and are introduced to theoretical and methodological frameworks for future research.

The history of art and visual culture curriculum guides students in acquiring skill in critical thinking about visual culture, leading to a bachelor of arts (B.A.) degree. Each student who chooses to major or minor in visual culture devises an individual study plan with a faculty adviser. The lower-division courses, numbered 1–99, intended for general education students and prospective majors, provide an introduction to the field of visual culture according to geographic areas and visual traditions within those areas. Upper-division courses cover a broad range of issues in various aspects of world culture from earliest times to the present. Advanced upper-division courses focus on selected fields, topics, and methods. The most advanced courses, numbered 190 and 191, are taught in seminar format.

Declaring the Major

To declare the major, students must complete two of the required four lower-division history of art and visual culture courses chosen from two different geographical regions:

10s Africa and its Diaspora;

20s Asia and its Diaspora;

30s–40s Europe and the Americas;

50s Mediterranean;

60s Native Americas;

70s Oceania and its Diaspora

Students considering this major are encouraged to complete these courses early in their studies and consult with the history of art and visual culture undergraduate adviser to develop a plan of study. Transfer students should consult the Transfer Student/Transfer Credit section.

Program of Study

The history of art and visual culture (HAVC) major requires four lower-division and nine upper-division courses including the satisfactory completion of the senior comprehensive requirement. Students must take courses in each of the different cultural settings to ensure methodological and disciplinary breadth.

HAVC majors are also strongly encouraged to take at least one thematic or cross-regional course. (Courses in 80s, 180s, or 191s.)

Lower-Division Requirements

Four courses, each from a different geographical region listed above.

HAVC 80 may be used to fulfill the lower-division regional breadth requirement for regions 10 (Africa), 60 (Native Americas), or 70 (Oceania).

Upper-Division Requirements

Nine courses, as follows:

- course 100A recommended during sophomore or junior year

- courses 101–191: eight courses required, including a seminar (190s and 191s) to satisfy the senior comprehensive (see Comprehensive Requirement below).

In completing upper-division course work, students must complete three upper-division courses (courses 101–191) from three different regions. Two of those regions must be a geographical area not studied at the lower-division level.

Senior Comprehensive Requirement

All seniors must complete one seminar, 190–191, as their “senior exit” course to satisfy the senior comprehensive requirement. Seminars can be taken for senior exit credit only by permission of the instructor. Within the context of this advanced seminar, students will produce carefully supervised work culminating in the completion of a written project that meets the standards of the senior level of achievement in the major. Students whose performance is outstanding are eligible for honors in the senior comprehensive.

Concentration in Religion and Visual Culture

This program is for students who wish to pursue the study of religion in conjunction with studies of visual culture. It consists of an individually planned sequence of courses, including a core set of lower-division courses to provide grounding in issues, methods, and a general history of visual culture; upper-division courses from within the department; and at least four upper-division courses from other departments that focus on the study of religion.

A student enters the concentration by proposing, in consultation with their faculty adviser, a sequence of upper-division courses to fulfill the religion and visual culture requirements. The declaration of major requirements for the religion and visual culture concentration are the same as listed in the Declaration of Major section. The faculty adviser for the religion and visual culture concentration is Raoul Birnbaum.

Requirements for the Religion and Visual Culture Concentration

The 15-course curriculum of the religion and visual culture concentration is pedagogically distinct from that of history of art and visual culture. Students are required to take four lower-division classes (each from a different geographical area) and eleven upper-division courses, seven from within history of art and visual culture and four relevant upper-division courses taken from other departments.

Students in the religion and visual studies concentration complete the following required upper-division curriculum listed below.

Eleven courses, as follows:

- 100A recommended in sophomore or junior year
- 101–191: six courses required, including a seminar (190s and 191s) to satisfy the senior comprehensive (see Comprehensive Requirement above).
- Four relevant upper-division courses in the study of religion from programs on campus such as anthropology, history, literature, and philosophy. (The department maintains a current list of approved courses that focus on the study of religion.)

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. Students in History of Art and Visual Culture meet the DC requirement by completing course 100A.

Minor Requirements

Nine courses, as follows:

- lower-division: three courses from three different geographical regions;
- upper-division: six courses planned in consultation with a faculty adviser.

Department Advising

Undergraduate Adviser

The undergraduate adviser offers specific information about navigating through the program and the curriculum and assists students with requirements, prerequisites, policies and procedures, learning support, scholarships, and special opportunities for undergraduate research.

Faculty Advisers

Faculty are the best resource for learning about the philosophies and foundations of history of art and visual culture. Faculty advisers work individually with students to develop a specific course of study, recommend additional courses of interest, and discuss long-term career goals including education beyond the baccalaureate. A faculty adviser is assigned to each student by the undergraduate adviser during the declaration of major meeting.

Languages

All majors are encouraged to study at least one foreign language. Graduate programs in visual culture, art history, and other related disciplines generally require competence in another language besides English. Students are encouraged to consult with their faculty adviser to discuss an appropriate course of language study.

Transfer Students and Transfer Credit

As preparation, transfer students are encouraged to fulfill at least three of the lower-division history of art and visual culture requirements prior to transfer. Refer to the ASSIST articulation agreements at www.assist.org for approved lower-division courses. A student may transfer up to six art history courses toward the major, only three of which may be upper division. Upper-division transfer credit is evaluated on a case-by-case basis and must be approved by the student's faculty adviser. Transfer students are strongly encouraged to contact the History of Art and Visual Culture Department before enrolling at UCSC.

Study Abroad

The University of California's Education Abroad Program (EAP) operates in countries throughout the world. Students may receive transfer credit for a maximum of three upper-division art history courses taken through the EAP program (see Transfer Student/Transfer Credit above). Many EAP programs require competency in a language besides English (see Languages above). Students should make every effort to consult with a faculty member about their course of study before going abroad.

Careers

The preparation students receive from the baccalaureate of arts degree in history of art and visual culture

provides skills that can lead to successful careers in law, business, and social services, in addition to a more specific focus on museum curating, art restoration, studies in architecture, and studies in art history leading to a graduate degree.

Graduate Study

There are many graduate programs of visual culture that lead to the master of arts (M.A.) and doctor of philosophy (Ph.D.) degree in fields such as art history, cultural history, semiotics, rhetoric, history of religions, comparative arts, theory and criticism of art, and so forth. Most graduate programs require a reading knowledge of one or two languages other than English (see Languages above). Students who are contemplating graduate study should consult with their faculty adviser as early as possible in their undergraduate career.

Graduate Program

The History of Art and Visual Culture Department offers a course of study leading to the Ph.D. in visual studies. The Ph.D. is designed to steep our graduates in the most theoretically relevant methodologies for understanding the significance of visual artifacts and the social and cultural qualities of human vision (termed *visuality*); provide students with exposure to a range of cultural perspectives and visual artifacts drawn from around the world; and cultivate in our graduates the necessary skills and knowledge to secure and excel in academic and curatorial positions. The program is both interdisciplinary and flexible. Students work closely with their advisers and the director of graduate studies to craft personalized courses of study that advance their intellectual and professional goals.

The program employs a wide range of visual evidence for examination, without being constrained by traditional hierarchies of art. Fine arts, architecture, photography, film, performances, utilitarian objects, and popular entertainments all are primary source material for scholars in the field. The program at UCSC is particularly adept at illustrating significant differences in how disparate cultural groups interpret their visual worlds, given the breadth of cultural perspectives taught by our faculty. With scholars focusing on cultures in Africa, the Americas, Asia, Europe, and the Pacific Islands, visual studies at UCSC offers students an unparalleled opportunity to consider the role of social and cultural forces in guiding how and what their members see.

Graduate Program Requirements

Students are required to enroll in a minimum of two courses per quarter until advancement to candidacy (normally achieved no later than the start of their fourth year). Students entering with a B.A. take a total of twelve, 5-credit graduate courses during their first two years of study. Those entering with an M.A. may receive advanced standing based on the evaluation of the visual studies graduate committee. In no case will students entering with an M.A. have more than a year's worth of course work waived.

All students entering with a B.A. (or with an M.A. that is not in visual studies) must take four five-credit core courses within their first two years: HAVC 201, *Introduction to Visual Studies* (fall); HAVC 202, *Critical Theory* (fall); and HAVC 203, *Theories and Histories of Seeing* (winter, taken twice). Students entering with an M.A. in visual studies will meet their core courses requirements after taking *Theories and Histories of Seeing* once.

Field Clusters/Field Specialties

Appreciating that most of our graduates will be required to fit themselves back into traditional disciplinary

structures once they enter the academic job market, the program is designed to provide students with both new means of interpreting visual evidence and suitable depth of understanding in older disciplinary traditions. While all graduates will acquire a shared foundation in theories of *visuality* (attained through our core course requirements), individual student programs vary considerably depending on the type of department in which the student hopes to secure employment after graduation. In addition to completion of the core courses required of all students, each student will develop a cluster of individualized field courses in consultation with their adviser based on her/his particular professional goals.

Each student is required to take a minimum of four, 5-credit courses in a disciplinary cluster (beyond the core course requirements). This requirement pertains both to students entering with a B.A. and an M.A. Acceptable field cluster courses might center around a medium (i.e., painting or architecture), a temporal/stylistic category (i.e., Early Modern or Postmodernism), a cultural, national, or social group (i.e., Pacific Islanders or China), or a disciplinary approach (i.e., cultural anthropology or gender studies). Field clusters are developed in consultation with the student's adviser and, ideally, help lay the foundations for dissertation work. To count toward the degree, field clusters must receive prior approval from the visual studies graduate committee. Beyond the core and field courses, students admitted with a B.A. must complete an additional four five-credit elective courses.

Students entering with a B.A. take four courses to complete the field cluster requirement and another four to meet their elective requirement. Of these eight courses, at least four have a visual studies designation, and at least three courses must be drawn from departments outside of visual studies. Students admitted with a non-visual studies M.A. must take as many as four elective courses beyond those designated core and field (depending on the determination of the visual studies graduate committee based on a review of previous graduate course work), while students admitted with a visual studies M.A. must take a minimum of one course.

Students entering the program with an M.A. in visual studies meet the same distribution requirements as those students entering with a B.A. Of the eight courses making up the field cluster requirements and elective courses, at least four must have a visual studies designation, and at least three courses must be drawn from departments outside of visual studies. Students entering with an M.A. that is not in visual studies meet their distribution requirement by selecting at least five courses with a visual studies designation and at least two courses drawn from departments outside of visual studies.

Visual studies graduate students are encouraged to augment their course electives by drawing from the graduate seminars offered by the departments and programs of Anthropology, Digital Arts and New Media, Film and Digital Media, History, History of Consciousness, and Philosophy.

Language Requirement

Students must demonstrate reading knowledge of one foreign language prior to the start of their second year (either through attainment of a score of 550 or higher on the Educational Testing Service Graduate Student Foreign Language Test or through passage of a reading examination administered by the department).

Students are encouraged to master a second foreign language. Based on a student's area of interest, and the joint assessment of the student's adviser and the director

of graduate studies, proof of proficiency in an additional language or languages may be required prior to the student being admitted to candidacy for the Ph.D. Should proficiency in additional languages be required, it must be demonstrated prior to the close of the student's third year of study.

Qualifying Examinations

After completing all course work and passing one language examination, students are required to pass a qualifying examination prior to the close of the fall quarter of their third year, unless a petition for an extension, demonstrating reasonable cause, is approved by the visual studies graduate program committee. The qualifying examination is divided into three topic areas, with each one including a written and an oral component. Each topic area should display historical breadth and variety of media. Two of the topic areas should ideally relate to the future dissertation topic, while one of the remaining must constitute an outside area, examining a topic that is chronologically, geographically, and/or methodologically distinct from the other two.

Prior to the end of his/her second year, a student who entered the program with a B.A. should consult with his/her adviser to assemble a group of three faculty members who will serve as examiners and aid the student in assembling the necessary topic areas, compiling the needed reading lists, and preparing for the written and oral components of the examination in each area. The examination will have two parts. In part one, each student will respond in writing to three general questions, one posed by each of their three examiners in the pre-arranged topic areas. In part two, each student will gather together with his/her examiners to field questions probing and clarifying the previously submitted written component of the qualifying examination. In order to pass the qualifying examinations, the student must receive the unanimous endorsement of the committee members.

Advancing to Candidacy

Advancement to candidacy follows and is contingent upon passing the qualifying examinations, all needed language examinations, and the subsequent appointment of a dissertation reading committee of at least three members.

Dissertation

After advancing to candidacy, a student must complete an approved dissertation prospectus, a colloquium, and dissertation, and pass an oral defense of the thesis. A written dissertation prospectus is due no later than the end of the second quarter following the student's completion of the qualifying examinations. The prospectus is a brief, concise essay (with bibliography) that defines the scope, methodology, and rationale for the proposed dissertation. It is prepared in consultation with the student's dissertation director, who must approve of the document prior to scheduling the colloquium.

The dissertation director, in consultation with the student and director of graduate studies, will invite four to five faculty members, in appropriate fields, to attend the colloquium and provide input on the prospectus and assess the student's preparedness to begin researching and writing the dissertation. Faculty participating in the colloquium need not be members of the dissertation committee, but should represent faculty whose expertise has bearing on the student's project. A student will pass the colloquium after having demonstrated to the satisfaction of all colloquium committee members adequate preparation to begin researching and writing the dissertation. The dissertation itself must make a significant and original contribution to the field of visual studies,

as judged by each dissertation committee member.

Final Examination

An oral defense of the dissertation is the only final examination requirement, unless a petition to waive the oral defense, demonstrating reasonable cause, is approved by the student's primary adviser and the visual studies graduate program committee. The student's dissertation committee, under the supervision of the director of graduate studies, will conduct the examination. In the event that the director of graduate studies serves on the dissertation committee, the chair of History of Art and Visual Culture will oversee the defense. Interested faculty and students in the visual studies program will have the opportunity to observe the defense.

Minor

UCSC graduate students enrolled in doctoral programs may obtain a minor in visual studies on their Ph.D. degree by meeting the following requirements:

- Securing approval from a core member of the visual studies faculty to serve as an adviser for their minor.
- Having at least one core member of visual studies serve on either their qualifying examination or dissertation committee.
- Submitting a significant piece of writing that demonstrates competency in the field. The writing could take the form of a seminar paper or dissertation chapter. The essay must meet the approval of the student's visual studies adviser.
- Successfully completing four graduate courses taught by either core or affiliated members of the visual studies program. The courses must form a coherent cluster in visual studies and be pre-approved by the student's minor adviser.

Normative Time from Matriculation to Degree

The visual studies Ph.D. program at UCSC is designed to require six years for students matriculating with a B.A. and five to six years (depending on advanced standing granted) for those entering with an M.A. The pre-candidacy period is two years for students entering with a B.A. and a minimum of one year for those arriving with an M.A. in visual studies. During this period students will devote themselves to coursework, completion of the language examination, some teaching, and, ideally, our teaching-related independent study course. Students will show competency in one foreign language prior to the start of their second year, and show competency in additional foreign language(s), as required, by the close of their third year, pass their qualifying examinations during the fall quarter of their third year, complete an approved version of their prospectus and schedule their colloquium for a date prior to the close of the spring quarter of their third year, and finish their dissertation and successfully defend it before the end of their sixth year.

Lower-Division Courses

Africa and its Diaspora

10. Introduction to African Visual Culture. W

An interdisciplinary approach to the study of the basic structures (gender, art within political sphere, and spiritual aspects of visual culture) and cultural institutions (initiations, closed associations, kingship, title association, etc.) around which the study of African visual

culture revolves. (General Education Code(s): CC.)
E. Cameron

Asia and its Diaspora

20. Visual Cultures of Asia. *

An introduction to the art and architecture of East Asia, including China, India, Southeast Asia, and Japan. In order to achieve a fuller understanding of the arts of these countries a historical, cultural, and religious context is provided. (Formerly course 10D, *Presence and Power in the Visual Cultures of Asia.*) (General Education Code(s): CC, IH, A.) *The Staff*

22. Religion and Visual Culture in China. *

Introduction to the study of religious currents and practices in China and their visual expression. In addition to "religious art," topics include such pivotal matters as body concepts and practices, representations of the natural world, and logics of the built environment. (Formerly course 80G.) (General Education Code(s): IM, A, E.)
R. Birnbaum

24. Southeast Asia Visual Culture. S

Introduces the visual cultures of Southeast Asia. Topics include indigenous megalithic art, textiles, and jewelry, as well as Hindu and Buddhist art and architecture. Also considers shadow play and dance performance as alternative lenses to looking at ritual and visual narratives rendered on stone temples. (Formerly course 10C.) (General Education Code(s): CC, IH, A, E.) *B. Ly*

27. Image and Ideology in Indian Art. F

Examination of the ways social, religious, and political patronage have affected the production and reception of art in the Indian subcontinent. The course is designed as a series of case studies from different periods of Indian history. (Formerly course 80N, *Indian Art: Image and Ideology.*) (General Education Code(s): IM, A, E.)
K. Thangavelu

Europe and the Americas

30. Introduction to European Visual Culture. *

An introduction to the European tradition in visual culture, from antiquity to the present, but not in chronological order. All media, including the fine arts, architecture, film, video, and installation and performance work are incorporated. Presents the major visual regimes of representation while it probes the meanings and limits of Europe and the European tradition in the context of the visual. (Formerly course 10G, *Europe.*) (General Education Code(s): IM, IH, A.) *The Staff*

31. The Nude in the Western Tradition. W

The human body without clothing in European and European-American art and visual culture from ancient Greece to the present day. Among the themes to be addressed: gender, youth and age, sexuality and sexual preference, fecundity and potency, erotic art and pornography, primitivism and the naked body of the non-European. (Formerly course 10E.) (General Education Code(s): IM, IH, A.) *D. Hunter*

40. Museum Cultures: The Politics of Display. F

Explores the history of collecting and displaying art (museums, galleries, fairs) since the mid-19th century and the effect of institutional changes on aesthetic conventions. Follows the history from the origins of museums and collections to contemporary critiques of institutional exclusion and misrepresentation. (Formerly course 80D.) (General Education Code(s): IM, A.) *The Staff*

41. Modern Art in Context. *

Examines the social, economic, and political significance of European and U.S. modernist art and architecture,

moving from French realism to American minimalism. Provides the historical background and theoretical frameworks needed to make sense of modernist art and culture. (Formerly course 80V.) (General Education Code(s): IM, A.) *M. Berger*

43. History of Modern Architecture. S

Examines the origins and development of modern architecture, from the Enlightenment and the Industrial Revolution to the 20th Century and beyond. Buildings, urban plans, and works of art and design are discussed in relation to political, social, and cultural currents. (Formerly course 46.) (General Education Code(s): IM, IH, A.) *D. Sandler*

The Mediterranean

50. Ancient Mediterranean Visual Cultures. *

The role that ancient art and visual culture play in constructing social identities, sustaining political agendas, and representing various cultural, ritual, and mythological practices in Mesopotamia, Egypt, Greece, and Rome, including the sociology of ancient cultures, mythology, religious studies, gender studies and history. (Formerly course 80E.) (General Education Code(s): IM, A.) *The Staff*

51. Greek Eyes: Visual Culture and Power in the Ancient Greek World. F

The central role of visual communication in ancient Greek civilization: examines the construction of cultural, social, political, religious, and gender identities through material objects and rituals. Includes discussions of images of the public and private sphere, athletic and theatrical performances, mythology, pilgrimage, and magic. (Formerly course 80X, *Greek Eyes: Visual Culture and Power in the Ancient Greek*.) (General Education Code(s): IM, A.) *M. Evangelatou*

Native Americas

60. Indigenous American Visual Culture. *

Selected aspects of art and architecture of the first peoples of the Americas, north, central, and south, from ca. 2000 B.C.E. to present. Societies to be considered may include Anasazi, Aztec, Inca, Northwest Coast, Maya, Navajo, Plains, and others. (Formerly course 80M.) (General Education Code(s): ER, A, E.) *C. Dean*

Oceania and its Diaspora

70. Visual Cultures of the Pacific Islands. S

Interdisciplinary course examines visual cultures of Australia, Melanesia, Micronesia, and Polynesia from the archaeological past through contemporary periods. (Formerly course 105P.) (General Education Code(s): CC, A, E.) *S. Kamehiro*

Topics and Cross-Regional Studies in History of Art and Visual Culture

80. Colonial Histories and Legacies: Africa, Oceania, and the Indigenous Americas. W

A comparative study of the arts of selected cultures which developed outside the spheres of influence of the major European and Asian civilizations. Emphasis is on the function of the arts in these disparate geographic regions. Students cannot receive credit for this course and course 100E. (Formerly course 10E, *Africa, Oceania, and the Americas*.) (General Education Code(s): CC, IH, A, E.) *E. Cameron*

81. Video Games as Visual Culture. W

Through the aesthetics and theory of electronic games, introduces the histories, ideas, and debates that inform game studies. Topics include: narratology/ludology debates, interactivity, serious games, and alternative games.

(Formerly course 80H.) (General Education Code(s): IM, T5-Humanities and Arts or Social Sciences, A.) *The Staff*

99. Tutorial. F,W,S

Supervised study for undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

100A. Methods in History of Art and Visual Culture. W

Introduction to major issues of method and critique in study of art and visual culture. Focuses on understanding disciplinary and critical modes of scholarly inquiry in the visual arts, including role of historical research. Emphasizes intensive reading, discussion, and writing. Course 100A is a prerequisite for all History of Art and Visual Culture seminars. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to sophomore, junior, and senior History of Art and Visual Culture majors. (General Education Code(s): W,A.) *The Staff*

Africa and its Diaspora

110. Visual Cultures of West Africa. *

Explores visual cultures of West Africa through time (Nok to present). Attention paid to relationships between peoples and impact of European/Arab presence on visual cultures. Prerequisite(s): course 10 or 80 recommended. (Formerly course 107B, *West Africa*.) (General Education Code(s): CC, A, E.) *The Staff*

111. Visual Cultures of Central Africa. F

Examination of visual cultures of Central Africa within a historical sequence from the Sanga archaeological excavations to contemporary easel painting. (Formerly course 107A, *Central Africa*) Prerequisite(s): course 80 suggested. Enrollment restricted to sophomores, juniors and seniors (recommended). Enrollment limited to 90. (General Education Code(s): CC, A, E.) *E. Cameron*

115. Gender in African Visual Culture. *

In Africa, relationships exist between gender and visual culture. Course examines where categories come from, differences in men's and women's visual cultures, and how visual cultures teach, reinforce, and negotiate gender definitions. When are male/female boundaries crossed, and why? (Formerly course 185B, *Gender*.) Enrollment limited to 35. (General Education Code(s): A, E.) *E. Cameron*

116. African Architecture. *

Study of the built environment in Africa. Focusing in depth on 10 major architectural forms or sites, this course explores the diversity of architectural types and how gender, politics, religion, and culture shape and are shaped by architectural spaces. (Formerly course 185C.) Enrollment limited to 35. (General Education Code(s): A, E.) *E. Cameron*

117. Contemporary Art of Africa. *

Examines contemporary arts in post-colonial Africa, 1960-present, including new popular cultural forms; arts resulting from new class and national structures; commodification of culture; Pan-Africanism; exhibitionism; and questions of destiny. (Formerly course 185D.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 35. (General Education Code(s): IM, A, E.) *E. Cameron*

118. Art of the Contemporary African Diaspora. *

Considers contemporary art by African artists operating

in metropolitan centers, as well as Afro-British, Afro-Caribbean, and African-American production. Topics are organized thematically and address constructing and deconstructing the idea of Africa; cultural authenticity; diaspora; Creolité and creolization; hybridity; cosmopolitanism; post-black; and globalism in the arts. (Formerly course 189Y.) Recommended: background in art history. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 35. (General Education Code(s): A.) *The Staff*

Asia and its Diaspora

122. Visual Cultures of China.

122A. Sacred Geography of China. *

An examination of the close relationship of religious traditions and the natural world in China, and its expression in visual representation. Particular emphasis on the ways in which competing groups sought to define or re-envision an understanding of the terrain. (Formerly course 154A.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 35. (General Education Code(s): CC, A.) *R. Birnbaum*

122B. Constructing Lives in China: Biographies and Portraits. *

Consideration of biographies and portraits in China as representations of human types and individuals, and the use of these representations as models for constructing lives. Attention to historical and social contexts, early times to present. Special focus on Chinese Buddhist traditions. A previous course that focuses on traditional China or Buddhist studies strongly recommended. (Formerly course 155.) Enrollment limited to 35. (General Education Code(s): CC, A, E.) *R. Birnbaum*

122C. Writing in China. *

Examines material and conceptual phenomena of writing in Chinese visual culture. Focuses on the intersections of places and practices of writing through various inscribed sites, ranging from oracle bones, seals, and mountain facades to hand scrolls, architecture, and contemporary art. (Formerly course 159D.) Enrollment limited to 35. (General Education Code(s): A.) *The Staff*

122D. Chinese Landscape Painting. *

Examines the history and significance of the subjects most prominent in Chinese painting during the past one thousand years, focusing on the cultural factors that made landscape a fundamental value in the Chinese tradition and the methods whereby painters created pictorial equivalents. (Formerly course 159B.) Enrollment limited to 35. (General Education Code(s): IM, A.) *The Staff*

123. Visual Cultures of South Asia.

123A. Modernity and Nationalism in the Arts in India. F

Deals with artistic responses to the forces of modernity, colonialism, industrialization and globalization in India during the 19th and 20th centuries. Addresses the complex and often painful climb toward re-establishing a truly Indian artistic identity. (Formerly course 189D.) Enrollment limited to 35. (General Education Code(s): A, E.) *K. Thangavelu*

123B. Religions and Visual Culture of South Asia. *

South Asia is the home of many religions (Hinduism, Buddhism, Jainism, Islam, and Sikhism). Introduces the role images (painting, sculpture, architecture, photography, film) play in shaping these diverse reli-

gious traditions. (Formerly course 106A.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 80. (General Education Code(s): CC, A, E.) *B. Ly*

124. Visual Cultures of Southeast Asia.

124A. Arts of Ancient Southeast Asia. W

Focuses on Hindu and Buddhist arts of ancient Southeast Asia (Indonesia, Cambodia, Vietnam, and Thailand). Materials covered include indigenous megalithic arts, stone sculptures, and monumental temple architecture such as Angkor Wat, Borobudur, Prambanan, and the Bayon. Prerequisite(s): course 20, 24, 27, 122B, 123B, 124B, 124C, or 124D, or permission of instructor. Enrollment restricted to sophomores, juniors, and seniors. (General Education Code(s): CC.) *B. Ly*

124B. History of Photography in Southeast Asia. *

Examines how photography was used in Southeast Asia to document the racial difference and the exotic "Others" under the regime of colonialism. Considers the role photography played in "documenting" the Vietnam-American War and how contemporary Southeast Asian-American artists challenge this photographic history in their art. Prerequisite(s): course 20, 24, 27, 123A, 124A, 124C, 124D, 141E, or 141F, or permission of instructor. Enrollment restricted to sophomores, juniors and seniors. (General Education Code(s): CC.) *B. Ly*

124C. Arts and Politics in Theravada Traditions. *

Consideration of the arts and architecture in Theravada Buddhist traditions in Sri Lanka and Southeast Asia. Topics and themes include ritual, relics, visual narrative, mural painting, contemporary art, mass-mediation movement, and political protest. (Formerly course 163B.) Prerequisite(s): course 20, 24, or 123B; enrollment restricted to juniors and seniors. Enrollment limited to 35. (General Education Code(s): CC, A.) *B. Ly*

124D. Contemporary Art of Southeast Asia and its Diaspora. *

Examines the respective national notions of modernity in the region through a comparative lens. How global capital flow and transnational cultural exchanges impact the production of arts of Southeast Asia and its diaspora. Themes and issues include: colonialism and art education; nationalism; identity politics; memory; trauma; gender; race; sexuality; and the body. Prerequisite(s): course 20, 24, 41, 43, 123B, 124A, 124B, 124C, 141A, 141B, 141C, 143B, 143C, or 143D. Enrollment restricted to sophomores, juniors, and seniors. (General Education Code(s): CC.) *B. Ly*

127. Topics in Cross-Regional Studies in Visual Cultures of Asia.

127A. Buddhist Visual Worlds. F

Introduction to the study of Buddhist visual traditions, from their beginnings to the present day. Case studies examined with careful attention to historical, social and cultural contexts; particular emphasis on the relation of visual traditions to Buddhist practices. (Formerly course 114.) Enrollment restricted to sophomore, junior, and senior students. (General Education Code(s): IM, A.) *R. Birnbaum*

127B. Buddhist Pure Lands. S

Conceptions of "pure lands" have engaged the imaginations of Mahayana Buddhists for more than two

millennia. Course considers literary and visual representations of pure lands and their inhabitants, as well as related practice traditions. Special emphasis on Chinese traditions. Previous courses in Asian visual cultures and/or Buddhist studies recommended. (Formerly course 154D.) Enrollment limited to 35. (General Education Code(s): CC, A.) *R. Birnbaum*

127C. Ritual in Asian Religious Art. *

Examination of interaction between image and ritual in Asian religious art. Case studies from different historical periods and geographical locations (e.g., China, Tibet, Japan, Indonesia, India). Examples include mandalas, ritual bronzes, tankas, sacred caves, temples, tea ceremonies, and calligraphy. (Formerly course 105E.) (General Education Code(s): IM, A, E.) *The Staff*

127D. Storytelling in Asian Art. *

Combination of theoretical perspectives on narrative from literary criticism, rhetoric, folklore, and film theory with art historical focus on images (cave temples, stone reliefs on stupas, scrolls, dance-drama, etc.) from India, Pakistan, China, Japan, Cambodia, and Indonesia. (Formerly course 160.) Enrollment limited to 35. (General Education Code(s): A, E.) *The Staff*

Europe and the Americas

135. History of Art and Visual Culture in Europe.

135B. German Art, 1905–1945. F

Expressionism, agitprop, the Bauhaus, New Objectivity, attacks on modernism, National Socialist realism. Painting, sculpture, graphic art, and some architecture and film, studied in the context of political events from the eve of World War I to the end of World War II. (Formerly course 136.) (General Education Code(s): IM, A.) *D. Hunter*

135D. French Painting, 1780-1855. *

The art of David, Gros, Ingres, Gericault, Delacroix, the Barbizon School, and Courbet studied in relation to the changing status of the art and the political events from 1789 to 1848. Second in a series of three courses on French art and its historical context. See courses 135C and 141A. (Formerly course 177.) Enrollment limited to 35. (General Education Code(s): IM, A.) *D. Hunter*

135E. Jewish Identity and Visual Representation. *

An exploration of the theoretical and practical or experiential applications of Jewish identity in European visual representation. Brief background on pre-emanicipation textual and cultural issues followed by study of the Jewish subject and Jewish subjectivities in modernity. (Formerly course 172.) Enrollment restricted to juniors and seniors. Enrollment limited to 35. (General Education Code(s): IM, A, E.) *The Staff*

135F. History of the Book. *

History of book production and use in the West from antiquity to modern times. Development from roll to codex and from script to print. Emphasis on the relationship between text and image. Class conducted in Special Collections, McHenry. Exhibition as class project. (Formerly course 153.) Enrollment limited to 25. (General Education Code(s): A.) *E. Remak-Honnef*

137. Renaissance.

137A. Northern Renaissance Art. *

Considers the painting and prints produced in North-

ern Europe in the 15th and 16th centuries. Major issues include the status of realism and classicism, the role of religion and religious reform, and the rise of popular imagery. (Formerly course 105R.) (General Education Code(s): A.) *The Staff*

137B. Italian Renaissance: Representation and Institutions. *

Lives of Italian Renaissance people from birth to death, examining the nature and roles of the institutions which defined human existence in this period. Uses visual arts both illustratively and to study how institutions fashioned their images through art and architecture. (Formerly course 115.) (General Education Code(s): IM, A.) *The Staff*

137C. High Renaissance. *

An investigation of the High Renaissance as a period and stylistic concept, using the major artists and monuments of the period 1480–1525 to discuss issues of theory, history, and art. Artists considered include Leonardo da Vinci, Michelangelo, and Raphael. (Formerly course 168.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 35. (General Education Code(s): IM, A.) *The Staff*

137D. Art of the Venetian Renaissance. *

Considers Venetian art in the 15th and 16th centuries. Topics include major artists (the Bellini, Carpaccio, Titian, Tintoretto, Veronese, Palladio) and the relationship of the city to outside forces (Byzantine Empire, Turkish Empires) and other Italian cities. (Formerly course 189V.) Enrollment limited to 35. (General Education Code(s): IM, A.) *The Staff*

137E. Renaissance Prints. *

Examines the issues surrounding the technology and uses of printed images from the early Renaissance through the end of the early modern period. Topics may include the political, religious, and satirical uses of prints and the representation of women in prints. (General Education Code(s): IM, A.) *The Staff*

140. History of Art and Visual Culture in the U.S.

140A. America in Art. *

Introduction to American visual arts: architecture, painting, photography, sculpture, and performance art, from the nineteenth through the twenty-first century. Explore social and political meanings of art and what art reveals about our nation's values and beliefs, in particular, gender and race. (Formerly course 126.) (General Education Code(s): IM, A.) *M. Berger*

140B. Victorian America. *

Examines how American writers and artists negotiated complexities of U.S. society during the 19th century. Emphasis on issues ranging from women's rights to laissez-faire capitalism, and from Reconstruction to manifest destiny. Considers how the era's cultural products provided artists, patrons, and audiences with metaphorical coping strategies to counteract what Victorians perceived to be the period's overwhelming social and political changes. (Formerly course 178A.) Enrollment limited to 35. (General Education Code(s): IM, A.) *M. Berger*

140C. Race and American Visual Arts. S

Investigation of the role played by visual arts in fashioning racial identities of European-Americans, African Americans, Native Americans, and Latinos in the United States. (Formerly course 156.) Enrollment limited to 35. (General Education Code(s): ER, A, E.) *M. Berger*

140D. Chicano/Chicana Art: 1970–Present.*

Taking the terms “Chicano” and “Chicana” as a critical framework, addresses cultural and conceptual themes in visual art production since 1970. Questions concerning aesthetics, identity, gender, and activism in painting, photography, murals, and installation art explored. (Formerly course 182.) (General Education Code(s): ER, A, E.) *J. González*

141. Modern Art and Visual Culture in Europe and the Americas.**141A. Impressionism to Pop Art: Art in Modern Culture.***

Critical reading of modernism as a high art tradition. Emphasis on context: culture of capitalism, shift in power from Europe to the U.S., role of gender and race, and the aesthetic as either apolitical refuge or site of disruption and critique. Third in a sequence of three courses on French art and its historical context; see courses 135C and 135D. (Formerly course 137.) (General Education Code(s): IM, A.) *The Staff*

141B. Surrealism to Postmodernism.*

From Paris to New York, World War II to Vietnam, consumerism to conceptualism, an introduction to visual arts and theories of representation produced in the U.S. and Western Europe between 1930 and 1990, with attention to the social and political role of the art market, criticism, and censorship. (Formerly course 140, Surrealism to Postmodernism, Paris-New York.) (General Education Code(s): IM, A.) *J. González*

141C. Activist Art Since 1960: Art, Technology, Activism.*

Students explore art and technology produced for social change since 1960 within the context of major historical ruptures, such as the Vietnam War, the women’s movement, environmental protection, AIDS activism, anti-capitalist, and international human rights movements. (Formerly course 142.) (General Education Code(s): IM, A, E.) *The Staff*

141E. Histories of Photography.*

Introduction to the histories of photography and the critical debates around different photographic genres such as medical photography, art photography, and political photography. Students will develop a critical language in order to analyze photographs while considering the importance of social and institutional contexts. (Formerly course 149A.) (General Education Code(s): IM, A.) *J. González*

141F. The Camera and the Body.*

Through the study of historical and contemporary visual texts (from ethnography and portraiture to advertising and erotica), this course explores how photographic images of the body, while masquerading as “natural,” “self-evident,” or “scientific,” participate in highly coded sign systems that influence who looks at whom, how, when, and why. (Formerly course 180.) Enrollment limited to 35. (General Education Code(s): IM, A.) *J. González*

141H. Media History and Theory.*

An introductory examination of the writing about the issue of “medium” and media theory in visual culture. Technologies, discourses, and practices from all periods that use the comparison of media as a major approach to understanding the problems of the visual are highlighted. New media, film, television, video, traditional arts are also treated. (Formerly course 131.) (General Education Code(s): IM, A.) *The Staff*

141I. Environments, Installations, and Sites.*

A study of conceptual and formal issues that have informed the production of temporary, site-specific art works since 1960. Works that seek to transform the role of the audience, to escape or remake museum and gallery spaces, to introduce environmental concerns, or to situate art in “the land” or in “the street” serve as a focus. (Formerly course 181.) Enrollment limited to 35. (General Education Code(s): IM, A.) *J. González*

141M. Museum Practices. W

How are museums organized, categorized, visited? How are objects physically handled, documented, and displayed? Going beyond the practical, course interrogates the concepts that practice is based on and the impact these concepts have on society and culture in the United States. Prerequisite(s): course 40 or by permission of instructor. Enrollment restricted to History of Art and Visual Culture majors and minors. Enrollment limited to 35. *E. Cameron*

143. Architecture.**143A. Contemporary Architecture and Critical Debates.***

Examination of practitioners, projects, issues, and theories in contemporary architecture circa 1968 to the present. Topics include the architecture of aftermath, the ethics of memory and memorialization, the corporatization of museums, the role of criticism and exhibitions, and the cult of the brand-name architect. (Formerly course 124.) (General Education Code(s): IM, A.) *The Staff*

143B. History of Urban Design. F

Examines urban design from the Renaissance to the present, including Latin American colonial cities, Utopian plans, and sites such as Brasilia and Chandigarh. The course focuses on social justice, diversity, and the role of art and architecture. Enrollment restricted to juniors and seniors. (General Education Code(s): IM.) *D. Sandler*

143C. Latin American Modern Architecture.*

Presents Latin America’s modern architecture with relation to colonization; the influence of immigrants from Europe, Africa, and Asia; the presence of indigenous cultures; and the search for autonomy. Case studies include Argentina, Brazil, Chile, Mexico, Venezuela, and Uruguay. (General Education Code(s): A, E.) *D. Sandler*

143D. Architecture and the City in Modern and Contemporary Visual Culture.*

Examines the modern and contemporary depictions of cities in visual and material culture, from paintings and photographs to logotypes and souvenirs. Also examines the roles of narrative in spatial representations, including literature, film, and television productions. Enrollment restricted to juniors and seniors. (General Education Code(s): IM.) *D. Sandler*

The Mediterranean**151. Greek Myths Antiquity to the Present.***

Myths dominated the culture and visual production of the ancient Greek world, and their presence is still strong today. How did they codify social, political, and religious realities and needs? How were they perceived in different time periods? In addition to ancient Greek and Roman and later European sculptures and paintings, this course considers less conventional sources, such as modern films, comics, and advertisements. Course 51 recommended

as preparation.. (Formerly course 106I, *Myth in Greek and Roman Art*.) (General Education Code(s): IM, A.) *M. Evangelatou*

153. The Mediterranean from the Rise of Christianity to the Rise of Islam. F

The use of images in the transition from polytheism to Christianity and from the late Roman to the early Byzantine Empire (3rd-7th Centuries, C.E.). Examines visual culture at the intersection of historical, social, political, and religious developments. Course 51 or 151 recommended as preparation. (Formerly course 163A, *Early Medieval Visual Culture: The Mediterranean*.) Enrollment restricted to sophomores, juniors, and seniors; other students should contact instructor. One quarter of a 10-series course or a course in ancient or medieval culture is recommended as preparation. Enrollment limited to 35. (General Education Code(s): IM, A.) *M. Evangelatou*

154. Byzantine Visual Culture: Politics and Religion in the Empire of Constantinople, 330-1453 A. C.. F

Centered on the capital city of Constantinople (modern Istanbul), the Hellenized and Christianized Roman Empire of the Eastern Mediterranean today known as Byzantium played a major, yet often overlooked, role in European history for more than a millennium. This course examines its visual production and relation to politics and religion in court and church ceremonial, expressions of Christian faith, and cultural interactions with Western Europe, Islam, and the Slavic world. (Formerly course 104A, *Byzantine Visual Culture: Politics and Religion in New Rome, 300-1453 A. D.*) (General Education Code(s): IM, A.) *The Staff*

Native Americas**160. Topics in Pre-Hispanic Visual Culture.****160A. Mexico.***

Art and architecture of selected pre-Hispanic cultures from the gulf coast, central, western, and southern Mexico including the Olmec, Zapotec, Toltec, Mixtec, Mexica (Aztec), and others. (Formerly course 110A.) Offered in alternate academic years. (General Education Code(s): IM, A.) *C. Dean*

160B. The Andes. F

The art of selected pre-hispanic cultures of Colombia, Ecuador, Peru, and Bolivia including the Nazca, Moche, Chimú, and Inca. (Formerly course 110B.) (General Education Code(s): IM, A.) *The Staff*

162. Advanced Studies in Pre-Hispanic Visual Culture.**162A. The Maya. S**

The art and architecture of the Maya of southern Mesoamerica from the first century C.E. to ca. 1500. Courses 80, 60, or 160A recommended as preparation. (Formerly course 150A) Enrollment limited to 35. (General Education Code(s): CC, A.) *C. Dean*

162B. The Inka.*

The visual culture of the Inka of the Andean region of western South America including textiles, metalwork, and the built environment. Courses 80 (formerly 10E) or 60 (formerly 80M) recommended as preparation. (General Education Code(s): CC.) *C. Dean*

163. The Native in Colonial Spanish America.* Indigenous contributions to colonial Spanish American visual culture including architecture, manuscripts, sculpture, painting, textiles, feather-work, and metallurgy. Focus on colonial Mexico, the Andes, and California.

(Formerly course 151A.) Enrollment limited to 35. (General Education Code(s): A, E.) *C. Dean*

Oceania and its Diaspora

170. Art of the Body in Oceania. F

Explores "art of the body," defined broadly, from various perspectives. Examines colonial representations of Oceanic bodies, self-representation through bodily adornment and display (including tattoo, scarification, body painting, ornament, and dress), and bodily metaphors in Oceanic visual cultures. (Formerly course 80T.) (General Education Code(s): ER, A, E.) *S. Kamehiro*

172. Textile Traditions of Oceania. W

Investigates how textiles contribute to cultural fabric of Oceania. Explores women's roles in socioeconomic exchanges and cultural production; gender issues regarding production and function of Oceanic textiles; and history of processes, functions, and aesthetics. (Formerly course 187A.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements. Prior coursework related to Oceania recommended. Enrollment restricted to juniors and seniors or by permission of instructor. Enrollment limited to 25. (General Education Code(s): CC, W, A, E.) *S. Kamehiro*

Topics and Cross-Regional Studies in History of Art and Visual Culture

180. Gardens of Delight: Fifteen Centuries of Islamic Visual Culture. W

Examines some of the most representative creations of Islamic visual culture from the 7th Century to the present in order to appreciate the richness of this tradition and its extensive influence on other cultures. Focuses on the social, political, and religious role of a variety of materials, from mosques, palaces, and gardens to visual narratives, ceremonies, dance, and contemporary films. (Formerly course 139, *The Art and Architecture of Islam*.) (General Education Code(s): CC, A, E.) *M. Evangelatou*

190. Seminars in the History of Art and Visual Culture.

190A. African Art and Visual Culture. *

Advanced seminar requiring intensive research and writing on changing topics related to a specific area of African art and/or visual culture chosen to demonstrate critical mastery of this subject. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191O.) Prerequisite(s): courses 100A, and 80 or 10. Enrollment restricted to juniors and seniors majoring or minoring in history of art and visual culture. Enrollment limited to 18. May be repeated for credit. (General Education Code(s): A, E.) *E. Cameron*

190B. Play and Ritual in Visual Cultures. *

Compares how play and ritual construct worlds and regulate visual cultures—from dolls to "ritual" objects and performances. Attention given to areas where play and ritual overlap and the visual cultures that result. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191F.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A, E.) *E. Cameron*

190D. The World of the Lotus Sutra. *

Close study of the principal text of East Asian Buddhism as a self-enclosed vision of reality, with careful consideration of the forms and functions of the

world of visual and aural representation that it has inspired. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 100A and course 127A or permission of instructor. Enrollment limited to 18. (General Education Code(s): A.) *R. Birnbaum*

190E. Huayan Visions. *

Explores the distinctive conceptual world of the Buddhist *Huayanjing* (*Avatamsaka-sutra*) and its expression in visual forms. This long text, composed in Sanskrit and later translated into Chinese, is a principal scripture of the international Mahayana Buddhist traditions of Asia. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190I.) Prerequisite(s): course 100A; course 127A, an upper-division course in Buddhist studies is recommended, or permission of the instructor. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *R. Birnbaum*

190F. Chan Texts and Images. *

Examines selected issues in history of Chan (Zen) Buddhist traditions in China from medieval times to the present day. Concepts, methods, and visual expression of Chan practice situated through study of texts and visual materials. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191H.) Prerequisite(s): course 100A, and course 127A or permission of instructor. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *R. Birnbaum*

190G. Buddhist Wisdom Traditions. W

Careful study of Mahayana Buddhist perfection-of-wisdom traditions—texts and related material culture, including visual imagery and illustrated books—with focus on the particular vision of reality that they aim to produce or reveal. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191Z.) Prerequisite(s): courses 100A and 127A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *R. Birnbaum*

190J. Visual Cultures of the Vietnam-American War. *

Examines the visual culture of the Vietnam-American war and its legacy in contemporary art of Southeast Asia. Considers representations in different media: painting, drawing, photography, film, novels, and material cultures. Issues addressed include memory, trauma, identity politics, body, race, gender, pornography, and prostitution. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191A.) Prerequisite(s): course 100A; and one of the following or permission of instructor: course 20,24,123B, 124A, 124B, 124C, or 124D. Enrollment restricted to junior and senior history of art and visual culture majors. Enrollment limited to 18. (General Education Code(s): ER, A, E.) *B. Ly*

190K. Thematic Approach to Visual Cultures of Southeast Asia. *

Undergraduate seminar that takes topical and thematic approach to looking at ancient or modern and contemporary arts of Southeast Asia (e.g., textile, water in arts and architecture, comparative modernity, race, gender, and sexuality). The specific topic and theme varies from year to year. This course can be taken for senior exit credit only by permission of the instructor.

Prerequisite(s): course 100A; and one of the following or permission of instructor: course 20,24,123B, 124A, 124B, 124C, or 124D. Enrollment restricted to junior and senior history of art and visual culture majors. Enrollment limited to 18. *B. Ly*

190M. Representations of Women in Indian Art. *

Deals with representations of the female divinity in Indian religious imagery, and of women in secular and courtly paintings. Also examines roles women play in the production of art in the Indian subcontinent. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190U.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A, E.) *K. Thangavelu*

190O. Berlin: History and the Built Environment. *

Explores Berlin's urban and architectural history through themes: the meaning of memory in architecture; the political and cultural implications of preservation, globalization, and tourism. Because these questions are relevant beyond Berlin, course draws comparisons with other cities. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *D. Sandler*

190P. Death and Patriotism: The Case of the French Revolution. *

What are the relations between the mortal body and politics in times of crisis? What purposes can death, or the threat of death, serve? Examines representations of executions, assassinations, and funerals during the French Revolution, with an emphasis on the Terror. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *D. Hunter*

190Q. Portraiture: Europe and America, 1400–1990. S

Western portraiture and self-portraiture at certain key moments (early modern Italy, 16th-century Germany, 17th-century Holland, France from the reign of Louis XIV to the Revolution, contemporary U.S.) are explored by reading 20th-century interpretations and some primary sources. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 100A. Enrollment limited to 18. (General Education Code(s): A.) *D. Hunter*

190R. The Life/Sculpture of Gianlorenzo Bernini, Master of the Roman Baroque. *

Sculptures, performances, and art theory of Roman Baroque artist Gianlorenzo Bernini. Early modern sources on Bernini's life and recent art history used to assess issues in cultural theory: embodiment, performance/performativity, visual and textual genres, space/time in sculpture. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191B.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *The Staff*

190T. Topics in Pre- and Post-Columbian Visual Culture. F

Seminar on changing topics related to the current scholarship on pre-Hispanic and colonial Spanish American visual culture. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors. Juniors and seniors from other majors may enroll with permission of the instructor. Enrollment limited to 18. *The Staff*

190U. Word and Image in Illuminated Byzantine Manuscripts. *

Religious, scientific, and secular manuscripts of Byzantium: examines how words and images interacted to express and promote central concepts of Byzantine culture; serve liturgical needs of private devotion; reflect imperial ideals; diffuse moral values and knowledge; and proclaim social status and cultural affiliations. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190R.) Prerequisite(s): course 100A, and course 154 or permission of instructor. Enrollment restricted to juniors and seniors. Enrollment limited to 18. (General Education Code(s): A.) *M. Evangelatou*

190V. Cult of Mary in Byzantium. W

Why did the cult of the Virgin Mary become so important in Byzantine culture? Examines historical, cultural, theological, political, and social reasons for this development, seen through the interaction of Byzantine visual culture and literature. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191X.) Prerequisite(s): courses 100A and 154. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *M. Evangelatou*

190W. Art and Culture Contact in Oceania. F

Examines impact of culture contact on Oceanic and Euro-American visual cultures in context of "discovery," colonialism, and "postcolonialism." Topics include 18th-century visual culture, colonial identities, primitivism, syncretism, impact of Christianity, contemporary art/market, media, tourism, transnationalism, and globalization. Course can be taken for senior exit credit only by permission of instructor. (Formerly course 190O.) Prerequisite(s): course 100A; prior course work related to Oceania recommended. Enrollment restricted to junior and senior history of art and visual culture majors and minors, or by instructor permission. Enrollment limited to 18. (General Education Code(s): A, E.) *S. Kamehiro*

190X. Art and Identity in Oceania. *

Theoretical discussions and Pacific Basin case studies on 1) definitions of cultural, ethnic, and national identities; 2) relationship between art, museums, and construction of historical and cultural narratives; 3) ways "tradition" defined in art practices and used by groups to assert an identity in their present. Participants first develop a theoretical framework and vocabulary for analyzing artistic production in a variety of cultures. Through specific case studies, will explore how art, architecture, and museums actively contribute to define and challenge ethnic and national identities. Course can be taken for senior exit credit only by permission of instructor. (Formerly course 191P, Art and Identity in the Pacific: Creating and Challenging Ethnic and National Identities.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior his-

tory of art and visual culture majors, or by permission. Enrollment limited to 18. (General Education Code(s): ER, A, E.) *S. Kamehiro*

191. Seminars in the History of Art and Visual Culture.**191A. Iconoclasm. ***

What happens when, to control an object, it is destroyed? Examines destruction of art as a way of ending the object's life cycle, as a device of social tension/change, and as a colonial and post-colonial mechanism of religious/political control. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 191C.) Prerequisite(s): course 100A; and course 80 or permission of instructor. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A, E.) *E. Cameron*

191B. The Virgin of Guadalupe: Images and Symbolism in Spain, Mexico, and the U.S. F

Focus on the histories of miraculous images of *La Virgen de Guadalupe de Extremadura* (Spain) and *La Virgen de Guadalupe de Tepeyac* (Mexico). The foundations and growth of the cult of the Mexican Guadalupe during the colonial period is examined along with the multivalent symbolism of her image. Considers contemporary "appearances" of the Virgin of Guadalupe, from the miraculous images on a tree in central California and the compositions of Chicano artists, to mass-produced kitsch. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190B.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A, E.) *C. Dean*

191C. Subalternatives: Representing Others. *

Explores how visual representation (in fine art, popular art, film, and television) encodes difference in selected cultural and historical contexts. Considers (post)colonial image-making both as a strategy of domination as well as resistance. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190C.) Prerequisite(s): course 100A. Enrollment restricted to juniors and seniors. Enrollment limited to 18. (General Education Code(s): ER, A, E.) *C. Dean*

191D. Semiotics and Visual Culture. *

How can visual culture be understood as the production, circulation, and recirculation of signs? This course offers a history of semiotics and its methodological application in the analysis of images in popular culture and within the discipline of art history. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190S.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior students. Enrollment limited to 18. (General Education Code(s): A.) *J. González*

191E. Feminist Theory and Art Production. *

A close reading of works of art and theoretical texts by feminists working from 1970 to the present. The course encourages debate around the past, present, and future relevance of feminist theories to visual cultural studies, paying particular attention to issues of cultural and ethnic difference. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190T.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and mi-

nors. Enrollment limited to 18. (General Education Code(s): A.) *J. González*

191F. Image and Gender. *

Examines what visual representations (feminine and masculine) reveal of gender in 19th- and 20th-century European and American culture; how images reflect norms of gender; and how we are conditioned to read images in gendered terms. Explores how femininity and masculinity were conceived during historical periods and how gender ideals changed in response to social, political, and economic pressures. Students encouraged to consider the fluid nature of 21st-century notions of ideal femininity and masculinity and possible alternatives. This course can be taken for senior exit credit only by permission of the instructor. (Formerly course 190Y.) Prerequisite(s): course 100A. Enrollment restricted to junior and senior history of art and visual culture majors and minors. Enrollment limited to 18. (General Education Code(s): A.) *M. Berger*

191H. History and Theories of Architectural Preservation. S

Examines the meanings of architectural preservation with relation to memory, identity, tourism, gentrification, and urban disasters. Combines the study of theories and concepts of preservation with examples of buildings and urban sites from the whole world. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 100A; and one of the following or permission of instructor: course 43, 143B, 143C, or 143D. Enrollment restricted to junior and senior history of art and visual culture majors. Enrollment limited to 18. *D. Sandler*

191M. Museum Exhibitions. S

Class creates and installs an exhibition. Students take the roles of museum departments, moving the project from concept to installation. The impact exhibitions make in culture and society will be examined throughout each step of the process. This course can be taken for senior exit credit only by permission of the instructor. Prerequisite(s): course 141M. Enrollment restricted to junior and senior history of art and visual culture majors. Enrollment limited to 18. *E. Cameron*

195. Senior Thesis. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Independent field study away from the campus. Students submit petition to sponsoring agency. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Independent field study away from the campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual study in areas approved by sponsoring instructors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual study in areas approved by sponsoring instructors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**201. Introduction to Visual Studies. F**

Introduces the visual studies discipline and the History of

Art and Visual Culture Department, providing students with an overview of the field's development, its issues of central concern, and its dominant research methods. Features intensive readings, student-led discussions, and exposure to some of the primary texts instrumental in the development of the field. Required seminar for all first-year visual studies graduate students. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Berger*

202. Critical Theory. W

Builds on the foundation established by course 201. Offers more detailed theoretical readings to familiarize students with the methodological frameworks and debates that laid the groundwork for the field as well as those that have proven productive for practitioners of visual studies. Prerequisite(s): course 201. Enrollment restricted to graduate students. Enrollment limited to 15. *J. González*

203. Theories and Histories of Seeing. S

Provides an in-depth case study of the visual practices and culture of a specific society. Builds on the foundation established by courses 201 and 202, offering sustained application of the general methods and theories to which students were previously introduced. The society under consideration rotates each year depending on the research interest of the faculty member teaching the course in any given spring. Prerequisite(s): courses 201 and 202. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *R. Birnbaum*

212. Yoruba Visualities and Aesthetics. *

Yoruba conceptions of visibility are explored and compared to seeing through Western eyes. Critical reading focuses on Western and Yoruba scholars' work on visualities and complementary theoretical writings on Yoruba aesthetics and philosophy. Enrollment restricted to graduate students. Enrollment limited to 15. *E. Cameron*

222. The Image of Arhat in China. *

Indian Buddhist sage-monks (arhats) are portrayed in China in ways that represent a remarkable variety of visual/historical/practice traditions. This seminar examines these depictions and explores the ranges of means and functions attached to this theme. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Birnbaum*

224. Seeing Race. *

Investigates how discursive systems racialized the sight of various racial and ethnic groups in 19th- and 20th-century U.S. society. Focuses on the construction and maintenance of racial values systems and on the historically specific ways in which an eclectic assortment of visual artifacts have been read by groups over time. Considers the visual and material implications of race-based sight. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Berger*

232. The Monument Since 1750 in Relation to Nationhood and the Experience of War. W

Investigates modern monuments (1750 to present) and the creation or maintenance of a nation, especially in terms of war and its immediate aftermath. Destruction or alteration of monuments and production of anti- or counter-monuments are also examined. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Hunter*

240. Engaged Buddhism and Visual Culture. S

Begins with an analysis of photography and films capturing the Gandhian and Dalit movement in India. Students then read key Buddhist texts on engaged Buddhism, and look at the rise of engaged Buddhism in Southeast Asia in the 1960s and how it impacted modern and contemporary art in Southeast Asia and its diaspora. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Ly*

243. Alternative Architecture. F

Focuses on what is commonly left out of architectural history: the ephemeral, informal, illegal, and uncertain. Topics include: anonymous and collective architecture; temporary interventions; everyday urbanism; and vestigial urban spaces. These topics are understood through theories of space as socially produced (Henri Lefebvre, Michel de Certeau, among others), and through cultural movements and manifestoes (Situationist International, Aesthetics of Hunger, etc.) Enrollment restricted to graduate students. Enrollment limited to 15. *D. Sandler*

245. Race and Representation. *

Explores how human subjects come to be visually defined and marked by "race" discourse. Covers diverse theoretical literatures on the topic, primarily in visual studies, but also in cultural studies, post-colonial studies, and psychoanalysis. Enrollment restricted to graduate students. Enrollment limited to 15. *J. González*

250. The Cult of Mary in Byzantium. *

Why did the cult of the Virgin Mary become so important in Byzantine culture? Students examine historical, cultural, theological, political, and social reasons for this development seen through the interaction of Byzantine visual culture and literature. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Evangelatou*

260. Visual Literacy in Spanish America, 1500-1800. *

Visual literacy is considered as a particular predicament of colonial societies. Students consider the legibility of artifacts in colonial Spanish American contexts given its culturally diverse audiences and examine specific instances of (mis)interpreted images and transcultured representations. Enrollment restricted to graduate students. Enrollment limited to 15. *C. Dean*

270. Colonial Cultures of Collecting and Display. *

Examines collections and exhibitions of colonized people, places, and objects through primary sources, theoretical texts, and analytical case studies (with some emphasis on Oceania). Focuses on visual discourses of race, science, religious conversion, colonial settlement, nation-building, education, and entertainment. Enrollment restricted to graduate students. Enrollment limited to 15. *S. Kamehiro*

294. Teaching-Related Independent Study.

F,W,S

Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Independent study or research for graduate students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research.

Students submit petition to course sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

History of Consciousness

415 Humanities 1
(831) 459-2757
<http://histcon.usc.edu/>

Faculty and Professional Interests

GOPAL BALAKRISHNAN, Associate Professor of History of Consciousness

Classics of political thought from Plato to Rousseau, early modern and modern European intellectual history, historical sociology, the history and future of capitalism, nationalism

JAMES T. CLIFFORD, Professor Emeritus of History of Consciousness

History of anthropology, travel, and exoticism; transnational cultural studies, museum studies, indigenous studies

ANGELA Y. DAVIS, Professor Emerita of History of Consciousness and Feminist Studies

TERESA DE LAURETIS, Professor Emerita of History of Consciousness, Literature, and Film and Digital Media

BARBARA L. EPSTEIN, Professor of History of Consciousness

Social movements and theories of social movements, 20th-century U.S. politics and culture, Marxism and related theories of social change

DONNA J. HARAWAY, Professor of History of Consciousness and Feminist Studies

Feminist theory, cultural and historical studies of science and technology, relation of life and human sciences, human-animal relations, and animal studies

DAVID S. MARRIOTT, Professor of History of Consciousness

Literary theory, psychoanalysis, black cultural theory and philosophies of race, literary and visual cultures of modernism

VICTOR BURGIN, Professor Emeritus of History of Consciousness

Hayden White, Professor Emeritus of History of Consciousness

Extended Department Faculty

JOHN BROWN CHILDS, Professor of Sociology

Ethnic conflict and transcommunal cooperation; sociology of knowledge; African American, Native American, Latino interactions

MICHAEL H. COWAN, Professor of American Studies

American cultural theory and history, history of American studies, symbolic expression in American life, urban cultural studies, American literary studies, studies in the institutional culture of higher education

GINA DENT, Associate Professor of Feminist Studies, History of Consciousness, and Legal Studies

Africana literary and cultural studies, legal theory, popular culture

SHELLY ERRINGTON, Professor of Anthropology

Globalization of folk art, visual and social semiotics, photography, film, the Internet and digital media, Southeast Asia, and Latin America

CARLA FRECCERO, Distinguished Professor of French Literature and Feminist Studies

Renaissance studies, French and Italian language and literature, early modern studies, postcolonial theories and literature, contemporary feminist theories and politics, queer theory, U.S. popular culture

HERMAN S. GRAY, Professor of Sociology

Cultural studies, media and television studies, black cultural politics, social theory

SUSAN HARDING, Professor of Anthropology

Culture, politics, narrative, gender, local/global studies,

ethnographic writing, fundamentalism, Christianity, state-making, aging, America, and Spain

DAVID C. HOY, Professor of Philosophy
Kant, Hegel, Nietzsche, Heidegger, Derrida, Foucault, phenomenology, poststructuralism, and contemporary European philosophy

ROBERT L. MEISTER, Professor of Politics
Political and moral philosophy, law and social theory, Marxian theory, institutional analysis, antidiscrimination law

HELENE MOGLEN, Professor Emerita of Literature and Feminist Studies



TRILOKI NATH PANDEY, Professor of Anthropology
Native peoples of North America, cultures of India, political anthropology, anthropological theories and comparisons; native North America; tribal India; Nepal

ANDREW SZASZ, Professor of Sociology
Environmental sociology (environmental movements, policy, environmental justice); theory

RICHARD TERDIMAN, Professor of Literature
Nineteenth- and 20th-century French and European literature and culture, literary and cultural theory, contemporary critical theory, cultural globalization

ANNA TSING, Professor of Anthropology
Culture and politics, feminist theory and gender in the U.S., social landscapes and tropical forest ethnoecologies, ethnicity, local power and relations to the state in Indonesia, Southeast Asia, and the U.S.

PATRICIA ZAVELLA, Professor of Latin American and Latino Studies
Relationship between women's work and domestic labor, poverty, family, sexuality and social networks, feminist studies, ethnographic research methods, and transnational migration of Mexican/la workers and U.S. capital

Program Description

History of consciousness is an interdisciplinary graduate program centered in the humanities, with links to the social sciences, physical and biological sciences, and arts. It is concerned with forms of human expression and social action as they are manifested in specific historical, cultural, and political contexts. The program stresses flexibility and originality. Interest is focused on problems rather than disciplines. Although students are prepared to teach in particular fields, the emphasis is on questions that span a number of different approaches.

Over more than 30 years of existence, the history of consciousness program has become widely recognized as a leader of interdisciplinary scholarship. Program graduates are influential scholars at prominent universities, and dissertations have been published by major publishing houses and academic presses. Graduates currently find academic employment in a wide range of disciplines, including literature, feminist studies, science studies, anthropology, sociology, American studies, cultural studies, ethnic studies, communications, the study of religion, and philosophy. In addition, history of consciousness graduates work as filmmakers, museum researchers, free-lance writers, postdoctoral researchers, and academic administrators.

Since the curriculum concentrates on theoretical and methodological issues and is concerned with the integration of disciplines, candidates for admission are expected to have a relatively clear idea of the project they wish to pursue. Experience of advanced work in one or more fields is preferred, but not required.

History of consciousness emphasizes a variety of topics in its seminars and research pursuits. These areas of research include studies at the intersection of race, sexuality, and gender; global capitalism and cultural processes; psychoanalytic and semiotic theories of the image; science and technology studies; theories and histories of religion; social movements; and literary studies and poetics. Seminars are regularly offered in these and other areas of ongoing faculty research.

History of consciousness has strong cooperative relations with associated faculty from other campus programs, scholars who offer seminars and participate in advising, qualifying exams, and thesis committees. Within the limits of seminar size and faculty time, cross-disciplinary work in graduate courses offered by other departments is encouraged. The formal list of associated faculty is a non-exhaustive indication of advising possibilities beyond the program's core faculty. Campus research organizations, such as the UCSC Center for Cultural Studies, the Institute for Humanities Research, the Institute of Advanced Feminist Research, and the Chicano/Latino Research Center, also provide venues for collaborative work.

Requirements

Students are required to enroll in a minimum of two courses per quarter until advancement to candidacy (normally achieved no later than the fourth year).

Incoming students are required to take a minimum of five history of consciousness graduate seminars during the first two years. In the first year, students are required to take the introductory seminar, course 203A, *Approaches to History of Consciousness*. In the course of the first year, students must also take a writing intensive "B" seminar, either 203B, *Approaches*, or a "B" seminar following another seminar the student has taken. By the end of the first year, students are expected to complete a full seminar paper. Unless an exception is approved by the Director of Graduate Studies, "B" courses do not count toward the five seminars selected to fulfill the basic department requirement. The remainder of the courses taken to fulfill university enrollment requirements may include not only history of consciousness seminars but also independent study with specific faculty or graduate seminars offered in other departments.

Additional requirements for the doctor of philosophy (Ph.D.) vary with individual disciplinary and interdisciplinary needs and are determined in consultation with relevant faculty and the chair of the program.

Advancement to candidacy depends on the general quality of a student's work; demonstration of proficiency in a foreign language relevant to the student's area of work, either by passing a written exam administered by the department or successfully completing a language course approved by the department; success in the qualifying exam; and proposal of an acceptable thesis topic. The qualifying examination is centered on a qualifying essay that demonstrates the candidate's ability to do extended, dissertation-level research and analysis relevant to the proposed thesis topic and dissertation plan. The exam focuses on the student's research project and on the fields of scholarship it presupposes.

After advancement to candidacy, required by the end of the fourth year, students concentrate on the writing of the dissertation. The current normative time to degree limit of seven years means that a student usually has at least three years after advancement to candidacy for completion of the dissertation.

Students also have the option of doing advanced work in a traditional discipline and receiving a parenthetical degree notation of this specialization. In such cases, students must satisfy the appropriate department's

criteria. Currently such degree notations may be negotiated with American studies, anthropology, literature, philosophy, sociology, and feminist studies. Students are expected to complete at least one year of supervised teaching as part of the degree requirements.

Applications

The deadline for applications to the History of Consciousness program is December 1 of each year. Admissions information and application materials are available online at graddiv.ucsc.edu.

Applications are invited from students with backgrounds and interests in the humanities and social sciences and are especially encouraged from individuals with a clear idea of the project they wish to undertake. Strong preference is given to applicants working in areas for which the faculty resources in history of consciousness are appropriate and available. Graduate Record Examination (GRE) scores are required as is a writing sample of no more than 10 pages.

Admission is for the fall quarter only.

It is important to note that in light of California's elimination of affirmative action as an admissions criterion, the history of consciousness department reaffirms its commitment to the principles of affirmative action. These principles mean a commitment to diversity, equal opportunity, and outreach to underrepresented communities. Further, this commitment underlines our understanding that the very fabric and quality of our scholarship depends on the representation and interplay of diverse experience and perspectives. So defined, affirmative action is reflected in every aspect of the history of consciousness program, including scholarship, teaching, admissions, hiring, and the process of departmental governance.

Lower-Division Courses

80A. Culture and Ideology in the 20th Century. *

A survey of the principle ideological issues of the 20th century—attitudes toward sex, race, class, work, violence, and knowledge—viewed from the perspective of structuralist and semiological theories of culture. (General Education Code(s): T4-Humanities and Arts.) *A. Davis*

80B. Constructions of the Exotic. *

Analyzes ethnographic and auto-ethnographic representations of non-Western peoples. Films, video, ethnographies, novels, and journalism are considered, paying attention to specific histories of colonial and postcolonial contact which influence images of "culture" and "identity." (General Education Code(s): T4-Humanities and Arts.) *J. Clifford*

80C. Social Movements of the 1930s and 1960s in the U.S.. W

Examines the rise of a mass movement of the left in the U.S. during the 1930s, in the context of economic depression and the growing international threat of fascism. (Formerly "The 1930s Depression and Radicalism in the U.S.") (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *B. Epstein*

80H. Marxism. *

Advanced introduction to the main currents of Marxism from the 19th century to the present. Lectures and discussion address Marx's conceptions of capitalism, later attempts to theorize the political, and philosophical and aesthetic consequences of this critique. (General Education Code(s): T4-Humanities and Arts.) *G. Balakrishnan*

80J. Social Movements in the U.S.. *

Traces the history of social movements in the late 19th- and 20th-century U.S., including populism,

labor, socialism, Communism, the New Left, civil rights, feminism. Looks at the relationship between cultures of protest and mainstream popular and political cultures. (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *B. Epstein*

80K. God's Economy: Capitalism, Faith, and Power. F

Works through linear historical time, tracing the co-constitution of the secular, the economic, and the religious beginning with the relatively simultaneous emergence of capitalism, colonialism, the Reformation, and the Enlightenment. Then follows the growth of U.S. evangelicalism and fundamentalism from their roots in missionary projects through a tentative reconciliation in the new Christian Right. (General Education Code(s): T4-Humanities and Arts.) *J. Brabinsky*

80Q. Science as Culture and Practice. *

Using tools from the analysis of social history, visual and material culture, narrative, and laboratory and field practices, introduces students to modern science, technology, and medicine studies. Examples come especially from 20th- and 21st-century life and human and information sciences. May be repeated for credit. (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *D. Haraway*

80U. Modernity and Its Discontents. F

Offers an introduction to the idea of modernity from Kant to Freud, Nietzsche to Fanon. (General Education Code(s): T4-Humanities and Arts.) *D. Marriott*

Upper-Division Courses

102. Philosophy and Poetics. *

Introduction to the relationship between philosophy and poetics in some major 19th- and 20th-century poets and thinkers. Enrollment restricted to juniors and seniors. Enrollment limited to 30. *D. Marriott*

111. States, War, Capitalism. S

Survey of seminal work on ancient origins of the state, diverse geo-political systems of war and diplomacy, and consequences of the formation of the world market on the evolution of geo-political systems up to and beyond the wars of today. Enrollment restricted to juniors and seniors. Enrollment limited to 35. *G. Balakrishnan*

118. Jewish Social Movements. W

Jewish social movements of the late 19th and 20th centuries, in Europe (Eastern and Western) and the U.S.: the confrontation between Hasidism and Haskalah, tensions between socialism and Zionism, between religiosity and secularism, the mutual influences among these tendencies. (Also offered as History 185D. Students cannot receive credit for both courses.) Enrollment restricted to juniors and seniors. Enrollment limited to 20. (General Education Code(s): E.) *B. Epstein*

199. Tutorial. F,W,S

A program of individual study arranged between an undergraduate student and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

203A. Approaches to History of Consciousness. *

An introduction to history of consciousness required of all incoming students. The seminar concentrates on theory, methods, and research techniques. Major interpretive approaches drawn from cultural and political analysis are discussed in their application to specific problems in the history of consciousness. Prerequisite(s): first-year stand-

ing in the program. See the department office for more information. (Formerly course 203.) *The Staff*

203B. Approaches to History of Consciousness. *

Writing-intensive course based on readings in course 203A. Prerequisite(s): course 203A. Enrollment restricted to graduate students. Enrollment limited to 9. *G. Balakrishnan*

204A. Introduction to Cultural Studies. *

Classic texts from the British cultural studies tradition. Traces later developments in North America, Latin America, Australia, and elsewhere. Asks how class analysis has been complicated by work on race, ethnicity, gender, sexuality, and postcoloniality. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *J. Clifford*

204B. Introduction to Cultural Studies. *

Writing intensive course based on readings in course 204A. Prerequisite(s): course 204A. Enrollment restricted to graduate students. Enrollment limited to 20. *J. Clifford*

205A. Theories of Slavery. *

Explores philosophical, legal, and socio-historical analyses of slavery. Focus on Atlantic slavery and the production of race and gender formations, complemented by discussion on contemporary forms of slavery. Impact of historical slavery on prevailing discourses and institutions. (Also offered as Feminist Studies 225A. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

205B. Theories of Slavery. *

Writing-intensive course based on readings in History of Consciousness 205A and Feminist Studies 225A. (Also offered as Feminist Studies 225B. Students cannot receive credit for both courses.) Prerequisite(s): course 205A or Feminist Studies 225A. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

208A. Radical Critiques of Penalty. *

Examines recent theories of imprisonment, focusing on the philosophical and criminological literature associated with scholarly and activist movements arguing for prison abolition. In considering the disarticulation of crime and punishment, race, class, and gender serve as principal analytical categories. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

208B. Radical Critiques of Penalty. *

Writing intensive course based on readings in course 208A. Prerequisite(s): course 208A. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

209A. Women of Color: Feminist Theories and Practices. *

Examination of feminist consciousness in the indigenous and diasporic cultural histories of women of color. Analysis of "feminist moments" in these histories and their epistemological implications for the construction of feminist theories that take into account intersections of gender, ethnicity, class, and sexual orientation. Discussion of possible paradigmatic shifts in feminist theory. Enrollment restricted to graduate students. Enrollment limited to 15. *A. Davis*

209B. Women of Color: Feminist Theories and Practices. *

Writing intensive course based on readings in course 209A. Prerequisite(s): course 209A. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

210A. Cultural and Historical Studies of Race and Ethnicity. *

Explores the historical construction of racial and ethnic categories in the Americas, especially the U.S., in interaction with gender, sexuality, class, and nationality. Intended to introduce current work by UCSC faculty and Bay Area scholars and to stimulate graduate student research projects, the course is organized by intensive reading around key questions, followed by presentations by invited scholars. Emphasizes research resources and methodologies. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

210B. Cultural and Historical Studies of Race and Ethnicity. *

Writing intensive course based on readings in course 210A. Prerequisite(s): course 210A. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

211A. French Hegel. *

Introduces the "return to Hegel" in the work of some major 20th-century French thinkers. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

212. Feminist Theory and the Law. *

Interrogation of the relationship between law and its instantiating gendered categories, supported by feminist, queer, Marxist, critical race, and postcolonial theories. Topics include hypostasization of legal categories, the contest between domestic and international human rights frameworks, overlapping civil and communal codes, cultural explanations in the law, the law as text and archive, testimony and legal subjectivity. (Also offered as Feminist Studies 212. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *G. Dent*

215A. Critical Theory in the Marxist Tradition. *

An introduction to classic texts of the Frankfurt School, focusing on works by Adorno, Horkheimer, Benjamin, and Marcuse. Explores their uses and critiques of Marxism, emphasizing questions of the relation between philosophy and history, theory and praxis, aesthetics and politics, and identifying issues relevant to contemporary debates around race, class, and gender. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *A. Davis*

215B. Critical Theory in the Marxist Tradition. *

Writing intensive course based on readings in course 215A. Prerequisite(s): course 215A. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *A. Davis*

217A. Seminar: Topics in Feminist Theory. *

Studies in the theory and history of feminist consciousness; analysis of the main areas of a specifically feminist interest; determination of the theoretical bases for a distinctively feminist perspective on the principal problems of the life and human sciences; examination of relations of class, race, and gender in feminist theory and practice. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *The Staff*

217B. Seminar: Topics in Feminist Theory. *

Writing intensive course based on readings in course 217A. Prerequisite(s): course 217A. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *The Staff*

218A. Postcolonial Theory. *

Study of selected topics in postcolonial theory, including decolonizing critiques of Western knowledges and

epistemologies, nationalism, gender and sexuality, cultural representations of neo-colonialism and imperialism, subalternity, history and historical transformation, and global relations of dominations. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

218B. Postcolonial Theory. *

Writing intensive course based on readings in course 218A. Prerequisite(s): course 218A. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

219A. Psychoanalysis and Cultural Criticism. *

Readings in Freudian psychoanalytic theory from Freud and his contemporaries to the present, with emphasis on concepts (such as the unconscious, sexuality, fantasy, narcissism) that have informed recent cultural criticism around questions of social identity, subjectivity, marginality, and power. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

219B. Psychoanalysis and Cultural Criticism. S

Writing intensive course based on readings in course 219A. Prerequisite(s): course 219A. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

220A. Globalization and Cultural Process. F

Discusses theories of globalization and its cultural effects. How are cultural forms destroyed, imposed, appropriated, hybridized, translated, invented, and reinvented at local, national, regional, and transnational levels? Historical and ethnographic focus on tourist encounters, museums, nativisms, film/media performances, etc. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *G. Van Den Abbeele*

220B. Globalization and Cultural Process. *

Writing intensive course based on readings in course 220A. Prerequisite(s): course 220A. Enrollment limited to 20. May be repeated for credit. *J. Clifford*

222A. Theories of Late Capitalism, Nationalism, and the Politics of Identity. *

Looks at the theoretical literature on what is variously called late capitalism/postindustrialism/postfordism, and in that context considers the rise of nationalism and identity politics in the latter part of the 20th century. The primary focus is on the U.S. and Western Europe, but questions of the globalization of capital and the transformation of relations between "the West" and "the Third World" are also considered. Written work for the course consists of weekly short papers. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Epstein*

222B. Theories of Late Capitalism, Nationalism, and the Politics of Identity. *

Writing intensive course based on readings in course 222A. Prerequisite(s): course 222A. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Epstein*

223. Recent European Philosophy. *

Seminar on recent developments in European philosophy, with particular attention to German theorists such as Nietzsche, Heidegger, Gadamer, Horkheimer, Adorno, or Habermas. Theorists such as Sartre, Merleau-Ponty, Derrida, Foucault, Bourdieu, Levinas, Laclau, or Vattimo may be read as well. (Also offered as Philosophy 223. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *D. Hoy*

224. History of Consciousness. *

Examination of contemporary theories of consciousness in both analytic and continental traditions. Among those who deflate modern philosophy's preoccupation with consciousness are not only Dennett, Davidson, and Rorty,

but also Heidegger, Foucault, and Derrida. Among those who argue for irreducibility of subjectivity are not only Searle, Nagel, and Chalmers, but also Sartre, Merleau-Ponty, and Levinas. Discussion of parallel readings from both philosophical perspectives. (Also offered as Philosophy 256. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 25. *D. Hoy*

225. The Politics of Affect. *

Point of departure is the question of the political, posed with respect to psychoanalysis. The underlying question is what the political does to psychoanalysis, but also what the unconscious does to the political. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

226. Marxist Humanism and the Anti-Humanist Turn. *

Seminar in which texts are read in the tradition of Marxist humanism and in the turn toward an anti-humanist stance originating among French and other European intellectuals in the 1950s and 1960s, then taking hold widely among left intellectuals in the U.S. and elsewhere. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Epstein*

228. Fundamental Problems of Metapolitics. *

Focuses on seminal works of political thought: the first half devoted to ancient and modern classics; the second considering several major contemporary reflections. Aims to reconstruct and assess the claims regarding epistemic conditions and criteria of metapolitical judgment. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Balakrishnan*

230A. Poetry, Language, Thought. *

Introduces the relation between philosophy and poetics in some major 20th-century poets and thinkers. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

230B. Poetry, Language, Thought. *

Writing-intensive course based on readings in course 230A. Prerequisite(s): course 230A, or permission of instructor. Enrollment limited to 15. *D. Marriott*

233A. Theories of Modernity and Postmodernity. *

Study of social and cultural theories of modernity and postmodernity; analysis of various conceptualizations of the modern and the postmodern and their relation to production, history, aesthetics, cultural identity, social struggle; texts from a variety of disciplines (literature, sociology, philosophy). Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

233B. Theories of Modernity and Postmodernity. *

Writing-intensive course based on readings in course 233A. Prerequisite(s): course 233A. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

234A. Social Movements in the 20th-Century U.S. W

The history of major social movements in the 20th-century U.S., including populism, labor, socialism and communism, civil rights, the women's movement, the anti-nuclear movement. Various theoretical perspectives on the rise and fall of social movements. Enrollment restricted to graduate students. Enrollment limited to 15. Offered in alternate academic years. May be repeated for credit. *B. Epstein*

234B. Social Movements in the 20th-Century U.S. S

Writing intensive course based on readings in course

234A. Prerequisite(s): course 234A. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *B. Epstein*

235A. Theory of Religion. *

The difficulty of defining religion (universal essence vs. local/individual experience), of specifying its categorical boundaries, and of generating a theory based on more traditional disciplines (anthropomorphism, societal, psychic, transcendent, cognitive/ritual, historical/cultural/political). Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

235B. Theory of Religion. *

Writing intensive course based on readings in course 235A. Prerequisite(s): course 235A. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

237A. Historical Materialism. F

Students read landmark works of classical and contemporary Marxism. Writings from Marx, Lenin, Trotsky, Lukacs, Gramsci, Adorno, Benjamin, Sartre, Althusser, Anderson, Jameson, and Zizek are addressed. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *G. Balakrishnan*

237B. Historical Materialism. *

Writing-intensive seminar based on course 237A. Students read landmark works of classical and contemporary Marxism. Writings from Marx, Lenin, Trotsky, Lukacs, Gramsci, Adorno, Benjamin, Sartre, Althusser, Anderson, Jameson, and Zizek are discussed. Enrollment restricted to graduate students. Enrollment limited to 10. May be repeated for credit. *G. Balakrishnan*

239A. The Dialectical Legacy. *

From Adorno to Zizek rediscoveries of Hegel have provided the impetus for some of the most innovative currents of 20th-century Marxism. Examines the philosophical and historical problems that Marx inherited from Hegel through close readings of their major works. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Balakrishnan*

239B. The Dialectical Legacy. *

From Adorno to Zizek rediscoveries of Hegel have provided the impetus for some of the most innovative currents of 20th-century Marxism. Examines the philosophical and historical problems that Marx inherited from Hegel through close readings of their major works. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Balakrishnan*

240. Basic Principles of University-Level Pedagogy (1 credit). *

Provides training for graduate students in university-level pedagogy in general. Under the supervision of the department chair, coordinated by a graduate student with substantial experience as a teaching assistant. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

242A. Violence and Phenomenology: Fanon/Hegel/Sartre. *

Study of the work and influence of Frantz Fanon from a range of viewpoints: existential, phenomenological, psychoanalytic, and political; a variety of genres: film, literature, case history, and critique; and a set of institutional histories: clinical, cultural, and intellectual. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

242B. Violence and Phenomenology: Fanon/Hegel/Sartre. *

Writing intensive course based on readings in course

242A. Prerequisite: course 242A. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

243A. Nationalism, Anti-Semitism, and Jewish Resistance in World War II. *

Jewish resistance to Nazism during World War II, in Eastern Europe, and its historical context. Includes the pre-war rise in nationalism and anti-Semitism in Poland and Lithuania, Jewish integration in the Soviet Union, and the consequences for wartime resistance. (Also offered as History 256. Students cannot receive credit for both courses.) Enrollment restricted to seniors and graduate students. Enrollment limited to 15. *B. Epstein*

247. Performance/Performativities. *

Performance acts and theories of performativity in visual culture from modernity to present. Major theoretical positions subtending the emergence of performances/performativities: subjectivity, identity, temporality, media, ritual, the event, the body and embodiment, collaboration, and politics. (Also offered as Digital Arts and New Media 247. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Qualified seniors accepted with permission of instructor. Enrollment limited to 15. *C. Sousloff*

250A. Foundations in Science Studies. *

Critical inquiry into topics in the history, sociology, anthropology, and philosophy of science and technology. Organized around the position that science is its practice, the seminar explores practices of representation, science studies and cultural studies, local/global tensions and networks, and the science question in feminism and antiracism. Enrollment restricted to graduate students. Enrollment limited to 15. *K. Banad*

250B. Foundations in Science Studies. *

Writing intensive course based on readings in course 250A. Prerequisite(s): course 250A. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Haraway*

251A. Readings in Science Studies. *

Focus is on recent literature in social, cultural, and historical studies of science, medicine, and technology. This seminar familiarizes students with current scholarly debates, research networks, national traditions, international exchanges, conference proceedings, interdisciplinary projects, and publication sites. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *D. Haraway*

251B. Readings in Science Studies. *

Second quarter of two-quarter course. Writing-intensive course based on the readings studied in course 251A. Prerequisite: course 251A. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Haraway*

252. Poststructuralism. *

French poststructuralism, with particular attention to the main philosophical texts of Jacques Derrida and Michel Foucault. Other representative theorists as well as critics of poststructuralism are studied as time permits. (Also offered as Philosophy 252. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *D. Hoy*

253A. Topics in Cultural Analysis. F

Advanced graduate seminar in which students do research on focused topics. Each quarter centered on single thematic area. Students read works of culture-theory and exemplary studies illustrating methodologies, problems, and current controversies. Prerequisite(s): minimum of

second-year status in the history of consciousness program; instructor evaluates student's ability to participate. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Haraway*

255. Carl Schmitt: Political and Legal Order in Modern Thought. *

Students study the main translated texts of Carl Schmitt's work, as well as certain secondary commentary on his body of thought. (Formerly course 255A.) Enrollment restricted to graduate students. Enrollment limited to 15. *G. Balakrishnan*

256A. Theories of the Visual. F

Study of psychoanalytic theories of the visual including the emergence of psychoanalysis and cinema as parallel discourses and the mobilization of key psychoanalytic concepts—scopophilia, voyeurism, fetishism—in Freudian and Lacanian understandings of the gaze so central to film and photographic theory. Enrollment restricted to graduate students. *D. Marriott*

256B. Theories of the Visual. W

Writing intensive course based on readings in course 256A. Prerequisite: course 256A. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

259A. Kant, Lacan, and the Ethics of Psychoanalysis. W

Offers an introduction to Jacques Lacan's *Return to Kant* and the response it provokes as a reading of sadism, politics, and ethics. Specific point of entry adopted for course is Lacan's seminar on "The Ethics of Psychoanalysis." Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

259B. Kant, Lacan, and the Ethics of Psychoanalysis. *

Writing-intensive course based on readings in course 259A. Prerequisite(s): course 259A. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Marriott*

261. Modern Intellectual History. F

Survey of 19th- and 20th-century intellectual history that focuses on a cross-section of major works from Hegel to Levi-Strauss. Enrollment restricted to graduate students. Enrollment limited to 15. *G. Balakrishnan*

264. The Idea of Africa. *

Examines the position of Africa in cultural studies and the simultaneous processes of over- and under-representation of the continent that mark enunciations of the global and the local. Themes include defining diaspora, the West as philosophy, and Africa in the global economy. (Also offered as Feminist Studies 264. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. *G. Dent*

291. Advising (2 credits). F,W,S

Independent study formalizing the advisee-adviser relationship. Regular meetings to plan, assess and monitor academic progress, and to evaluate course work as necessary. May be used to develop general bibliography of background reading and trajectory of study in preparation for the qualifying examination. May be repeated for credit. *The Staff*

292. Practicum in Composition. *

A practicum in the genres of scholarly writing, for graduate students working on the composition of their qualifying essay or doctoral dissertation. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

293. Field Study. F,W,S

Research carried out in field settings, based on a project approved by the responsible faculty. The student must

file a prospectus with the department office before undertaking the research and a final report of activities upon return. May be repeated for credit. *The Staff*

294. Teaching-Related Independent Study. F,W,S

Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. *The Staff*

295. Directed Reading. F,W,S

Systematic working through a prearranged bibliography which is filed as a final report at the end of the quarter with the signature of the instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S

A seminar study group for graduate students focusing each quarter on various problems in the history of consciousness. A statement and evaluation of the work done in the course will be provided each quarter by the students who have participated in the course for that quarter, and reviewed by the responsible faculty. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Independent study and research under faculty supervision. Students submit petition to sponsoring agency. *The Staff*

298. Doctoral Colloquium. *

Under the supervision of a History of Consciousness faculty member, students finishing their dissertation meet weekly or bi-weekly to read and discuss selected draft chapters, design difficulties and composition problems. May be repeated for credit. *The Staff*

Human Biology

See Biological Sciences, page 147.

Humanities

503 Humanities I

(831) 459-2696

<http://humanities.ucsc.edu>

Faculty and Professional Interests

Professor

JEROME NEU

Philosophy of mind; emotions, culture, and insults; philosophy of law; Freud and psychoanalytic theory

FORREST G. ROBINSON

Nineteenth- and 20th-century American literature, including Mark Twain, the American West, and popular culture; biography and American culture theory

Program Description

The humanities at UCSC includes the traditional humanistic disciplines of history, literature, and philosophy as well as interdisciplinary programs in feminist studies and American studies. The humanities is also the home for linguistics, languages, and writing. The humanities offers a range of courses in support of the campus' general education requirements.

At the undergraduate level, the following majors are offered: American studies, classical studies, feminist studies, German studies, history, Italian studies, Jewish studies, language studies, linguistics, literature, and philosophy. Several undergraduate minors are

offered including the following: classical studies, East Asian studies, history, Italian studies, Jewish studies, language studies, linguistics, literature, and philosophy. Undergraduate students may also pursue individual majors. At the graduate level, five departments offer graduate degrees: History, History of Consciousness, Linguistics, Literature, and Philosophy. Instruction and testing to satisfy the campus' writing requirements is offered through the writing program.

Information Systems Management

See Engineering, page 272.

Italian

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Professor

MARGARET BROSE (Literature)
Italian literature, 19th- and 20th-century poetry and poetics, the novel, Romanticism, medieval literature, gender studies, autobiography

Associate Professor

DEANNA SHEMEK (Literature)
Italian literature and cultural history, Renaissance studies, early modern popular culture, narrative (early modern to contemporary), women's studies, literary theory

Lecturer

GIULIA CENTINEO
Italian culture and civilization; history of Italian language; Italian linguistics, syntax, and semantics; language pedagogy

MARIA (TONIA) PRENCIPE
Technology and foreign language pedagogy; modern Italian culture, history, literature, and cinema; creative writing; promotion of Italian language and culture of K-12

Program Description

Students interested in acquiring proficiency in Italian can enroll in language courses from beginning to advanced levels. In addition, students may select from among the following programs: a major or minor in language studies, a major in literature with an emphasis in Italian literature, a major in global economics, or a major in Italian studies.

The sequence of lower-division courses 1-6 is aimed at enabling students to gain proficiency in aural comprehension, speaking, reading, and writing. Courses 1A and 1B offer lower-division intensive Italian language instruction equivalent to levels 1, 2, 3. The 1, 2, 3 sequence starts once a year in the fall quarter, while the 1A-1B sequence starts once a year in the winter quarter. Classes are taught in Italian from the beginning level.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

The Office of International Education (OIE) sponsors programs of study in Italy. For a list of current programs and requirements, visit their web site, <http://oie.ucsc.edu>.

Lower-Division Courses

1. Instruction in the Italian Language. F

Aural comprehension, speaking, reading, writing, and laboratory. Check the quarterly Schedule of Classes for exact quarter(s) of offering. Elementary sequence (1-2-3) begins in fall quarter. *The Staff*

1A. Intensive Elementary Italian. W

Intensive instruction in elementary Italian language emphasizing oral fluency. Taken in conjunction with Italian 1B, the two courses are equivalent to levels 1-2-3. Accelerated pace allows a rapid mastery of grammar and syntax, giving the student a basic knowledge of Italian in only two quarters. *The Staff*

1B. Intensive Elementary Italian. S

Sequential to course 1A, completes the equivalent instruction offered through Italian 1-2-3. May not be taken by students who have completed Italian 1 or Italian 3. Open to students who have successfully completed either 1A or Italian 2; for students completing course 2, course 3 is preferable. *The Staff*

2. Instruction in the Italian Language. W

Aural comprehension, speaking, reading, writing, and laboratory. Check the quarterly Schedule of Classes for exact quarter(s) of offering. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. Prerequisite(s): course 1; or placement by examination. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. *The Staff*

3. Instruction in the Italian Language. S

Aural comprehension, speaking, reading, writing, and laboratory. Check the quarterly Schedule of Classes for exact quarter(s) of offering. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. Prerequisite(s): course 2; or placement by examination. *The Staff*

4. Intermediate Italian. F

Short stories, articles, films, and newsclips are used as the basis for studying intermediate-level conversation and composition. Laboratory assignments involve use of the World Wide Web, conversations with native speakers, films and video clips. Students interested in this course who have not taken the prerequisite at UCSC should meet with the instructor, preferably prior to the first class meeting, and take the placement examination. Prerequisite(s): course 1B or 3, or placement by examination. Enrollment limited to 25. (General Education Code(s): CC, IH.) *The Staff*

5. Intermediate Italian. W

Reading of Italian short stories and a play are used as basis for further study and refinement of oral and written skills at the intermediate level. Particular emphasis is placed on oral/written discussion of abstract ideas and topics, and on the study of different language registers/contexts. Laboratory work is regularly assigned. Students interested in this course who have not taken the prerequisite at UCSC should meet with the instructor, preferably prior to the first class meeting and take the placement exam. Prerequisite(s): course 4 or placement by examination. Enrollment limited to 25. (General Education Code(s): CC, IH.) *The Staff*

6. Intermediate-Advanced Italian. S

Reading of first novel in the language and weekly viewing of Italian films serve as basis for oral reports and discussions on various aspects of Italian culture and civilization. Weekly assignments, three essays, and a paper on topics derived from or related to the text. Students interested in this course who have not taken the prerequisite at UCSC should meet with the instructor, preferably prior to the first class meeting, and take the placement examination. Prerequisite(s): course 5 or placement by examination. Enrollment limited to 25. (General Education Code(s): CC, IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

106. Italian Culture Through Film.

Film is used as a medium through which images of Italians and their culture are disseminated, perpetuated, and crystallized. Whether these representations offer historical perspectives or stereotypes, they are important documents for the study of Italian culture, society, history, and politics. While analyzing films by and about Italians, we develop an informed opinion on relevant issues in Italian studies. The course is taught in English with an enhancement section in Italian. The enhancement section meets once a week and is designed to give students who are already familiar with the language the opportunity to discuss the films in Italian and to read/view additional material in the language. Students cannot receive credit for this course and Languages 80D. Prerequisite(s): course 6. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Italian Studies

Department of Literature
303 Humanities 1
(831) 459-4778
http://reg.ucsc.edu/catalog/html/programs_courses/tist/PS.html

Core Program Faculty

MARGARET R. BROSE, Professor of Literature
GIULIA CENTINEO, Lecturer in Italian

CYNTHIA POLECRITTI, Associate Professor of History

MARIA (TONIA) PRENCIPE, Lecturer in Italian

DEANNA SHEMEK, Professor of Literature

Affiliated Faculty

MURRAY BAUMGARTEN, Professor English and Comparative Literature

MARIA EVANGELATOU, Assistant Professor History of Art and Visual Culture

CARLA FRECCERO, Professor of Literature and Feminist Studies

MARY-KAY GAMEL, Professor of Literature

CHARLES W. HEDRICK JR., Professor of History

TYRUS MILLER, Professor of Literature

ELEONORA PASOTTI, Assistant Professor of Politics

DANIEL SELDEN, Professor of Literature and Classics

NINA TREADWELL, Associate Professor of Music

JAMES WILSON, Lecturer in Writing

Emerita Faculty

VIRGINIA JANSEN, Emerita, History of Art and Visual Culture

Program Description

Students interested in an interdisciplinary approach to Italian culture through the combined study of language, literature, history, art history, and other subjects may pursue a major or minor in Italian studies. The guidelines for the completion of the major may be obtained from Professor Cynthia Polecristi of the History Department. There are several options for study in Italy through the UC Education Abroad Program (EAP), either for a year (Bologna, Milan), for an intensive semester (Milan, Bologna, Rome, Siena), or for the summer (Siena). The Italian studies program is administered by the Literature Department.

Major Requirements

Each student must complete the lower-division language sequence (Italian 1–6, or equivalent). In addition, students are required to take 10 courses (one of which may be lower division), including a core unit of five courses which must be taken at UCSC: three Italian literature courses, one course in Italian history, and one course in Italian art history. A course featuring the work of Dante is required. A minimum of five courses must be taught principally in Italian. Five may be approved elective courses, which may feature Italy in a European or global context. One Italian literature course may be replaced by an Italian culture course. Up to five elective courses may be approved from UC EAP's yearlong study abroad in Italy. All students in the major must satisfy the Italian Studies senior exit requirement by writing a senior essay focused on Italian literature, history, or art history. This essay may be produced within an approved seminar, or (with faculty permission) by enrolling in a one-credit senior exit course in conjunction with another upper-division course in Italian literature, history, or history of art and visual culture. This combination must be approved by a faculty advisor in Italian Studies.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. Italian Studies majors satisfy the DC Requirement through satisfactory completion of the senior essay, as described above. Please refer to updated information at <http://reg.ucsc.edu/catalog/html/disciplinarycommunicationchart.html>.

Minor Requirements

Each student must complete the lower-division language sequence (Italian 1–6, or equivalent). Students must also complete five upper-division courses in Italian studies: three Italian literature courses, one course in Italian history, and one course in Italian art history. A course featuring the work of Dante is required. One Italian literature course may be replaced by an Italian culture course. Three of the five upper-division courses must be completed at UCSC; three must be taught principally in Italian. A maximum of two courses may be transferred from EAP.

2010-11 Italian Studies Curriculum

Fall

Italian 1, *Instruction in the Italian Language*

Italian 4, *Intermediate Italian*

History 65A, *Medieval Europe 200-1000* (Polecristi)

History 196C, *Modern Italian Culture* (Polecristi)

Italian Literature 102, *Italian Literary Genres* (Shemek, in Italian)

History of Art and Visual Culture 153, *The Mediterranean: Rise of Christianity to Rise of Islam* (Evangelatou)

Winter

Italian 1A, *Intensive Elementary Italian*

Italian 2, *Instruction in the Italian Language*

Italian 5, *Intermediate Italian*

History 164A, *Late-Medieval Italy* (Polecristi)

Pre- and Early Modern Literature 183, *Dante's "Divine Comedy"* (Brose, in English)

Italian Literature 130D, *Dante's "Divine Comedy"* (Brose, in Italian)

Writing 2, *Modern Italy* (Wilson)

Spring

Italian 1B, *Intensive Elementary Italian*

Italian 3, *Instruction in the Italian Language*

Italian 6, *Intermediate-Advanced Italian*

History 164B, *Renaissance Italy* (Polecristi)

History of Art and Visual Culture 190V, *The Cult of Mary in Byzantine Visual Culture* (Evangelatou)

Modern Literary Studies 144H, *Jewish Writers and the European City: Venice* (Baumgarten)

Languages 80/Italian 106, *Italian Culture through Film* (Centineo)

Japanese

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Professor

SHIGEKO OKAMOTO

Sociolinguistics, discourse analysis, pragmatics, language and gender, foreign language pedagogy, Japanese linguistics

Associate Professor

ALAN S. CHRISTY

Early modern and modern Japan; history of social sciences, colonialism, nationalism

Assistant Professor

NORIKO ASO

Japanese social and cultural history, women's history, race and ethnicity, colonialism, nationalism, Korean history

Lecturer

SAKAE FUJITA

Foreign language methodology, drama/theater/improvisation use in language learning, language and identity, foreign language literacy

Program Description

Students interested in acquiring proficiency in Japanese can enroll in language courses from beginning to advanced levels. In addition, students may select from among the following programs: a major or minor in language studies, an East Asian studies minor, or a major in global economics.

The sequence of lower-division courses 1–6 is aimed at enabling students to gain proficiency in aural comprehension, speaking, reading, and writing. Instruction takes place mostly in Japanese from the second half of the first quarter.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

The UC Education Abroad Program (EAP) has information on study in Japan. There are EAP centers in Yokohama, Tsuru, Kyoto, Tokyo, Sendai, Tsukuba, and Tohoku. Courses taken abroad can, with approval of an adviser, be applied to major requirements. For more information on the program, see UC Education Abroad Program. For information on credit applied to a major, contact the appropriate department.

Lower-Division Courses

1. Instruction in the Japanese Language. F

Students carry out beginning-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write Japanese scripts (hiragana, katakana, and about 40 kanji). *The Staff*

2. Instruction in the Japanese Language. W

Students carry out beginning-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 70 additional kanji. Prerequisite(s): course 1; or consent of instructor. *The Staff*

3. Instruction in the Japanese Language. S

Students carry out beginning-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 70 additional kanji. Prerequisite(s): course 2; or by consent of instructor. *The Staff*

4. Intermediate Japanese. F

Students carry out intermediate-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 70 additional kanji. Prerequisite(s): course 3; or by consent of instructor. (General Education Code(s): IH.) *The Staff*

5. Intermediate Japanese. W

Students carry out intermediate-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 70 additional kanji. Prerequisite(s): course 4; or by consent of instructor. (General Education Code(s): IH.) *The Staff*

6. Intermediate Japanese. S

Students carry out intermediate-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 100 additional kanji. Emphasis is placed on developing the student's cultural knowledge relevant to inter-cultural communication. Prerequisite(s): course 5; or by consent of instructor. (General Education Code(s): CC, IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***103. Advanced Japanese. F**

Students carry out advanced-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 100 additional kanji. Emphasis placed on developing the student's cultural knowledge about Japan as well as knowledge relevant to inter-cultural communication. Prerequisite(s): course 6; or by consent of instructor. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. *The Staff*

104. Advanced Japanese. W

Students carry out advanced-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 100 additional kanji. Emphasis placed on developing the student's cultural knowledge about Japan as well as knowledge relevant to inter-cultural communication. Prerequisite(s): course 103; or by consent of instructor. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. *The Staff*

105. Advanced Japanese. S

Students carry out advanced-level tasks that involve listening, speaking, reading, and/or writing, and learn how to read and write 100 additional kanji. Further development of cultural knowledge and understanding through critical examination of authentic Japanese materials in a variety of genres, including literary work, expository writing, and films. May be repeated for credit with consent of instructor. Prerequisite(s): course 104; or by consent of instructor. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. (General Education Code(s): TA.) *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Jewish Studies

Department of History
201 Humanities
(831) 459-2982
<http://jewishstudies.ucsc.edu>

Principal Faculty

BETTINA APTHEKER, Professor of Feminist Studies
Women's history, feminist oral history and memoir, feminist pedagogy, African American women's history, queer studies, feminist Jewish studies, feminist critical race studies. Among her research interests the history of Jewish women in America

MURRAY BAUMGARTEN, Professor of English and Comparative Literature, Neufeld-Levin Co-Chair
Dickens, Victorian literature and culture, the Bible, translation, modern Jewish writing, the Holocaust

MARGARET BROSE, Emerita Professor of Literature

MARK CIOC, Professor of History
German history, modern European history; environmental history

NATHANIEL DEUTSCH, Professor of Literature and History
Hebrew Bible; rabbinic literature; Jewish mysticism; Hasidism; Eastern European Jewish life; ethnography

BARBARA EPSTEIN, Professor of History of Consciousness
Recently working in Minsk collecting testimonies in Yiddish and other languages on Jewish experiences during WWII

GILDAS HAMEL, SOE Lecturer in History and Classical Languages
History of Judaism and Christianity; Hebrew and Greek Bible; classical languages

PETER KENEZ, Emeritus Professor of History, Neufeld-Levin Co-Chair
Russian history, Eastern Europe, 20th-century Europe, Soviet film

TAMMI ROSSMAN-BENJAMIN, Lecturer in Hebrew
Hebrew language and culture; biblical Hebrew syntax and semantics; the Hebrew Bible; Jewish thought; psycholinguistics; second language acquisition and bilingualism

DAN SELDEN, Professor of Literature
Research on Classical and Hellenistic Judaism and medieval Jewish mysticism

CATHERINE SOUSSLOFF, Professor of History of Art and Visual Culture
European cultural theory, aesthetics, and the historiography of art; performance studies; early modern Italian art; media history including film; Jewish identity and representation

BRUCE THOMPSON, Continuing Lecturer in History

European intellectual and cultural history, French history, Jewish intellectual and cultural history, British and Irish history, history of cinema, history of espionage, environmental history

Faculty Advisers

MURRAY BAUMGARTEN, Professor of English and Comparative Literature

NATHANIEL DEUTSCH, Professor of Literature and History

BRUCE THOMPSON, Lecturer in History

GILDAS HAMEL, Lecturer in History

TAMMI ROSSMAN-BENJAMIN, Lecturer in Hebrew



RAOUL BIRNBAUM, Professor of History of Art and Visual Culture

Buddhist studies, especially Chinese practices from medieval times to the present; religion and visual culture in China

A. HUNTER BIVENS, Assistant Professor of Literature

Twentieth- and 21st-century German literature and film; Marxism and critical theory; psychoanalysis, lyric poetry; literary realism; the novel

BRIAN CATLOS, Associate Professor of History
Pre-modern Mediterranean; medieval Iberia and Europe and the Islamic world; Christian-Muslim-Jewish relations, ethnicity, minorities, social, and economic history; world history

RYAN COONERTY, Lecturer in Politics
American political history, law and international relations

MARIA EVANGELATOU, Assistant Professor of History of Art and Visual Culture
Medieval visual culture, with emphasis on Byzantium and its periphery; manuscript illumination, Marian cult and iconography; ancient Greek and Roman visual culture; Islamic visual culture; gender studies

LAUREL FOX, Professor of Ecology and Evolutionary Biology
Terrestrial population and community ecology, plant-animal interactions

ROBERT GOFF, Associate Professor Emeritus of Philosophy

MARGO HENDRICKS, Professor Emeritus of Literature

MARC MANGEL, Professor of Applied Mathematics and Statistics
Mathematical modeling of biological phenomena, especially the evolutionary ecology of growth, aging, and longevity; quantitative issues in fishery management; mathematical and computational aspects of disease

WILLIAM NICKELL, Lecturer in Literature
Leo Tolstoy; Russian cultural history; 1920s-30s Soviet Russia; Russian/Soviet Film; Russian language and pedagogy

LOISA NYGAARD, Associate Professor of Literature
Eighteenth- and early 19th-century German literature; Goethe; Romantic fiction; landscape and landscape aesthetics; xenophobia in Germany

PAUL ROTH, Professor of Philosophy
Philosophy of social science, philosophy and sociology of science, epistemology, history of analytic philosophy, philosophy of history

AVI TCHAMNI, Lecturer in Music

Composition, Jewish music, computer and electronic music, Middle Eastern music, theory, algorithmic music and generative musical syntax, orchestration, ethnomusicology

Program Description

The interdisciplinary program in Jewish studies introduces students to the study of classical, medieval, and modern Jewish cultures and to the range of disciplines that bear upon the field.

The Jewish studies major and minor offers students the chance to gain knowledge and skills in a variety of contexts in various aspects of Jewish culture, with special reference (though not limited) to modern issues. The major and minor will help them prepare to move successfully into graduate programs in a variety of disciplines, especially in humanities, social sciences, and pre-professional programs, and will provide students with a grounding in materials fundamental to western culture and liberal education. This program connects with a range of disciplines and programs on the UCSC campus that explore the meanings of modernity; at the same time, this program will help students develop analytical tools, strategic versatility, and critical literacy.

Note that modernity here is not defined as Europe or North America; the Jewish studies program intends to speak to modernity as a global phenomenon, dealing with sites where Jews lived. In the 19th and 20th centuries Jews were widely spread across the globe and often played active and influential roles in their communities. These include such places as Shanghai, Tianjin, Harbin, India, Latin America, Egypt, Iran, and of course throughout Europe, Great Britain, and North America.

Students, especially those who plan to continue their studies in graduate school, may wish to gain proficiency in Yiddish, German, or Spanish, depending on their area of interest. The upper-division course Hebrew Bible (Pre- and Early Modern Literature 144B) is strongly recommended, as is developing language proficiency in Hebrew.

Jewish studies is administered by the Department of History. For additional information on curriculum and advising, go to <http://jewishstudies.ucsc.edu>.

Study Abroad

Jewish studies encourages students to take advantage of the Education Abroad Program (EAP). The University of California has developed educational opportunities abroad in conjunction with the Jerusalem Study Center at The Hebrew University of Jerusalem. Students who participate in the UC Education Abroad Program may petition to apply up to three courses from EAP toward their Jewish studies major or minor requirements.

Requirements for the Major

A prerequisite for the Jewish studies major is the lower-division sequence in elementary Hebrew (Hebrew 1, Hebrew 2, and Hebrew 3) or equivalency. Transfer students who must take Hebrew 1, 2, and 3 are permitted to declare the major in the quarter immediately after taking Hebrew 1. Students are also encouraged to take Hebrew 4 and Hebrew 5. The major requires a minimum of 13 courses, including the comprehensive requirement. In consultation with a faculty adviser, students will plan a program of study to fulfill the following distribution of courses:

- History 74, *An Introduction to Jewish History and Culture* or Literature 61J, *An Introduction to Jewish Literature and Culture*
- History 80W/Literature 80L, *The Holocaust:*

The Destruction of European Jewry or History 75, *Film and the Holocaust*

- History 185G, *Jewish Studies: Methods and Approaches*
- two, 5-credit, upper-division history core courses
- two, 5-credit, upper-division literature core courses
- five, 5-credit, elective courses, four of which must be upper-division
- one comprehensive exit requirement (see below)
- among the 13 courses required for the major, one course must satisfy the Disciplinary Communications (DC) Requirement (see below)

Comprehensive Exit Requirement

Students may satisfy the Jewish studies comprehensive exit requirement by completing an approved exit seminar (offered by history or literature) or a senior thesis (Modern Literary Studies/Pre- and Early Modern Literature 195 or History 195 A and B). Please consult the Jewish studies web site for a more detailed description of these courses.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement is satisfied through taking a history exit seminar course in a field related to Jewish studies: History 196G, 196M, 196N, 196P, or 196R. Students may take a literature senior seminar courses to satisfy the comprehensive requirement but will be required to take an additional history exit seminar to satisfy the DC Requirement.

Chronological Distribution Requirements

Among the 13 courses required for the major, at least three must meet the following chronological distribution requirements:

- one course must satisfy the classical chronological distribution requirement
- one course must satisfy the modern chronological distribution requirement
- one course must satisfy the Holocaust chronological distribution requirement, which is accomplished by completing History 80W/Literature 80L, *The Holocaust: The Destruction of European Jewry* or History 75, *Film and the Holocaust*

Transfer Credits and Substitutions

Jewish studies majors must take a minimum of six regularly scheduled Jewish studies courses plus the comprehensive/DC requirement from members of the UCSC Jewish studies faculty. Subject to the limits indicated, courses from the following categories may be applied to the Jewish studies major:

- Courses taken at another institution (limit of 3)
- Education Abroad Program (limit of 3)
- Related courses not currently on the pre-approved Jewish studies course list (limit of 2)
- Independent and field studies (limit of 1)

Minor in Jewish Studies

Students whose major area of interest is not Jewish studies may nonetheless find that a minor in Jewish studies makes an invaluable contribution to their studies. This introduction to Jewish studies is helpful for students who plan to do graduate work in Jewish studies, whether through regular disciplines or in Jewish studies programs, and also for students who plan to attend rabbinical schools or to find work with Jewish communities. For others with an interest in Jewish topics, but without such plans, a minor in Jewish studies offers intellectual enrichment and a focus within the student's chosen field.

Requirements for the Minor

- three lower-division Jewish studies courses. (Two of the required lower-division courses may be satisfied through the study of Hebrew language.)
- five upper-division Jewish studies courses. (At least two of the upper-division courses must be taken from any of the Jewish studies core course lists.)

Upper-Division Courses

101. Jewish Studies: Methods and Approaches. W

Examines scholarship about Jewish cultures, communities, and intellectual through the prisms of a variety of disciplines: history, anthropology, literature, feminist studies, biblical commentary, art history, philosophy, and music. Seeks to equip students with a sophisticated understanding of the methods scholars have used to illuminate both the coherence and the diversity of Jewish experience from antiquity through the 20th Century. Enrollment limited to 20. (General Education Code(s): CC.) *N. Deutsch*

Journalism

Writing Program
166 Kresge College
(831) 459-2431
<http://writing.ucsc.edu/>

Program Description

Admission to the minor in journalism has been suspended. The following conditions will apply if it is reinstated.

The Writing Program accepts students each quarter into the minor in journalism. The minor consists of a series of courses and internships that emphasize not just craft but critical analysis. The program immerses the student in studies of the rhetoric of nonfiction writing and of the significance of public discourse. It is designed to coordinate with a student's major in any field of study in which the practice of writing for newspaper and magazine publication might complement normal course work.

A full description of the minor, an explanation of application procedures, and a petition for admission into the program may be obtained at the Writing Program office (Kresge 166). Petitions are reviewed during the second week of each quarter; selection is based on course work and writing samples. Interested students are encouraged to get more details about the minor from the writing program office (166 Kresge College).

Course Requirements

- Writing 64, *Newswriting Workshop*. All students must take this course (or its equivalent) before they are approved for the minor.
- Five upper-division courses in writing. At least three must be from the following: Writing 165, 166 (one or more courses in the series), and 167. The remaining two courses may include any upper-division creative writing course (see Literature), American Studies 105, Community Studies 144, Environmental Studies 156 (for environmental studies majors), Film and Digital Media 150, and Writing 101 (if not used as media criticism), 102, 103, 104, 107, 108, 109, 110A, 120, 161, 163, 169, and 195.
- One course in media criticism (ordinarily Writing 167, but Sociology 116, Community Studies 80L, Writing 70, and 128 are accepted)
- One quarter of internship
- A senior thesis or portfolio

Kresge College

College Office
(831) 459-2071
<http://www2.ucsc.edu/kresge>

For college description and list of faculty, see page 98.

Lower-Division Courses

12A. Service Learning (3 credits). F,W,S

Students find a volunteer position with the instructor's assistance and perform community service in non-profit organizations, schools, unions, or local government agencies. Students meet weekly, keep a journal, and write a "social action witnessing" report of their experience. Enrollment restricted to college members. Enrollment limited to 15. May be repeated for credit. *F. Williams*

12B. Service Learning (2 credits). S

Students find a volunteer position with the instructor's assistance and perform community service in non-profit organizations, schools, unions, or local government agencies. Students meet weekly, keep a journal, and write a "social action witnessing" report of their experience. Enrollment restricted to college members. Enrollment limited to 15. May be repeated for credit. *F. Williams*

15A. The Writer as Witness (3 credits). W

Students are involved in a community service project to produce a portfolio of social-action writing that situates the writer as witness in the community. Enrollment restricted to college members. Enrollment limited to 20. *S. Cooper*

15B. The Writer as Witness (2 credits). S

Students are involved in a community-service project to produce a portfolio of social-action writing that situates the writer as witness in the community. Enrollment restricted to college members. Enrollment limited to 20. *S. Cooper*

24. Imagining Utopia (3 credits). S

Explores possible futures by studying several utopian visions, projects, and manifestos. Students imagine a fu-

ture by writing a manifesto and other creative non-fiction pieces that embrace a utopian imagination. Enrollment restricted to college members. Enrollment limited to 20. *S. Cooper*

42. Student-Directed Seminar (no credit). F,W,S

Seminar taught by upper-division Kresge students under Kresge faculty supervision. (See course 192.) Students submit petition to sponsoring agency. *The Staff*

60F. Writer's Read (2 credits). W

Students attend weekly creative writing readings by fiction writers and poets, read excerpts from the writers' works, participate in question and answer sessions, and write short, creative and/or analytical responses to the readings and writings. Enrollment restricted to Kresge and Porter college members. Enrollment limited to 35. May be repeated for credit. *M. Perks*

60K. The Art of Comedy: Literature and Performance (3 credits). W

Students analyze comedic writing and practice writing comedy. Students develop pieces to be delivered in a performance at the end of the quarter. Enrollment restricted to college members. Enrollment limited to 22. *E. McKenzie*

62. Transformative Action. W

Introduces the most effective methods for social change. Examines social entrepreneurs, innovators, and visionaries. Reviews traditional methods of activism and new theories of nonviolent social change. Presents case studies of success in addressing problems of social injustice. Enrollment limited to 75. *C. King*

63. Kresge Garden Cooperative (2 credits). S

Offers hands-on gardening skills within a student-run space. Focuses on developing a strong cooperative garden on campus, with special attention to the documentation of this process. Enrollment limited to college members. Enrollment limited to 24. *D. Shaw*

65. Power and Representation Lab.

Enrollment limited to 20. *The Staff*

65A. Power and Representations: Food Systems (2 credits). F

Explores the relationship between our individual choices as "eaters" and "food citizens," and how those choices affect the collective "food system" on many scales—locally, statewide, nationally, and internationally. Concurrent enrollment in course 80A or 80B is required. Enrollment limited to 20. *D. Shaw*

65B. Power and Representation: Photography (2 credits). F

Focuses on creating a final project individually, or in collaboration with others, that engages issues of power and representation through the medium of photography. Concurrent enrollment in course 80A or 80B is required. Enrollment limited to 20. *S. Graham*

65C. Power and Representation: Creative Writing (2 credits).*

For students who wish to supplement their core experience with creative writing. Students do in-class and out-of-class writing assignments; read and discuss texts; and work to develop their final project. Concurrent enrollment in course 80A or 80B is required. Enrollment limited to 20. *F. Fatemi*

65D. Power and Representation: Art and Visual Performance (2 credits). F

Students investigate the themes presented in the core course to arrive at a final creative project in pairs, groups, or individually. Concurrent enrollment in course 80A or

80B is required. Enrollment limited to 20. *K. Burton*

75. Sustainable Food Systems.*

Introduces students to fundamental food-system issues and opportunities. Topics include: hunger, environmental sustainability, race and gender, food and agricultural policy, local food systems, gardening and farming models, social movements, and approaches for analysis and change. Enrollment limited to 55. *S. Gillon*

76. Social Documentary Photography.*

History of social documentary photography with its practice. Includes analysis of historical and contemporary images from social documentary work; camera, darkroom, and digital skill development; an individual student documentary project; and collective project discussion. Enrollment restricted to Kresge College members. Enrollment limited to 20. *The Staff*

77. Food Memoir (2 credits).*

Workshop in writing memoir that connects to issues of multiculturalism, gender, and environment. Designed to hone skills in creative writing through stories that students will unify into a larger memoir. Enrollment restricted to Kresge and College Eight members or by permission of instructor. *R. Somers*

80A. Introduction to University Discourse: Power and Representation. F

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Explores relationships between individuals and their communities—communities as small as families and friends, colleges and cities; communities as large as nations and the world. Examines ways we constitute ourselves as individuals in relation to communities, focusing on representations of class, ethnicity, sexual orientation, gender, and race in several genres—critical theory, film, art, fiction, non-fiction, and theater. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C1.) *The Staff*

80B. Rhetoric and Inquiry: Power and Representation. F

Explores the intersections of investigations, interpretation, and persuasion, and hones strategies for writing and research. Explores relationships between individuals and their communities—communities as small as families and friends, colleges and cities; communities as large as nations and the world. Examines ways we constitute ourselves as individuals in relation to communities, focusing on representations of class, ethnicity, sexual orientation, gender, and race in several genres—critical theory, film, art, fiction, non-fiction, and theater. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C2.) *The Staff*

80H. Reading Chinese Paintings.*

Introduces significant currents in Chinese cultural history and their visual expression through close examination of selected paintings. Readings focus on a rich variety of primary sources in translation. Course intended for honors students by permission of instructor. Enrollment limited to 20. (General Education Code(s): T5-Humanities and Arts or Social Sciences, A.) *R. Birnbaum*

80T. Power and Representation (Kresge Core Course for Transfer Students). F

Explores the intersections of investigations, interpreta-

tion, and persuasion, and hones strategies for writing and research. Explores relationships between individuals and their communities—communities as small as families and friends, colleges and cities; communities as large as nations and the world. Examines ways we constitute ourselves as individuals in relation to communities, focusing on representations of class, ethnicity, sexual orientation, gender, and race in several genres—critical theory, film, art, fiction, non-fiction, and theater. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to sophomore, junior, and senior college members. (General Education Code(s): T5-Humanities and Arts or Social Sciences, W.) *The Staff*

99. Tutorial. F,W,S

A program of directed study arranged between a freshman or sophomore student and a Kresge faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Independent Study (2 credits). F,W,S

A program of directed study arranged between a student and a Kresge faculty member. Class time is less proportional to credit given. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99G. Independent Study (3 credits). S

A program of directed study arranged between a student and a Kresge faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under Kresge faculty supervision. (See course 42.) Prerequisite(s): upper-division standing in Kresge, a proposal supported by a Kresge faculty member willing to supervise, and college approval. *The Staff*

193. Field Study. F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a Kresge faculty supervisor. To be used primarily by upper-division students doing part-time, off-campus study. Prerequisite(s): approval of student's adviser and the college. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a Kresge faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195. Senior Thesis. F,W,S

Senior thesis or project for student doing individual major program. May be repeated twice for credit. Prerequisite(s): permission of sponsoring committee and college approval. *The Staff*

198. Independent Field Study. F,W,S

Provides for college-sponsored individual study programs off campus, for which Kresge faculty supervision is not in person (e.g., supervision is by correspondence.) Prerequisite(s): approval of the student's faculty sponsor and college approval. *The Staff*

199. Tutorial. F,W,S

A program of individual study arranged between an upper-division student and a Kresge faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Language Program

218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Chinese

DAVID KEENAN
Chinese language, fiction, and history

French

ANGELA ELSEY
Francophonie, 19th-century French history and civilization, French and Francophone cinema

GRETA HUTCHISON
Foreign language pedagogy, second language acquisition, medieval French literature, and 19th-century literature and art

NORA MEGHARBI
Second and foreign language acquisition, applied linguistics, pedagogical grammar, technology and multimedia, sociolinguistics, TA training, course supervision, business French, scientific French, francophone literature, translation

German

ZSUZSANNA ABRAMS
Applied linguistics, language pedagogy, second language acquisition, intercultural communication, discourse analysis, computer-mediate communication

WALTER CAMPBELL
Language teaching, 18th- and 19th-century German literature, history of German

Greek

KAREN BASSI (Literature)
Greek and Latin literatures, Greek drama, Hellenistic poetics, feminist interpretation, literary and cultural theory, pre- and early modern studies, historiography

MARY-KAY GAMEL (Literature)
Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and Roman texts and artifacts, film, feminist approaches to literature and performance

GILDAS HAMEL (History)
History of Judaism and Christianity; Hebrew and Greek Bible; classical languages

CHARLES W. HEDRICK, JR. (History)
Greek and Roman history, epigraphy, historiography, political theory

JOHN P. LYNCH (Literature), Emeritus

JENNIFER LYNN
Later Roman Republic and Principate; Homeric epic; Hellenistic and Augustan poetry; Cicero

DANIEL SELDEN (Literature)
Afroasiatic languages and literatures, Greek and Latin, Hellenistic culture, the classical tradition, history of criticism, literary theory

Hebrew

TAMMI ROSSMAN-BENJAMIN
Hebrew language and culture, biblical Hebrew syntax and semantics, the Hebrew Bible, Jewish thought, psycholinguistics, second-language acquisition and bilingualism

Italian

GIULIA CENTINEO
Italian culture and civilization; history of Italian language; Italian linguistics, syntax, and semantics; language pedagogy

TONIA PRENCIPE
Technology and foreign language pedagogy; modern Italian culture, history, literature, and cinema; creative writing; promotion of Italian language and culture of K-12

Japanese

SAKAE FUJITA
Foreign language methodology, drama/theater/improvisation use in language learning, language and identity, foreign language literacy

SHIGEKO OKAMOTO
Sociolinguistics, discourse analysis, pragmatics, language and gender, foreign language pedagogy, Japanese linguistics

Latin

KAREN BASSI (Literature)
Greek and Latin literatures, Greek drama, Hellenistic poetics, feminist interpretation, literary and cultural theory, pre- and early modern studies, historiography

MARY-KAY GAMEL (Literature)
Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and Roman texts and artifacts, film, feminist approaches to literature and performance

GILDAS HAMEL (History)
History of Judaism and Christianity; Hebrew and Greek Bible; classical languages

CHARLES W. HEDRICK, JR. (History)
Greek and Roman history, epigraphy, historiography, political theory

JOHN P. LYNCH (Literature), Emeritus

JENNIFER LYNN
Later Roman Republic and Principate; Homeric epic; Hellenistic and Augustan poetry; Cicero

DANIEL SELDEN (Literature)
Afroasiatic languages and literatures, Greek and Latin, Hellenistic culture, the classical tradition, history of criticism, literary theory

Portuguese

ANA MARIA SEARA
Portuguese language; literature, film, and music of Brazil and the Portuguese-speaking world; acquisition and teaching of foreign, second, and heritage languages

Russian

WILLIAM NICKELL
Leo Tolstoy, Russian cultural history, 1920s–1930s Soviet Russia, Russian Soviet film, Russian language and pedagogy

Spanish and Spanish for Spanish Speakers

BRENDA BARCELÓ
Medical and professional Spanish, language instruction technology, Latin American culture, Latin dance expressions, Spanish/English/Spanish translation and interpretation, Hispanic linguistics, Romance languages

CARLOS CALIERNÓ
Bilingualism and intercultural communication; Latin American culture; history of the conquest, music, art, and cinematography

VERÓNICA FELIU
Latin American literature of the 20th century; Chilean feminisms, politics, and culture; Latin American cultural studies; Spanish learning for both non-native and heritage speakers

MARÍA VICTORIA GONZÁLEZ-PAGANI
Language teaching methodology; Spanish syntax; computer-assisted foreign language learning; Latin American cultural studies, especially women's contributions

MARÍA MORRIS
Language learning styles and strategies, culture and technology in language training

MARTA NAVARRO
Latin American literature, Mexican/Chicano culture, Latina/Chicana issues

ARIEL A. PÉREZ
Language acquisition and teaching methodology, computer-assisted language learning, teaching language for proficiency, oral proficiency assessment; Latin American current affairs

ALVARO ROMERO-MARCO
Spanish literature of the 19th- and 20th-centuries; film, cultural studies

EVE ZYZIK
Spanish linguistics, second language acquisition, cognitive linguistics, language pedagogy and curriculum design

Program Description

Understanding how language works is a crucial part of comprehending human consciousness and communication. Language is an intellectual tool basic to all disciplines. In today's communities, multicultural and global, learning a second language is not a refinement but a necessity—the key to understanding and communicating with others near and far. The goal of the Language Program at UCSC is to allow students to achieve a substantial level of proficiency in languages other than English. Since such proficiency always includes cultural as well as linguistic comprehension, the program requires investigating the complex relationship between language and culture.

The Language Program offers rigorous language training by professional language instructors. Most courses are taught in the target language from the very beginning. In 2010–11, the languages offered are Chinese, French, German, Greek, Hebrew, Italian, Japanese, Latin, Portuguese, Russian, Spanish, and Spanish for Spanish speakers.

Students with previous language preparation who wish to continue in that language take a placement examination to determine the course level appropriate for them. Each language's placement examination format is described in the quarterly *Schedule of Classes*, along with the time, date, and location of the examination.

Language learning at UCSC is supported by a variety of technologies. There is a campus language laboratory in the Media and Electronic Resource Center (MERC) at McHenry Library; the library also houses an abundance of print and audiovisual material in the languages taught at UCSC, including music recordings and videos. Television programs are received from countries around the world. Faculty in the Language Program are incorporating new technologies into their teaching on an ongoing basis, including computer software and web-based resources.

In addition to language courses, the program offers upper-division courses exploring history, sociology, literature, art, film, and other manifestations of culture. All courses are taught in the target language.

Students of language interested in theater have the opportunity to participate in the annual International Playhouse, which every spring presents highly successful programs. To date, pieces have been performed in Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, and Spanish.

Students are also encouraged to participate in foreign film series (e.g., Chinese, French, Italian, Portuguese, Russian, Spanish), international music and dance festivals, and conferences on intercultural or international topics.

Students who wish to concentrate on language study can choose various majors. Students can major in language studies, which combines courses in language proficiency and culture with general and applied linguistics. The Literature Department offers courses in French, German, Spanish, Latin American, and Italian literature. The Literature Department encourages all students to study a second language and requires two upper-division courses in a non-English literature for the intensive literature major. The History Department encourages students of Asian, Latin American, European, and classical history to study a second language and provides a variety of opportunities to make use of language skills in their studies. Latin American and Latino Studies focuses on the Hispanic culture of the Americas and requires all majors to read, speak, and write Spanish or Portuguese. Other area studies majors involving language study include classical studies, German studies, Italian studies, East Asian studies (Chinese emphasis), global economics, and health sciences.

Study abroad is an important component of language study at UCSC. Language students have various opportunities for studying abroad, including one-quarter programs in Siena, Italy, Japan (global economics taught in English), and Costa Rica (tropical biology taught in English); semester programs in Austria, Chile, Costa Rica, France, Germany, India, Italy, or Mexico; and the yearlong UC Education Abroad Program (EAP), with centers in Brazil, Chile, China, Costa Rica, France, Germany, Italy, Japan, Mexico, Russia, Spain, and Taiwan.

Lower-Division Courses

80D. Italian Culture Through Cinema. S

Film is used as a medium through which images of Italians and their culture are disseminated, perpetuated, and crystallized. Whether these representations offer historical perspectives or stereotypes, they are important documents for the study of Italian culture, society, history, and politics. While analyzing films by and about Italians, we develop an informed opinion on relevant issues in Italian culture and society. The course, to be taught in English, is organized thematically. Students cannot receive credit for this course and Italian 106. May be repeated for credit. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

80F. Israel's Struggle for Identity as Seen Through Israeli Cinema. S

Examines, through the medium of film, Israel's struggle for identity since its founding as a modern state. Topics include: Israel's relationship to the Jewish diaspora; the nature of Israel as a Jewish state; and the relationship between Israel and its Arab neighbors. Students may not receive credit for this course and Hebrew 106. May be repeated for credit. (General Education Code(s): ER, T4-Humanities and Arts, E.) *The Staff*

Upper-Division Courses

112. Language and Gender. S

Examines the relationship between language and gender. Topics include: gender differences in speech; linguistic gender norms and stereotypes; gender and the construction of identity in discourse; sexuality and language; sexism in language; social, educational, and political implications. (Formerly course 110.) *S. Okamoto*

150. Topics in Hispanic Linguistics: Introduction to Hispanic Linguistics.

Taught in Spanish. Students learn the major properties of the Spanish language from a linguistics perspective. Topics covered include: phonetics/phonology, morphology, and syntax. Prerequisite(s): Linguistics 52 or Linguistics 55; and Spanish 6 or Spanish for Spanish Speakers 63. Enrollment limited to 30. *E. Zyzik*

Graduate Courses

201. Second Language Teaching. S

Helps novice instructors learn about the theory and practice of language teaching and learning. Focuses on current methods used in communicatively oriented classrooms. Topics include: listening comprehension, grammar, vocabulary, reading, writing, and testing/assessment. Enrollment restricted to graduate students. Enrollment limited to 20. *E. Zyzik*

210. Oral Communication in the U.S. Classroom: Strategies for International T.A.s (2 credits). F

Seminar for international graduate students who speak English as a second or foreign language. Focuses on oral competency and serves to qualify students as graduate teaching assistants in UCSC classrooms or laboratories. Enrollment restricted to international graduate students; language assessment administered by the Graduate Division. *The Staff*

Language Studies

Linguistics Department
241 Stevenson College
(831) 459-4988
<http://ling.ucsc.edu>

Program Description

Language studies is an interdisciplinary major offered by the Linguistics Department. It is designed to equip students with competence in one or more foreign languages and, at the same time, provide them with an understanding of the general nature of human language—its structure and use. It requires (1) acquisition of demonstrable competence in a language other than English, (2) grounding in linguistics, and (3) completion of a series of cultural context courses related to the language. Currently, majors may choose a concentration in Chinese, French, German, Modern Hebrew, Italian, Japanese, Russian, or Spanish. Interested students should contact the Linguistics Department office early in their college career to obtain essential information about requirements. Students are also encouraged to download a current copy of the *Handbook of Undergraduate Programs in Linguistics and Language Studies* from our web site at <http://ling.ucsc.edu/>, which contains detailed information about the major.

A junior year abroad through the UC Education Abroad Program (EAP) in a country appropriate to the major language is recommended. A senior year abroad is approved only when all of the language proficiency requirements have been satisfied and when it is clear that any remaining courses can be satisfactorily completed abroad. Courses taken abroad may be used to satisfy major requirements only if approved by the undergraduate director or a designated adviser.

Requirements for the Language Studies Major

Early Declaration

It is important that prospective students declare the major as early as possible so that they can complete the advanced language, linguistics, and context requirements within the allowed period of enrollment.

Students who wish to include an EAP experience in their course of study will have to coordinate their choice of year abroad with the scheduling of UCSC courses. Transfer students who have not made significant progress with the language requirements before entering UCSC may find it difficult to include an EAP year before completion of graduation requirements.

Course Requirements

Language studies majors must satisfy course requirements in languages, linguistics, and cultural context.

Language component: Language studies majors (in French, German, Modern Hebrew, Italian, Russian, and Spanish) must achieve a level equivalent to six quarters in the language of concentration. One advanced language course after level 6 is also required. Majors in Chinese and Japanese must achieve a level equivalent to eight quarters of language study.

Six foundation courses in linguistics:

- Linguistics 50, *Introduction to Linguistics: Sounds and Words*
- Linguistics 53, *Semantics 1*
- Linguistics 101, *Phonology 1*
- Linguistics 112, *Syntax I*; or Linguistics 111, *Syntactic Structures*
- two advanced linguistics courses
- Five elective courses in linguistics or cultural context:
- Linguistics courses: any upper-division course offered by the Linguistics Department
- Cultural context courses in the major language: to be selected from disciplines such as literature, history, and politics, subject to departmental approval.

Senior exit requirement: In their senior year, language studies majors must satisfy the senior exit requirement in one of two ways:

Option 1. Successful completion of a capstone course. Students may designate an appropriate upper-division course as their capstone course.

- Language studies majors must have senior standing, achieved level-5 language competence, and must have completed Linguistics 101, *Phonology 1* and 112/111, *Syntax I* or *Syntactic Structures*.

Option 2. Senior thesis supervised by a faculty member.

- The proposal for a senior thesis must be submitted for departmental approval at least three quarters prior to the quarter of graduation.
- Students enroll in Linguistics 195, *Senior Thesis* with the approval of the faculty adviser. The senior thesis is an original investigation of the major language in some relevant way, such as the linguistic structure

or history of the language or its historical, literary, cultural, sociological, ethnographic, or political context.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in language studies is satisfied by completing course 101 and either course 111 or 112.

Requirements for the Minor

The minor requires completion of two years (six quarters) of language study (or demonstration of an equivalent level of ability) and eight additional linguistics and cultural context courses as follows:

- Linguistics 50, *Introduction to Linguistics: Sounds and Words*
- Linguistics 101, *Phonology 1*
- Linguistics 112, *Syntax I*; or Linguistics 111, *Syntactic Structures*
- two advanced linguistics courses
- three elective/context courses (see handbook for details)

There is no senior exit requirement for the minor.

Disqualification Policy

The Linguistics Department has adopted a major disqualification policy for linguistics and language studies majors that is intended to encourage students to take seriously their performance in the introductory courses and to make a strong effort to pass those courses.

Students who receive more than one No Pass, D,W, and/or F in the following introductory courses will not be permitted to major in linguistics or language studies:

- Linguistics 50, *Introduction to Linguistics: Sounds and Words*
- Linguistics 53, *Semantics 1*
- Linguistics 101, *Phonology 1*
- Linguistics 111, *Syntactic Structures*
- Linguistics 112, *Syntax 1*

Students who fail one of these courses will be sent a letter reminding them of this policy and warning them that they are at risk of disqualification should they fail to pass a subsequent introductory course.

Students may appeal their disqualification by writing a formal letter to the department chair. This letter should explain any extenuating circumstances that influenced their poor performance in the introductory courses. For example, if some event led to poor performance in multiple courses in a single quarter, a student has a potential case for appeal. In contrast, academic dishonesty or poor performance spanning multiple quarters will be considered evidence that a student is ill-suited for the majors.

The letter of appeal must be submitted to the Linguistics Department office (241 Stevenson College) no later than 15 days from the date the disqualification notice is mailed, or the 10th day of classes in the quarter of their disqualification, whichever is later. The department will subsequently notify the student and the student's college of the appeal decision no later than 15 days after the submission of the appeal.

Honors

Students who wish to be considered for honors should meet the deadline posted by the Office of the Registrar for declaring the intent to graduate. Determination of honors is based on a close reading of (1) the student's grades and narrative evaluations for all courses relevant to the major; (2) the results of the senior exit requirement; (3) other factors relevant to an assessment of academic excellence, such as research papers of professional quality. Generally, honors in the major are awarded to the top 10 percent of those graduating in the major. Only those students whose narratives are consistently excellent, and whose performance on the senior exit requirement is excellent, will qualify. Highest honors are rarely awarded, and then only to students whose performance in coursework is outstanding and who have completed an outstanding senior thesis.

Latin

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Professor

KAREN BASSI (Literature)
Greek and Latin literatures, Greek drama, Hellenistic poetics, feminist interpretation, literary and cultural theory, pre- and early modern studies, historiography

MARY-KAY GAMEL, Professor (Classics and Comparative Literature)
Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and Roman texts and artifacts, film, feminist approaches to literature and performance

CHARLES W. HEDRICK, JR. (History)
Greek and Roman history, epigraphy, historiography, political theory

JOHN P. LYNCH, (Literature) Emeritus

DANIEL SELDEN (Literature)
Afroasiatic languages and literatures, Greek and Latin, Hellenistic culture, the classical tradition, history of criticism, literary theory

Lecturer

GILDAS HAMEL (History)
History of Judaism and Christianity; Hebrew and Greek Bible; classical languages

JENNIFER LYNN
Later Roman Republic and Principate; Homeric epic; Hellenistic and Augustan poetry; Cicero

Program Description

The Language Program offers instruction in elementary Latin. It consists of a two-course sequence, Latin 1 and Latin 2, that begins in the fall quarter only. Students interested in Latin literature should see the course listings under Literature. Those interested in classical studies should see the program description for classical studies.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Lower-Division Courses

1. Elementary Latin. F

Instruction in Latin grammar, using a modern Latin method, designed to prepare for the study of classical literature. The sequence begins in the fall quarter only. *The Staff*

2. Elementary Latin. W

Instruction in Latin grammar, using a modern Latin method, designed to prepare for the study of classical literature. Prerequisite(s): course 1. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Latin American and Latino Studies

32 Merrill College
(831) 459-4284
<http://lals.uisc.edu>

Faculty and Professional Interests

Core Faculty

GABRIELA ARREDONDO, Associate Professor of Latin American and Latino Studies
Latino studies; Chicano history; U.S. immigration histories; U.S. social and cultural history; critical race and ethnicity theories; Chicana and Mexicana feminisms; "borderlands" studies; history of modern Mexico

JOHN G. BORREGO, Professor Emeritus of Latin American and Latino Studies

SYLVANNA FALCÓN, Assistant Professor of Latin American and Latino Studies
Human rights, racism/antiracism, globalization, gender, transnational feminism, Latin America (Mexico, Peru), United States

JONATHAN FOX, Professor of Latin American and Latino Studies
Latin American and Latino politics, including issues of democratization, accountability, social movements, transnational civil society, social and environmental policy, and immigration

ROSA-LINDA FREGOSO, Professor of Latin American and Latino Studies
Human-rights studies; intercultural and transborder feminism; cultural studies; Latino and Latin American film and media arts

SHANNON GLEESON, Assistant Professor of Latin American and Latino Studies
Migrant populations, the effects of documentation status, labor rights, civic engagement, inequality and stratification, political sociology, law and society, mixed methods and comparative approaches

WALTER L. GOLDFRANK, Professor Emeritus of Latin American and Latino Studies and Sociology

FLORA LU, Assistant Professor of Latin American and Latino Studies

Ecological anthropology, human behavioral ecology, Amazon rainforest, indigenous peoples, conservation, Ecuador, culture change, market integration, indigenous resource management, political ecology, environmental justice

MANUEL PASTOR JR., Professor of Latin American and Latino Studies

Urban poverty and regional development, Latinos in the urban U.S., environmental justice, macroeconomic stabilization in Latin America; distribution and growth in the developing world; Cuban economic reform; Mexican economic reform

HECTOR PERLA, JR., Assistant Professor of Latin American and Latino Studies

International relations; Latin American studies; Latino politics; political psychology; Central America; U.S. foreign policy; social and revolutionary movements; asymmetric conflicts

CECILIA M. RIVAS, Assistant Professor of Latin American and Latino Studies

Salvadoran transnationalism; media (Internet, newspapers); migration; globalization; race, ethnicity, and gender; bilingualism; consumption; El Salvador; Central America

PATRICIA ZAVELLA, Professor of Latin American and Latino Studies

Transnational migration by Mexicans, poverty, family, sexuality, labor, social networks, feminist studies, Chicano/Latino studies, ethnographic research methods

Participating Faculty

MARK D. ANDERSON, Assistant Professor of Anthropology

Racial formation, diaspora, nationalism, transnationalism, indigeneity, consumption, Central America, Honduras, Latin America, African diaspora

JEFFREY T. BURY, Assistant Professor of Environmental Studies

Political ecology; sustainable development; Latin American studies; international relations; institutional dimensions of natural resource conservation in the global south

PEDRO G. CASTILLO, Associate Professor of History

Chicano history and culture; American social and urban history; race, class, and gender in California history; immigration history, Latinos in the U.S.

CYNTHIA CRUZ, Assistant Professor of Education
Street ethnography; community-based learning and pedagogies; decolonial feminist pedagogies; Chicana studies and epistemologies; U.S.-Third World Feminisms; cultural studies and education

MARIA ELENA DIAZ, Associate Professor of History
Colonial Caribbean and Latin America; social and cultural history; ethnohistory; slavery, race, and gender

KENT H. EATON, Associate Professor of Politics
Comparative politics, international relations, political economy, public policy, territorial conflict, federalism, decentralization, party and electoral systems, Latin America, the Philippines

LISBETH HAAS, Associate Professor of History
U.S.-Mexico borderlands, Chicano and Native American history; visual culture in the colonial Americas; the U.S. West and California; historical memory, theory, and historical methodology

NORMA KLAHN, Professor of Literature
Latin American literary and cultural studies (specialization: Mexico), Chicano/Latino literature and culture from a cross-border perspective, modernity/postmodernity, poetics and politics, genre theory (novel, poetry, autobiography),

contemporary critical theories (i.e., border, ethnic, feminist, transnational/global)

LOURDES MARTÍNEZ-ECHAZÁBAL, Associate Professor of Latin American Literature

Latin American and Caribbean literatures; Afro-Latin American literatures, cultures, and societies; found[er]national narratives; Brazilian literature; literatures of Cuba and the Cuban diaspora; critical race theory

JUDIT MOSCHKOVICH, Professor of Mathematics Education

Mathematics cognition and learning; student conceptions of linear functions; discourse in mathematics and science classrooms; everyday mathematical practices; and bilingual mathematics learners

EDUARDO MOSQUEDA, Assistant Professor of Education

Mathematics education of English learners; large-scale dataset quantitative analysis; urban education issues

OLGA NÁJERA-RAMÍREZ, Professor of Anthropology

Folklore theory, ritual, festival, dance, greater Mexican culture, history and folklore, transnationalism, identity; expressive culture, ethnomusicology, bilingual communication, gender, history, and culture of Latin America, the U.S., and Mexico

MARCIA OCHOA, Assistant Professor of Community Studies

Gender and sexuality, race and ethnicity, Latino studies, media and cultural studies, ethnography of media, feminism, queer theory, multimedia production, Latin American studies—Colombia and Venezuela, political philosophy, geography

MATTHEW D. O'HARA, Assistant Professor of History

Modern Latin America and Mexico; late colonial Latin America; religion, spirituality, and ritual; urban history; race, ethnicity, and identity; political culture

JUAN POBLETE, Associate Professor of Literature
Latin(o) American literatures; transnational/global cultures (literature, radio, film); Latin(o) American cultural studies; 19th-century studies; the history of reading practices

CATHERINE RAMIREZ, Assistant Professor of American Studies

Chicana and U.S. Latino literature and history; gender studies and feminist theory; visual culture and style politics; cultural studies; popular and urban youth cultures; speculative fiction, comparative American studies

RENYA K. RAMIREZ, Associate Professor of American Studies

Native American studies, Indian identity, Native Americans and anthropology, urban Indians, Native American women, cultural citizenship, expressive culture, and anti-racist education

B. RUBY RICH, Professor of Community Studies
Documentary film and video, post-9/11 culture, new queer cinema, feminist film history, Latin American and Latin/a cinema, U.S. independent film and video, the essay film, the politics of film festival proliferation and the marketing of foreign films in the U.S.

BARBARA ROGOFF, Professor of Psychology
Human development in sociocultural activity; informal and formal arrangements for learning; adult/child and peer communication in families and schools in diverse cultural communities (especially in Guatemala, Mexico, and the U.S.); learning through observation and collaboration

GABRIELA SANDOVAL, Assistant Professor of Sociology

Latino/a sociology, voting and representational politics, urban sociology, political sociology

FELICITY SCHAEFFER-GRABIEL, Assistant Professor of Feminist Studies

Transnational feminism, migration, Latin American/Latino studies, Chicano/a studies, Internet, technology and the body, sexuality, gender and globalization

HELEN SHAPIRO, Associate Professor of Sociology
Political economy, Latin American economic history and development (with an emphasis on Brazil), industrial policy, the auto industry, the state and transnational corporations

Affiliated Faculty

JUDITH AISSSEN, Professor of Linguistics
Syntax, morphology, Optimality Theory, Mayan languages

JORGE ALADRO FONT, Professor of Spanish Literature
Spanish mysticism, theory and historical developments of imagery in the Middle Ages to the baroque period, Renaissance and baroque Hispanic literature, Italian ideas in the Spanish Renaissance, Cervantes

CAROLYN DEAN, Professor of History of Art and Visual Culture
Cultural histories of the native Americas and colonial Latin America

ROBERT W. FAIRLIE, Associate Professor of Economics
Labor economics, public policy, entrepreneurship, applied econometrics

DANA FRANK, Professor of History
U.S. social and economic history; women, labor, and working-class history; contemporary political economy; modern Central America

GREGORY S. GILBERT, Professor of Environmental Studies
Tropical ecology and conservation, disease ecology

MARÍA VICTORIA GONZÁLEZ-PAGANI, Lecturer in Spanish Language
Language teaching methodology; Spanish syntax; computer-assisted foreign language learning; Latin American cultural studies, especially women's contributions

MIRIAM GREENBERG, Assistant Professor of Sociology
Media studies, cultural studies, globalization, political and cultural economies of global cities, video production, and ethnography

KIRSTEN SILVA GRUESZ, Professor of Literature
Chicano/Latino literatures and cultures, Comparative Americas studies, language ideologies and bilingualism in literature

DANIEL GUEVARA, Associate Professor of Philosophy
Kant, moral philosophy, moral psychology, environmental ethics, history of modern philosophy

CRAIG HANEY, Professor of Psychology
Applications of social psychological principles to legal settings, assessment of the psychological effects of living and working in institutional environments, social contextual origins of violence, development of alternative legal and institutional forms

KAREN D. HOLL, Pepper-Giberson Professor, Environmental Studies
Restoration ecology, conservation biology, landscape ecology

AIDA HURTADO, Professor of Psychology
Social identity, feminist theory, social psychology of education, survey methodology

KENNETH KLETZER, Professor of Economics
International economics, macroeconomics, economic development

REGINA D. LANGHOUT, Assistant Professor of Psychology
School-community-university collaboration; how schooling and neighborhood experiences are informed by social class, race, and gender; participatory action research

JOHN LEAÑOS, Assistant Professor of Social Documentation
Social documentation, social art practice, community arts, documentary animation, Chicano/a art practice and cultural studies, media and cultural studies, subaltern studies, photography, installation art, public art and intervention

DEBORAH LETOURNEAU, Professor of Environmental Studies
Agroecology, tropical biology, insect-plant interactions, biological control as an alternative to chemical pesticides

DANIEL T. LINGER, Professor of Anthropology
Self and identity, politics, cultural theory, cities, violence, transnational experience, Brazil, Japan

PAUL M. LUBECK, Professor of Sociology
Political sociology; political economy of development, globalization, labor and work; logics of methodology; religion and social movements; Islamic society and identities; information and networks

ANDREW SALVADOR MATHEWS, Assistant Professor of Anthropology
Environmental anthropology, science and technology studies, conservation and development

LUCINDA PEASE-ALVAREZ, Associate Professor of Education
Language and literacy development, language-minority education, bilingualism, informal learning

JENNIFER POOLE, Assistant Professor of Economics
International trade, Latin American economics, applied microeconomics

MICHAEL ROTKIN, Lecturer in Community Studies
Marxist theory, capitalist system, community organizing, electoral politics, media, government programs, community power structure, institutional analysis, and affirmative action

DANIELA SANDLER, Assistant Professor of History of Art and Visual Culture
Modern and contemporary architecture and urbanism; visual and cultural studies; social inequality in space; architectural preservation; history and memory in the built environment; architecture and visual culture in Latin America and Europe, with foci on Brazil and Germany

ANA MARIA SEARA, Lecturer, Portuguese Language
Portuguese language; literature, film, and music of Brazil and the Portuguese-speaking world; acquisition and teaching of foreign, second, and heritage languages

DANA Y. TAKAGI, Professor of Sociology
Social inequality and identity, research methods, race relations, nationalism and social movements

KIP TELLÉZ, Associate Professor of Education
Preparation of teachers for linguistic and cultural diversity, second language learning, studies of the school curriculum, educational assessment

GUSTAVO VAZQUEZ, Assistant Professor of Film and Digital Media
Film and video production, directing drama, documentary and experimental cross-cultural experiences in film, film curator

RASMUS WINTHER, Assistant Professor of Philosophy
Philosophy of science, epistemology, metaphysics, philosophy of biology, American pragmatism, Latin American philosophy, evolutionary theory

KAREN TEI YAMASHITA, Associate Professor of Literature (Creative Writing)
History and anthropology of Japanese immigration to Brazil, Asian American literature, modern fiction, playwriting

Program Description

The Latin American and Latino Studies (LALS) Department prepares students for bilingual and multicultural participation in a rapidly changing and globalized world. The Latin American and Latino Studies Department integrates the study of Chicano/a and Latino/a communities in the U.S. with analysis of the histories, politics, cultures, and societies of Latin America and the Caribbean. The field is inherently interdisciplinary, drawing on sociology, history, anthropology, political science, media studies, communications, economics, environmental studies, literature, and urban planning.

LALS courses deal with changing political, social, economic, and cultural realities, among Latin America and U.S. Latino and Latina communities in ways that recognize cross-cultural, or transnational processes. Key concepts and processes studied include: immigration and transnational migration; gender, racial, sexual, and ethnic identities; social movements; diverse forms of cultural expression and cultural politics; ongoing political and economic restructuring in Latin America; and the challenges of political and economic empowerment for Latino/a communities in the U.S. Students learn to formulate thoughtful, critical and clear arguments on controversial topics and communicate effectively, including beyond the English language.

In addition to academic knowledge, LALS also provides opportunities for students to acquire practical, real-world skills. Through program-related internship and field-study experiences, students can acquire useful, pre-professional skills in any of the following key areas: community development/advocacy, public policy, education, journalism, media, performance, and research/writing, among others.

Latin American and Latino studies courses span a number of disciplines and are augmented by courses taught by participating faculty in various departments. A sample list appears at the end of the course descriptions. The Latin American and Latino Studies Department compiles a quarterly list of these courses offered by other departments that are pre-approved and count toward the major; this list appears on the department's web site under "courses" and is frequently updated.

Graduates of the LALS major have made careers in a wide variety of fields, including teaching, community organizing, community and government service, journalism and the media, environmental science, global economics, health care, legal services, library science, music, publishing, and research. Many have gone on to pursue advanced degrees in the U.S. or abroad in anthropology, bilingual education, communications, cultural studies, ecology, economics, geography, history, law, literature, media, public health, and sociology—to name a few.

Major Requirements

Two lower-division courses are required for the major: LALS 1, *Introduction to Latin American and Latino Studies*, and one Latin American and Latino Studies 80 course or two chosen from the list below. Ideally students (fresh and transfer) should take LALS 1, and two courses from the LALS 80s series, prior to taking

LALS 100 *Concepts and Theories in Latin American and Latino Studies*, a required course to declare the major.

See the LALS lower-division course list below:

Latin American and Latino Studies

- 1 *Introduction to Latin American and Latino Studies*
- 80B *Social Movements in Latin America*
- 80D *Political Change in Mexico*
- 80E *Latin American Philosophy*
- 80F *Latinos in the U.S.A. : Comparative Perspectives*
- 80G *Race, Class, and Gender*
- 80H *Comparative Latino/a Histories*
- 80I *Gender and Global Cinema*
- 80J *Race, Nation, and War*
- 80K *Latinos and Organized Labor in the U.S.*
- 80P *Energy, Society and Ecology in Latin America*
- 80Q *Música Latina*
- 80R *Organizing Across the Americas*
- 80S *Sexualities and Genders in Latin American and Latino Studies*
- 80T *Topics in Latin American and Latino Studies Cinema*
- 80W *Transnational Feminist Organizing in the Americas*
- 80X *Central American Peoples and Cultures*

Anthropology

- 80G *Barrio Popular Culture*
- 80I *Culture and Power in Latin America*

Environmental Studies

- 80A *The Future of Rain Forest*

History

- 11A *Latin America: Colonial Period*
- 11B *Latin America: National Period*
- 80N *Women at Work*

History of Art and Visual Culture

- 60 *Indigenous American Visual Culture*

Spanish /Latin American/Latino Literature

- 60 *Introduction to Literary Genres*
- 80N *Latino Expressions in the U.S.*

Music

- 4A and 4B *Latin American Ensembles* (three quarters fulfill one lower-division elective)
- 11D *Introduction to World Music*
- 80F *Music in Latin American Culture: Regional Traditions*

Philosophy

- 80E *Latin American Philosophy*

Sociology

- 15 *World Society*

Theater

- 80M *Chicano Teatro*

Other courses numbered 1–80 on Latin American and/or Latino/a subjects may be substituted with approval in advance from the Latin American and Latino Studies Department.

Courses with similar content taken at other institutions may be substituted with approval from the Latin American and Latino Studies Department.

In addition, all majors must complete 10 upper-division courses, including three required core courses, (no substitutions):

Latin American and Latino Studies

- 100 *Concepts and Theories in Latin American and Latino Studies*
- 100A *Politics and Society: Concepts and Methods*

100B *Culture and Society: Culture in a Global Context*
The remaining seven electives must meet the following criteria:

- A cluster of three courses must be taken in one of the following areas of concentration: 1) transnational migrations; 2) social inequalities; 3) collective action and social movements; 4) cultural politics and cultural flows. Courses may be taken in any department, as long as they fit into the cluster and appear on the LALS list of course offerings.
- At least one course must concentrate on pre-WWII topics
- At least one course must center on Chicano/a-Latino/a issues
- At least two courses must be taught in Spanish or Portuguese***

***Upper-Division courses in Portuguese are currently not taught at UCSC and must be taken elsewhere.

Language Requirements

All Latin American and Latino studies majors are expected to learn to speak, read, and write Spanish or Portuguese and to make use of these skills on a regular basis in their upper-division academic work. Majors must take at least two upper-division courses taught in Spanish or Portuguese. Before taking upper-division course work taught in the language, students must demonstrate proficiency in Spanish equivalent to the completion of Spanish 6 or 56, or Spanish for Spanish Speakers 63. Students who wish to pursue Portuguese may take the Portuguese 1A/1B or 60A/60B series. Students who have achieved fluency in Spanish or Portuguese through life experience may be exempt from this recommended preparatory course work after demonstration of their proficiency. In addition to Latin American and Latino studies and affiliated department course offerings, the required two upper-division courses taught in Spanish or Portuguese*** may be fulfilled through study abroad with prior approval by Latin American and Latino Studies. Students may also pursue internship or field study opportunities to satisfy one of the two required upper-division courses taught in Spanish or Portuguese; however, at least one of the two courses must be fulfilled in a classroom setting.

Field-Study and Internship Opportunities

All majors are strongly encouraged to undertake either a field study in Latin America, the Caribbean, a Latino/a community in the U.S., or formal academic study abroad through the Education Abroad Program (EAP). These paths are the best ways to improve language skills, explore the nature and direction of specific academic and career interests in relation to Latin American and Latino studies, and deepen cross-cultural understanding and relationships based upon personal experience.

Field studies are independent, community-based study projects for academic, credit, done under faculty sponsorship and arranged on an individual basis. Local opportunities for internships and field study in Latino/a communities on California's Central Coast are numerous. Credit for up to three upper-division courses may be applied toward the major from field study; however, course credit from field study and study abroad combined may not exceed three upper-division courses. Students should check the Latin American and Latino Studies Department web site for further information regarding the field-study process and course credit. A

listing of local field-study programs and petition forms are available at the Latin American and Latino Studies Department office, 32 Merrill.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in Latin American and Latino studies and the combined majors with global economics, literature, politics, and sociology are met by completing courses 100A and 100B.

Study Abroad

Students may apply to study abroad through the Education Abroad Program (EAP). EAP offers opportunities for students to study in Mexico City, Mexico; Santiago, Chile; Rio de Janeiro or Bahia, Brazil; and Madrid, Córdoba, Granada, and Barcelona in Spain. In addition to language and culture and university immersion programs, EAP also offers a Field Research Program in Mexico, an experiential program geared toward juniors and seniors who want to explore the "real" Mexico outside the classroom and at the same time receive undergraduate research training. The program has research sites in states such as Jalisco, Yucatán, Oaxaca, or Michoacán (final site choice depends on the research topic). Application deadlines are generally about one year in advance of the program, so students should visit the UCSC International Education Office early to plan for study abroad and to begin the application process. The department will approve courses taken abroad that cover topics appropriate to the LALS curriculum for upper-division credit toward the major. All credit for EAP classes is fully incorporated into students' UCSC transcripts. Financial aid applies to all programs and takes into account airfare and living costs in addition to tuition and fees. Before departure, students should present an academic plan for courses abroad to the department adviser for review. Credit for up to three EAP courses can be applied toward the major. (A maximum of three courses of field study and EAP combined can be applied toward the major requirements.)

Senior Comprehensive Requirement

Every major must complete a senior exit requirement in order to graduate. The preparation and completion of this requirement is structured into the senior year. There are five options to choose from:

- Enrollment in a Latin American and Latino Studies senior seminar (194 series), with good to excellent performance, including the submission of the required final research paper, a total of 25 pages written during the course of the quarter.
- An expanded research paper, a minimum of 20 pages in length. This paper often builds on related course work and requires approval from the relevant faculty adviser before the end of the winter quarter of the senior year. Students must be enrolled in an independent-study tutorial to complete this paper.
- A senior thesis, generally between 40–60 pages, based on two or more quarters of sustained independent research under the supervision of the faculty adviser while enrolled in an independent study (done by petition to LALS, and with the approval of the faculty adviser). If the thesis option is selected

by a combined major, it should be planned in consultation with an adviser from each department, completed under the supervision of a faculty member from either department, and read and approved by both advisers; one adviser is sufficient if this faculty member is affiliated with both departments.

- A senior project, which can be either a creative project or a community-action project. Creative projects include web site design, video, performance, slide show, photo exhibit, or other media work. A short written analysis of the student's experience in conducting the project is required. Community-action projects often involve sustained research and/or activity conducted in a community organization or public interest group, usually stemming from an internship. A 10-page description and analysis of the project is required.
- The student-directed seminar option is available to unusually qualified students only. It requires three quarters of preparation directed by a faculty adviser and approval by the Academic Senate Committee on Educational Policy prior to teaching the course. The class is limited to 15 students. This option can be taken only by petition to LALS and with the approval of the faculty adviser.

Latin American and Latino Studies Major Planners

The following are two recommended academic plans for undertaking basic preparation for the Latin American and Latino studies major. Plan One is a guideline for students who commit to the major early in their academic career. Plan Two is for transfer students.

Plan One—Frosh

| Year | Fall | Winter | Spring |
|---------------|--|--|--|
| 1st (frsh) | SPAN 1 LALS 1 | SPAN 2 LALS 80 | SPAN 3 LALS 80 |
| 2nd (soph) | SPAN 4 or SPSS 61 LALS 100 | SPAN 5 or SPSS 62 LALS 100A | SPAN 6 or 56 or SPSS 63 LALS 100B |
| 3rd (jr) | LALS upper- division course | LALS upper- division course | LALS upper- division course |
| 4th (sr) | LALS upper- division course LALS upper- division course | LALS upper- division course LALS upper- division course | LALS 194 (Senior- Exit Requirement) LALS upper- division course |

Plan Two—Junior Transfers

| Year | Fall | Winter | Spring |
|-------------|--|--|---|
| 3rd (jr) | SPAN 4 or SPSS 61 LALS 100 LALS 80 | SPAN 5 or SPSS 62 LALS 100A LALS 80 | SPAN 6 or 56 or SPSS 63 LALS 100B LALS upper- division course |
| 4th (sr) | LALS upper- division course LALS upper- division course | LALS upper- division course LALS upper- division course | LALS upper-division course LALS 194 (Senior- Exit Requirement) |

Combined Majors

The combined major options, requiring fewer courses than a double major, are established with the global economics, literature, politics, and sociology programs.

Latin American and Latino Studies/Global Economics

Students are required to take a total of 18 courses and to satisfy a senior comprehensive requirement. For the combined major in Latin American and Latino studies/global economics, students complete a total of seven lower-division course requirements for both the Latin American and Latino studies and global economics majors. Students are assigned a faculty adviser from each discipline. Upper-division course requirements include Economics 100A, 100B, and 113; LALS 100, 100A, and 100B; and five additional elective courses, two from economics and three from Latin American and Latino studies. Two of the upper-division courses must be taught in Spanish or Portuguese*** and two to four (at least one quarter) must be courses of academic study abroad, internship, or field study in a Spanish- or Portuguese-speaking country. The comprehensive requirement is met by the completion of a senior thesis on a topic suitable to both global economics and Latin American and Latino studies, supervised by a faculty member from either department and read and approved by the student's advisers from both departments.

***Upper-division courses in Portuguese are currently not taught at UCSC and must be taken elsewhere.

Latin American and Latino Studies/Literature

Students are required to take a total of 13 courses and to satisfy a senior comprehensive requirement. Students complete a total of two lower-division course requirements. One of the lower-division LALS classes must be LALS 1 or LALS 80 and one of the lower-division classes must be Spanish Literature 60 or a Literature 80 series course in a relevant area of study. For transfer students, a petition can be made to replace the LALS 1 or 80 course with an appropriate course from another institution.

Upper-division requirements include five core courses, LALS 100, 100A, 100B, Spanish Literature 102A, and Spanish Literature 102B; and six additional elective courses, three from Spanish Literature and three from LALS. At least four of the upper-division courses must be taught in Spanish or Portuguese*** (with at least one taught by LALS core or participating faculty), and at least one of the Literature courses must address theoretical concerns. Up to three relevant courses taken through study abroad programs from which credits are transferable to UCSC may be credited toward the major when the content is deemed appropriate by both departments. To complete the comprehensive requirement, students can write a senior thesis (by petition), enroll in an appropriate LALS Seminar (194 series), or enroll in an appropriate Literature Senior Seminar in the area of concentration. If the thesis option is selected, it should be planned in consultation with an adviser from each department, completed under the supervision of a faculty member from either department, and read and approved by both advisers; one adviser is sufficient if this faculty member belongs to both departments. Both departments must approve a study plan before the major can be declared.

***Upper-division courses in Portuguese are currently not taught at UCSC and must be taken elsewhere.

Latin American and Latino Studies/Politics

Students are required to take a total of 13 courses and to satisfy a senior comprehensive requirement. For the combined major in Latin American and Latino studies/politics, students complete two lower-division course requirements. One of the lower-division courses must be LALS 1 or 80, the other one course from

Politics 1–79. For transfer students, a petition may be made to substitute Latin American and Latino studies LALS 1 or 80, or one course from Politics 1–79) with appropriate course work from another institution. The 11 upper-division courses include three core course requirements (LALS 100, 100A and 100B), and Politics 100 and 140C, three courses from any Politics Department sequences (comparative, American, international, and theory), and four upper-division electives. At least one of the Latin American and Latino studies upper-division courses must be taught in Spanish or Portuguese***, and at least one course in the politics/Latin American and Latino studies combined major must be on Chicano/a-Latino/a issues. To complete the senior comprehensive requirement, students may take either a Politics (190) or LALS (194) senior seminar. ***Upper-division courses in Portuguese are currently not taught at UCSC and must be taken elsewhere.

Latin American and Latino Studies/Sociology

Students are required to take a total of 14 courses and to satisfy a senior comprehensive requirement. There are three lower-division course requirements, two from the Sociology Department and one from Latin American and Latino Studies Department. The lower-division LALS courses must be LALS 1 or 80; transfer students may petition to replace the LALS 1 or 80 with an appropriate course from another institution. Upper-division requirements include seven core courses: LALS 100, 100A, 100B; Sociology 103A, 103B, 105A, and 105B; and four additional elective courses, two from sociology and two from Latin American and Latino studies. At least one of the Latin American and Latino studies upper-division courses must be taught in Spanish or Portuguese***, and at least one course in the sociology/Latin American and Latino studies combined major must be on Chicano/a-Latino/a issues. Up to three relevant courses taken through study abroad programs from which credits are transferable to UCSC may be credited toward the major when the content is deemed appropriate by the faculty advisers of both sociology and Latin American and Latino studies. Students can satisfy the comprehensive requirement in one of three ways: (1) writing a senior thesis, (2) passing an appropriate LALS Senior Seminar (194 series), or (3) completing the sociology course option of two additional sociology upper-division courses in Inequality and Social Change. If the thesis option is selected, it should be planned in consultation with an adviser from each department, completed under the supervision of a faculty member from either department, and read and approved by both advisers; one adviser is sufficient if this faculty member belongs to both departments. ***Upper-division courses in Portuguese are currently not taught at UCSC and must be taken elsewhere.

Honors in the Major

The LALS faculty considers awarding honors in the major based on overall student academic performance in courses that count towards the major. To be considered for honors, narrative evaluations must indicate either consistently excellent performance or a pattern of increasingly improved performance, which reaches and maintains consistent excellence during the last several quarters. For combined majors, student work must be judged honors-level in both departments; the LALS faculty cannot award honors in the major unless the other department also confers honors. To receive the strongest consideration for honors in the major the following grade point average (GPA) criteria must be met: highest honors, 4.0; honors, 3.7. Students with a 3.5–3.7 GPA

in the major go under review, and a decision is made based on their evaluations, grade on core courses, and improvement over time.

LALS also awards honors for the thesis, creative or community action projects, or student taught seminars, by the recommendation of the faculty adviser. Note that a thesis, a creative/community project, or a student-taught seminar are the only senior exit requirement options that qualify for this distinct honors designation. Expanded papers and senior seminars do not qualify for a separate honors designation, but students who choose these options may still qualify for honors in the major.

Minor Requirements

The minor in Latin American and Latino studies consists of seven courses, including two lower-division courses (LALS 1 or an 80s series course) and five upper-division courses (including LALS 100 or LALS 100A or 100B and any other four upper-division courses that count towards the major). Knowledge of Spanish and/or Portuguese is highly recommended, but not required for the minor.

Graduate Studies

The Department of Latin American and Latino Studies offers a designated emphasis in Latin American and Latino studies for Ph.D. students in anthropology, education, environmental studies, history, history of consciousness, literature, psychology, politics, and sociology. This designated emphasis in Latin American and Latino studies provides graduate students with opportunities for interdisciplinary study with faculty from across the campus. Completion of the program will be listed on the graduate degree as a designated emphasis. The request must originate in the degree-granting department. Students in other departments wishing to pursue a designated emphasis in Latin American and Latino studies should consult with the chairs of their respective Ph.D. programs and of Latin American and Latino studies. A list, updated annually, of regularly offered approved graduate courses is available in the Latin American and Latino Studies Department office and web site at <http://lals.ucsc.edu>. Graduate students are encouraged to complete the application to the designated emphasis, available at the Latin American and Latino Studies Department, no later than their third year.

Requirements for the Designated Emphasis

Committee Composition. The student must have a designated graduate adviser from among the Latin American and Latino studies core, participating, or affiliated faculty. This adviser will be in addition to the graduate adviser from the student's home department. The Latin American and Latino studies adviser must serve on the student's qualifying examination committee and/or on the student's dissertation committee.

Writing. The student must prepare a significant piece of writing in the area of Latin American and Latino studies. This writing may take the form of a substantial seminar paper, master's essay, or doctoral dissertation chapter.

Course requirements. The student must take five graduate courses in Latin American and Latino studies, including the required LALS 200 and LALS 297. The remainder can be selected from appropriate graduate offerings of any UCSC department, as long as they are taught by core, participating, or affiliated Latin American and Latino studies faculty.

Teaching. The student must serve as a teaching assistant in at least one Latin American and Latino studies

course or teach a Latin American and Latino studies course independently in the regular curriculum or in Summer Session.

Courses. Graduate course work in Latin American and Latino studies is available both in the Latin American and Latino Studies Department and in other UCSC departments. Graduate courses to date in the Latin American and Latino Studies Department include

- 200 *Bridging Latin American and Latino Studies*
- 210 *Latina Feminisms: Theory and Practice*
- 212 *Latino Ethnographic Practice*
- 215 *Latina Cultural Studies; Transborder Feminist Imaginaries*
- 220 *Transnational Civil Society: Limits and Possibilities*
- 230 *Political Ecology in Latin America*
- 240 *Culture and Politics of Human Rights*
- 242 *Globalization, Transnationalism, and Gender in the Americas*
- 244 *U.S. Political Relations with Latin America*
- 297 *Independent Study*
- 299 *Thesis Research*

Additional Upper-Division Courses of Interest

American Studies

- 122 *Immigration and Assimilation*
- 157 *Sexual Identities and Communities: Tracing Latino Theory*

Anthropology

- 138B *Brazil*
- 130F *African Diasporas in the Americas*
- 130L *Latin American Ethnography*
- 130M *Inside Mexico*

Community Studies

- 185 *Gender and Sexuality in Latin America*

Economics

- 148 *Latin American Economies*

Education

- 128 *Immigrants and Education*
- 141 *Bilingualism and Schooling*
- 181 *Race, Class, and Culture in Education*

Environmental Studies

- 122 *Tropical Ecology and Conservation*
- 143 *Sustainable Development: Economy, Policy, and the Environment*

Feminist Studies

- 115 *Gender, Sexuality, and Transnational Migration Across the Americas*
- 120 *Transnational Feminisms*
- 194F *Chicana/Latina Cultural Productions*

History

- 123B *U.S. Immigration: 1877 to Present*
- 125 *California History*
- 126 *History of the Southwest: Colonial Period to 1920*
- 128 *Chicana History*
- 130 *History of Modern Cuba*
- 131 *Women in Colonial Latin American History*
- 132 *History of the Caribbean: Colonial Period*
- 134B *History of Mexico, 1850 to Present*
- 190A *Slavery and Race in Latin America*
- 190B *Race and the Nation in Latin America*
- 190C *American Race, Class, and Gender History*

190T *Latin America in the Cold War*

History of Art and Visual Culture

- 143 *Latin American Modern Architecture*
- 140D *Chicano/Chicana Art: 1970-Present*
- 160A *Topics in Pre-Hispanic Visual Culture: Mexico*
- 160B *Topics in Pre-Hispanic Visual Culture: The Andes*
- 162A *Advanced Studies in Pre-Hispanic Visual Culture: The Maya*
- 163 *The Native in Colonial Spanish America*
- 191B *The Virgin of Guadalupe: Images and Symbolism in Spain, Mexico, and the U.S.*

Spanish/Latin American/Latino Literature

- 102A *From the Conquest to Sor Juana*
- 130E *Latin American Poetry*
- 131H *National Literatures of Latin America: Cuba*
- 134G *Popular Culture in Latin American Narrative*
- 134M *Literatura y Modernidad*

Politics

- 140C *Latin American Politics*
- 190V *Problems in Latin American Politics*

Psychology

- 157 *Chicana Feminism* (also offered as Feminist Studies 151A)
- 159K *Advanced Topics in Chicana Feminism* (also offered as Feminist Studies 151B)

Sociology

- 122C *Chicanos/as and the Law*
- 156 *Latino Identity*
- 165 *World Systems Perspective*
- 177A *Latinos/as and the American Global City*

Spanish

- 156A *Topics in Hispanic Language and Culture: Hispanic Culture Through Film*
- 156F *Topics in Hispanic Language and Culture: El Humor en Español*

Spanish for Spanish Speakers

- 125 *Mexico and the Southwest*

The above is a partial list of upper-division courses taught by Latin American and Latino Studies participating and affiliated faculty based in other departments. A complete list of interdisciplinary course offerings approved for the Latin American and Latino Studies major and minor is published prior to each academic quarter on the department web site: <http://lals.ucsc.edu>.

Lower-Division Courses

1. Introduction to Latin American and Latino Studies. F/S

Interdisciplinary introduction presenting the elements for studying Latin American culture, society, economics, and politics, as well as the dynamics of Latino communities in the U.S. Special attention paid to issues of race, gender, and class, to emerging political and economic shifts in the Americas, and to new local and transnational efforts for social change on the part of Latin America's peoples and Latinos in the U.S. (General Education Code(s): ER, IS, E.) *The Staff*

42. Student-Directed Seminar.

Seminar taught by upper-division student under faculty supervision. Requires prior approval by Latin American and Latino Studies Department and two quarters (fall, winter) of supervised preparation prior to teaching in spring quarter. (See course 192). *The Staff*

80B. Social Movements in Latin America. *

Examines contemporary social movements in Latin America, especially those that arose from popular response to different forms of social exclusion and to authoritarian political systems. Explores a variety of popular movements, their successes and setbacks, including rural and urban uprisings, native nations and their descendants, women, African descendants, labor, environmental and grassroots movements. Enrollment limited to 60. (General Education Code(s): CC, T3-Social Sciences, E.) *H. Perla*

80D. Political Change in Mexico. *

Reviews broad trends in contemporary Mexican politics against the backdrop of long-term historical, social, and economic change throughout the 20th century, analyzing how power is both wielded from above and created from below. The course covers national politics, grassroots movements for social change and democratization, environmental challenges, indigenous movements, the media, and the politics of immigration and North American integration. (General Education Code(s): CC, T3-Social Sciences, E.) *J. Fox, The Staff*

80E. Latin American Philosophy. W

Is there a general school of philosophy endemic to Latin America? Would it have to appeal to quintessential Western philosophical questions regarding knowledge, values, and reality? If not, why not, and would it then still count as philosophy? What difference do ethnic and national diversity, as well as strong political and social inequality, make to the development of philosophical questions and frameworks? Course explores a variety of historically situated Latin American thinkers who investigate ethnic identity, gender, and socio-political inequality and liberation, and historical memory, and who have also made important contributions to mainstream analytical and continental philosophy. (Also offered as Philosophy 80E. Students cannot receive credit for both courses.) (General Education Code(s): T4-Humanities and Arts, E.) *R. Winther*

80F. Latinos in the U.S.: A Comparative Perspective. *

Analyzes the Latino experience in the U.S. with a special focus on strategies for economic and social empowerment. Stresses the multiplicity of the U.S. Latino community, drawing comparative lessons from Cuban-American, Puerto Rican, Chicano/Mexicano, and Central American patterns of economic participation and political mobilization. (General Education Code(s): ER, T3-Social Sciences, E.) *The Staff*

80G. Race, Class, and Gender. F

Examines the economic, social, political, and cultural experience of communities of color (Latinas/os, African Americans, Asian Americans, and Native Americans) and women in the U.S., through a sociological perspective. Using quantitative and qualitative methods, the relationship among individual actions, social institutions, societal forces, and social change are analyzed. Enrollment limited to 80. (General Education Code(s): ER, T3-Social Sciences, E.) *S. Gleeson*

80H. Comparative Latina/o Histories. W

Designed to survey recent works in the field of Latina and Latino histories, with particular emphasis on historiographical approaches and topics in the field. Readings are chosen to expose a selection of the varied histories and cultures of Latina/os in the U.S., and focus primarily on Mexicans, Puerto Ricans, and Cubans. (General Education Code(s): CC, T3-Social Sciences, E.) *G. Arredondo*

80I. Gender and Global Cinema. *

Applies critical and historical approaches to the study of gender in global cinema. Introduces students to different

aesthetic and cross-cultural approaches to representing gender in contemporary film. Focuses on films, documentaries, and video works from the Americas as well as from other regions of the global South. Enrollment limited to 80. (General Education Code(s): CC, T3-Social Sciences, E.) *R. Fregoso*

80J. Race, Nation, and War. *

Evaluates the relationship between processes of racial formation, war, and nationalism in Latin America. Case studies range from the wars of independence to more recent forms of transnational violence. Students engage historical and anthropological perspectives and critiques of modernity. Enrollment limited to 80. (General Education Code(s): ER, T3-Social Sciences, E.) *C. Rivas*

80K. Latinos and Organized Labor in the U.S. *

Students learn about the role of Latinos in different forms of U.S. organized labor (including, but not limited to, traditional unions). Focus is on organizing in several 20th-century, low-wage industries, as well as organizations representing Latino professionals. Enrollment limited to 80. (General Education Code(s): ER, T3-Social Sciences, E.) *S. Gleeson*

80P. Energy, Society, and Environment in Latin America. W

From petroleum extraction to hydroelectric power to ethanol production, Latin America is an important provider of the world's energy. Course examines the implications of this process for economic growth, climate change, environmental degradation, social inequality, and poverty. (Formerly Energy, Society, and Ecology in Latin America.) Enrollment limited to 80. (General Education Code(s): PE-E, T3-Social Sciences, E.) *F. Lu*

80Q. Musica Latina: Music of Latin America and the Caribbean. S

Surveys various musical forms and styles that have developed in Latin America and Latino communities in the U.S. Discusses concept of hybridity and grapples with this as a central issue in the evolution of Latin American/Latino music. Addresses migration of music, which not only contributes to its distribution but also to the evolution of musical practices of forms, styles and genres across borders. (Formerly *Musica Latina*.) (General Education Code(s): CC, T3-Social Sciences, E.) *The Staff*

80R. Organizing Across the Americas. F

Analyzes the range of theory and practice that emerged from and shaped significant social movements during the rise and fall of United States hegemony. Focuses on social struggles and revolutions in five distinct locations across the Americas: the United States (United Farm Workers--UFW), Cuba (Movimiento 26 de Julio--M26), Nicaragua (Frente Sandinista de Liberación Nacional--F.S.L.N.), Mexico (Zapatistas), and Brazil (Movimento dos Trabalhadores Rurais Sem Terra--MST). Enrollment limited to 80. (General Education Code(s): T3-Social Sciences, E.) *J. Borrego, The Staff*

80S. Sexualities and Genders in Latin American and Latina/o Studies. *

Introduction to issues and themes surrounding sexualities and genders within Latin American and Latina/o studies. Provides background in the basic theoretical and historical frameworks of gender and its relationship to sexuality. In addition to cross-border perspectives, course also examines how gender and sexuality are structured and experienced through other social categories. Enrollment limited to 80. (General Education Code(s): CC, T3-Social Sciences, E.) *The Staff*

80T. Topics in LALS Cinema. *

Lower-division offering on a topic of particular cultural,

historical or contemporary interest in the field of Latin American and Latino/a cinema. Enrollment limited to 80. (General Education Code(s): T3-Social Sciences, E.) *The Staff*

80W. Transnational Feminist Organizing in the Americas. F

Explores key aspects of transnational feminist organizing in the Americas, including the genealogy of transnational feminist theory and feminist perspectives on development in Latin America and the Caribbean. Analyzes how women from Latin America organize in response to their living conditions across gender, race, ethnicity, and national borders. *S. Falcon*

80X. Central American Peoples and Cultures. S

Examines contemporary societies and peoples of Central America considering how, in recent decades, media, history, war, cultural production, and migration have shaped Guatemala, Honduras, El Salvador, Nicaragua, and Costa Rica both as individual nations and as a region. Enrollment limited to 80. (General Education Code(s): CC, T5-Humanities and Arts or Social Sciences, E.) *C. Rivas*

81A. Mexican Folklórico Dance (2 credits). F

Provides instruction in the aesthetic, cultural, and historical dimensions of Mexican folklórico dance. Students taught choreographed dances from various regions of Mexico and also learn dance techniques (técnica) and stage make-up application. Additional workshops and lectures offered to supplement class. Open to all students; no previous experience required. (Also offered as Anthropology 81A. Students cannot receive credit for both courses.) May be repeated for credit. (General Education Code(s): A.) *O. Nájera-Ramírez*

81B. Mexican Folklórico Dance (2 credits). W

Second course in series. Provides instruction in the aesthetic, cultural, and historical dimensions of Mexican folklórico dance. (Also offered as Anthropology 81B. Students cannot receive credit for both courses.) May be repeated for credit. (General Education Code(s): A.) *O. Nájera-Ramírez*

81C. Mexican Folklórico Dance (2 credits). S

Third course in series. Provides instruction in the aesthetic, cultural, and historical dimensions of Mexican folklórico dance. (Also offered as Anthropology 81C. Students cannot receive credit for both courses.) Prerequisite(s): course 81A or 81B. May be repeated for credit. (General Education Code(s): PR-C, A.) *O. Nájera-Ramírez*

*Upper-Division Courses***100. Concepts and Theories Latin American and Latina/o Studies. F/W**

Interdisciplinary exploration of transnational migrations; social inequalities; collective action and social movements; and cultural productions, products, or imaginaries. Examines how transnational migration and hemispheric integration are transforming Latin American studies and Chicana/o-Latina/o studies. Explores the influence of neoliberalism and globalization, especially the intersection of critical analysis and social-justice praxis. Completion of course 1 highly recommended. (Formerly course 10, Bridging Latin American and Latina/o Studies) Enrollment restricted to sophomores, juniors, and seniors. (General Education Code(s): ER, E.) *P. Zavella*

100A. Politics and Society: Concepts and Methods. W

Focuses on social science issues through the interdisciplinary analysis of power relations. Compares diverse analytical strategies, assesses contending explanations, and builds practical research skills in the field of Latin American and

Latino Studies. Topics change yearly, but can include environmental justice, access to education, political participation, gender, and migration. Prerequisite(s): course 100 and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to sophomore, junior, and senior Latin American and Latino studies majors, minors, and combined majors or by permission. (General Education Code(s): E.) *J. Fox*

100B. Culture and Society: Culture in a Global Context. S

Focuses on transnational, regional, and local features of Latina/o and Latin American cultural production and artistic expression: how culture is shaped by historical, social, and political forces; how cultural and artistic practices shape the social world; and how culture is produced in an interconnected, postindustrial, and globalized economy. Prerequisite(s): courses 100 and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to sophomore, junior, and senior Latin American and Latino studies majors, minors, and combined majors. (General Education Code(s): E.) *R. Fregoso*

100W. Politics and Society: Concepts and Methods (7 credits). W

Focuses on social science issues through the interdisciplinary analysis of power relations. Compares diverse analytical strategies, assesses contending explanations, and builds practical research skills in the field of Latin American and Latino Studies. Topics change yearly, but can include environmental justice, access to education, political participation, gender, and migration. Prerequisite(s): courses 100, and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to sophomore, junior, and senior Latin American and Latino studies majors, minors, and combined majors with global economics, sociology, literature, and politics. Students cannot receive credit for this course and course 100A. (General Education Code(s): W, E.) *J. Fox*

101. Using Media. *

Hands-on survey of print, broadcast, audiovisual, and electronic media. Students complete and present a dozen different media production assignments as part of permanent portfolio. Assignments have Latino/Latin American focus. Peer critique of media projects. Prerequisite(s): concurrent enrollment in course 101L. (General Education Code(s): E.) *The Staff*

101L. Using Media: Video Laboratory (2 credits). *

Trains students in the fundamentals of video preparation, production and post-production through Social Sciences Media Laboratory. Prerequisite(s): concurrent enrollment in course 101. *The Staff*

111. The U.S.-Mexican Border Region. *

Global and national forces have transformed the 2,000-mile United States/Mexico border region into a site for world market factories. Analyzes how this transformation has affected workers and communities and systematically reviews subjective responses. (General Education Code(s): E.) *J. Borrego, The Staff*

122. Media and Nationalism. F

Evaluates the links between media and the production of national identities in Latin America. Focuses on theories of nationalism, media, and globalization to examine the production of national histories and representations. Enrollment restricted to juniors and seniors. Enrollment limited to 40. (General Education Code(s): E.) *C. Rivas*

126A. Global Capitalism and Community Restructuring. *

Examines how Watsonville (U.S.) and Irapuato (Mexico) are being restructured by national development, North American economic integration (NAFTA), and global capitalism. Explores the relentless penetration of market imperatives, their impact on the communities, and community response; costs/benefits of being abandoned by or being attractive to global capital; and how people are surviving—scrambling to find jobs, keeping families together, and engaging in binational strategies for survival. Prerequisite(s): permission of instructor; concurrent enrollment in laboratory course 126B. Enrollment limited to 25. (General Education Code(s): IS, E.) *J. Borrego*

126B. Voices from the Watsonville Community. *

Weekly Wednesday evening seminar in Watsonville allows students to interact with local workers, organizers, immigration and citizenship NGO's, affordable housing non-profits, entrepreneurs, large commercial developers, county planners, city managers, PVUSD educators, health activists, politicians, commercial and organic farmers, food processing owners/plant managers, and environmentalists, in order to develop a deeper understanding of the past, present, and future of the community and the region. Class will present findings and interact with panel of community members on a Saturday morning during first weekend of spring quarter. Prerequisite(s): concurrent enrollment in course 126A. Enrollment limited to 25. (General Education Code(s): IS, E.) *J. Borrego*

128. Latino Media in the U.S. *

Explores the history and practice of Latino media in the U.S. with an emphasis on work created by, for, with, and about Latino constituencies. Course highlights the role that media plays in struggles for social change, political enfranchisement, creative self-expression, and cultural development. Course content varies with instructor. (Also offered as Writing 128. Students cannot receive credit for both courses.) Enrollment limited to 39. (General Education Code(s): IM, E.) *The Staff*

129. Women Filmmakers: Latin American and Latina. *

Focuses on the work of a dozen major Latin American and Latina filmmakers from Argentina, Brazil, Venezuela, Mexico, and the U.S., including Maria Luisa Bemberg, Maria Navaro, Matilde Landeta, Lourdes Portillo. Examines contemporary films, from 1960 to present. (General Education Code(s): IM, E.) *R. Fregoso*

140. Rural Mexico in Crisis. *

Focuses on political, social, economic, and environmental changes in rural Mexico from the 1910 revolution through the Zapatista rebellion. Emphasizes the interaction between the state, markets, and rural civil society, covering agrarian reform, agricultural policy, grassroots development initiatives, democratization, indigenous movements, natural resource management, and migration. Prerequisite(s): Previous completion of course 80D recommended. Enrollment restricted to juniors and seniors. Sophomores may enroll with permission from instructor. (General Education Code(s): CC, E.) *J. Fox*

143. Race and Ethnicity. *

Race and ethnicity have been—and continue to be—powerful forces shaping the U.S. experience. This course examines a range of conceptual approaches and monographic studies grounded in the history of the U.S. The readings provide various criteria for studying and understanding these phenomena. The course problematizes "race" by asking what the readings tell us about "race-making" and the reproduction of racial ideologies in spe-

cific historical contexts. Similarly, "ethnicity" is treated as a historically specific social construct. (General Education Code(s): ER, E.) *G. Arredondo*

143J. Global Political Economy. F

Analyzes the global, social, economic, and political forces that shape transnational, national, and regional societal formations and consequently the entire environment for social change. Examines the evolution of revolutionary struggle and its origins within and impact upon the evolving capitalist system. *J. Borrego, The Staff*

144. Mexicana/Chicana Histories. *

Explores current historical and theoretical writings on the lived experiences of Chicanas and Mexicana women in U.S. history. Themes include domination/resistance politics, (re)presentations, contestation, social reproduction, identity and difference. (Formerly Chicanas/Mexicanas in the U.S.) (General Education Code(s): TA, E.) *G. Arredondo*

145. Grassroots Social Change in Latin America. *

Focuses on the analysis of collective action by underrepresented groups in Latin America. Concepts and issues include political participation and impact, gender, ethnicity and race, class, the environment, religion, non-governmental organizations, and social capital. Prerequisite(s): any two Latin American and Latino studies courses or permission of instructor; open to graduate students. Enrollment limited to 40. (General Education Code(s): CC, E.) *H. Perla*

149. Theories and Actors: U.S.-Latin American Policy Formation. *

Examines how domestic political considerations and transnational forces influence the formation of U.S. foreign policy, specifically in the context of relations with Latin America. Explores the impact of institutional, electoral, and psychological pressures, public opinion, interest groups, non-state actors, and the media on decision-making regarding U.S. foreign policy toward Latin America. Enrollment limited to 40. (General Education Code(s): PE-H.) *H. Perla*

152. Consumer Cultures Between the Americas. W

Examines the circuits of media, commodities, and migration connecting the Americas in an age of globalization. Issues of states, transnational markets, social relations, and cultural representations addressed. Relationship between consumption, nationalism, and globalization is considered critically. (Formerly Media and Commodities Between the Americas.) Enrollment limited to 40. (General Education Code(s): CC, E.) *C. Rivas*

160. North American Integration: Post-NAFTA. *

Analyzes the multi-dimensional process of integration in North America via NAFTA. Covers issues of trade and investment flows between Canada, the U.S., and Mexico, including important legislative, scientific, technological, cultural, and political components, as well as social dislocations and political challenges associated with NAFTA. (General Education Code(s): E.) *J. Fox, J. Borrego*

161P. Theater in the "Chicano Power" Movement. *

Covers the rise of Teatro Chicano as a cultural-political force within the 1960's "Chicano Power" Movement starting with founding playwright Luis Valdez and El Teatro Campesino and covering Chicana/o playwrights inspired by the movement, e.g. Cherrie Moraga, Luis Alfaro, and Josefina Lopez. (Also offered as Theater Arts 161P. Students cannot receive credit for both courses.) (General Education Code(s): A, E.) *The Staff*

163. America in Flux: Population Dynamics in the U.S. S

Examines key theories of demographics change in important policy issues, such as the aging of America, racial categorization, and immigration. Explores political and economic factors that have led to the changing face of the U.S. over the last century and key legislative changes that have changed the experience of immigrants. Students use primary demographic data from the U.S. Census Bureau and learn basic tools for demographic data access and presentation. Prerequisite(s): course 100A or by permission of instructor. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 40. (General Education Code(s): PE-H, E.) *S. Gleeson*

164. Environmental Justice. S

Introduces students to participatory-action research, which both creates positive social-environmental change and contributes to scientific knowledge. Through collaboration with environmental justice organizations, students develop research skills, hone critical reflection abilities, and understand the connections between race, ethnicity, power, poverty, and environmental problems. (Formerly Action-Research for Social Change, Environmental Quality: Lessons Learned from Latin America, U.S.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 35. (General Education Code(s): PE-E, E.) *F. Lu*

166. Latino Families in Transition. S

Explores the complex nature of Latino families in the U.S., which like other American families are undergoing profound changes. Placing families within a historical context of post-1960s social transformations, such as feminism, migration, "reconstructed" or multiple-earner households, examines how family members adapt, resist, and/or construct alternative visions and practices of family life. Prerequisite(s): course 1. Enrollment limited to 40. (General Education Code(s): ER, E.) *P. Zavella*

167. Amazonian Societies and the Environment. W

Overview of Amazonian societies and the environment from both a historical and contemporary perspective. Topics include indigenous resource management, hunting and conservation, and the ecological impacts of culture and economic change. Enrollment limited to 40. (General Education Code(s): PE-E, E.) *F. Lu*

168. Economic History of Latin America. *

Sheds light on Latin America's contemporary social and economic developments by providing an appreciation of their historical roots. Focusing on the period from independence until WWII, evaluates contesting explanations for Latin America's relatively poor economic performance and divergent policy implications. Prerequisite(s): course 1. (General Education Code(s): E.) *H. Shapiro*

169. Latin American Industrialization in a Global Perspective: Past, Present, and Future. *

Analyzes the economic, political, and social aspects of the industrialization process in Latin America. Evaluates import substitution policies, the changing roles of the state and foreign and domestic capital, and the impact of recent trade liberalization. Compares Latin America's development with that of the East Asian newly-industrialized countries (NICs) and looks at the implications of globalization. (General Education Code(s): CC, E.) *H. Shapiro*

170. Indigenous Struggles in the Americas. *

Focuses on the way Natives of First Peoples have interacted voluntarily and involuntarily with nonindigenous cultures. Examines their perspectives, thoughts, frustra-

tions, and successes. Touches on land issues and examines the way current indigenous cultures of Latin America face and adapt to social change. Focuses mainly on the Andes, lowland Amazon, Mesoamerica, and other areas. (General Education Code(s): CC, E.) *F. Lu*

172. Visualizing Human Rights. F

Explores how visual artists take up the subject of human rights in response to urgent challenges facing Latina/o and Latin American communities across the Americas. Examines the imprint of film and media arts reshaping human-rights discourse. Considers persistent themes in Latina/o representation, including colonialism and state terrorism; self-representation and the rights of collectives (racial, ethnic, and sexual groups); social and economic rights. *R. Fregoso*

174. Comparative Migration and Citizenship Paradigms. F

Examines U.S. migration patterns in comparison to other major destinations. Class discusses relevant socio-economic and political factors and the various citizenship paradigms present. Readings draw on disciplinary foci, including quantitative and qualitative analysis. (General Education Code(s): PE-H.) *S. Gleeson*

175. Migration, Gender, and Health. *

Through an interdisciplinary, cross-border approach, examines complex nature of Latino health in relation to migration and how women and men experience health problems differently. Examines how health problems are created by economic and social conditions, how migrants experience access to care, and how agencies can design culturally sensitive programs. (General Education Code(s): ER, E.) *P. Zavella*

176. Gender, the Nation, and Latina Cinema. *

Applies critical and cultural theories of interculturality, coloniality of power and transnational feminism to the study of Latina cinematic imaginaries in the Americas. Explores images and self-representations of race, sexuality, and the nation; citizenship, diaspora, and belonging; gender violence and state violence; militarization, human rights, and gender justice. (General Education Code(s): IM, E.) *R. Fregoso, The Staff*

178. Gender, Transnationalism, and Globalization. *

Focuses on the impact of globalization and transnationalism on gender relations in the Americas. Examines gender and power in the context of neoliberalism, modernity, the nation, social movements, and activism. Explores local and transnational constructions of gender, and the intersection of gender with race, ethnicity, class, and sexuality. Enrollment limited to 40. (General Education Code(s): ER, E.) *R. Fregoso, The Staff*

180. Borders: Real and Imagined. *

Situates "The Border" historically and within the context of U.S. imperialism. Examines the formalization of political "borders," methods of enforcement, and intra-group conflicts. Examines the varied experiences of colonialism and immigration between Mexicans, Puerto Ricans, Native Americans, and Cubans. Explores how the tools of "The Border" and "Borderlands" are being used to untangle the roles of race prejudice and sexual and gender discrimination. (General Education Code(s): TA, E.) *G. Arredondo*

190. Internship. F,W,S

Internships with campus or community organizations sponsored and evaluated by a Latin American and Latino studies faculty member. Students write an analytical paper or produce another major work agreed upon by student, faculty supervisor, and internship sponsor; sponsor must

also provide review of experience. Students submit petition to sponsoring agency. *The Staff*

190F. Internship (2 credits). F,W,S

Internships with campus or community organizations sponsored and evaluated by a faculty member from Latin American and Latino studies. Students write a short (8-page) descriptive paper or produce another work agreed upon by student and faculty supervisor. Students submit petition to sponsoring agency. *The Staff*

191. Latin American Studies Teaching Apprenticeship. F,W,S

Advanced students serve as facilitators for small discussion groups or aid in reading of papers related to Latin American Studies courses. Students are expected to read all course assignments and meet with instructors to discuss the teaching process. May not be counted toward major requirements. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching under faculty supervision of a lower-division course in Latin American and Latino studies, normally done by majors in the final quarter of study as the senior project. (See course 42.) Students submit petition to sponsoring agency. *The Staff*

193. Field Study. F,W,S

Supervised off-campus study in local Spanish-speaking community. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Latino Civic Engagement in Comparative Perspective. S

Explores the role of Latinos in civic and political life in the U.S., focusing on specific avenues for participation such as religion, work, and transnational experiences. Examines barriers to participation experienced by Latinos in the U.S. as well as relationships between civic engagement and political incorporation and the ramifications for inequality for Latinos and other ethnic/racial groups in cities across America. Enrollment restricted to juniors and seniors. Enrollment limited to 25. (General Education Code(s): PE-H, E.) *S. Gleeson*

194G. Chile: Social and Political Change. W

Analysis of Chilean politics and society from the election of Salvador Allende in 1970 to the present. Particular emphasis is given to understanding the different forces, internal as well as external, that broke the Chilean tradition of democratic rule in 1973, and to the current configuration. Enrollment restricted to junior and senior Latin American and Latino studies majors. Enrollment limited to 25. (General Education Code(s): CC, E.) *W. Goldfrank*

194H. Central American Political Relations with the U.S. W

Writing-intensive senior seminar on U.S.-Central American relations. Students gain understanding of Central American political history; the region's relations with the United States; and the problems arising from this relationship. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior Latin American and Latino studies majors, minors, and combined majors. Enrollment limited to 25. (General Education Code(s): W, E.) *H. Perla*

194I. Contemporary Ecuador. F

The Andean nation of Ecuador exemplifies cultural and biological diversity, rapid economic and social change, and increasing geopolitical influence as one of the current South American left-leaning countries. Course looks at Ecuador's recent history and future challenges. Enrollment restricted to sophomores, juniors, and seniors.

Enrollment limited to 25. (General Education Code(s): CC.) *F. Lu*

194M. Twentieth-Century Revolutions. *

Treatment of 20th-century Latin American revolutions from Zapata to the Zapatistas. Focuses on the causes and consequences of revolutions rather than on their narrative histories. Enrollment restricted to junior and senior Latin American and Latino studies majors. Enrollment limited to 25. (General Education Code(s): CC, E.) *G. Arredondo, W. Goldfrank*

194P. Tale of Two Cities. *

A comparative study of the social, economic, cultural, political, and geographical development of Los Angeles and Mexico City in the 20th century. Emphasis on the diverse peoples, changing physical environment and various images/interpretations of these two world cities. (Also offered as History 190D. Students cannot receive credit for both courses.) Prerequisite(s): two upper-division history courses and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior Latin American and Latino studies and history majors. Enrollment limited to 25. (General Education Code(s): W, E.) *P. Castillo, L. Haas*

194R. Violencia Cotidiana en las Americas. F

Senior seminar taught in Spanish. Engages a critical study of violence, social relations, and everyday life in contemporary Latin America. Focuses on the relationship between narratives and acts of violence, and the constitution and social effects of these representations. Requires proficiency in Spanish (written and spoken), and advanced reading knowledge of Spanish. Enrollment restricted to junior and senior Latin American and Latino studies majors, minors, double majors, and combined majors. Enrollment limited to 25. (General Education Code(s): E.) *C. Rivas*

194S. El Campo Mexicano en Crisis. S

Taught in Spanish. Analyzes both the causes and possible solutions to the challenges of rural poverty and democratization. Focuses on agrarian reform; agricultural development; protest movements; electoral change; local government; grassroots development initiatives; natural resources; the social construction of ethnicity, gender, and class; and the dynamics of migration. Mexico's regional diversity is highlighted as well, and students are encouraged to study a particular region in depth to accompany the course's national overview. Enrollment restricted to junior, and senior Latin American and Latino studies majors, minors, and combined majors with global economics, sociology, literature, and politics. Enrollment limited to 25. *J. Fox*

195B. Senior Project. F,W,S

Senior thesis writing under direction of major adviser. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195C. Senior Project. F,W,S

Senior thesis writing under direction of major adviser. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

196. Field Study Seminar. *

Emphasizes ethnographic strategies of fieldwork. Primarily oriented to students interested in understanding the daily life of societies and cultures. Prepares students both to conduct fieldwork, and to process their fieldwork experience. Covers complexities related to the experience of "stepping out of" one's own culture. Prerequisite(s): concurrent enrollment in course 196L. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 25. *J. Borrego*

196L. Field Study Seminar Lab (2 credits). *

Media lab trains students in the use of electronic and photographic media for the acquisition of field data. Through lectures, demonstrations, hands-on field exercises and review of students' media exercises, students will learn the fundamentals of photography, video production, and audio recording in the field. Prerequisite(s): concurrent enrollment in course 196. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 25. *J. Borrego*

198. Field Study. F,W,S

Off-campus study in Latin America, the Caribbean, or nonlocal Spanish-speaking community in the U.S. Nature of proposed study/project to be discussed with sponsoring instructor(s) before undertaking field study; credit toward major (maximum of three courses per quarter) conferred upon completion of all stipulated requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Individual studies undertaken off-campus. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Supervised directed reading; weekly or biweekly meetings with instructor. Final paper or examination required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Supervised research and writing of an expanded paper, completed in conjunction with requisite writing for an upper-division course taken for credit in the major. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Bridging Latin American and Latina/o Studies. S

Explores social, cultural, economic, and political changes that connect Latin America and U.S. Latina/o communities. The objective of this interdisciplinary team-taught course is to bridge previously distinct research approaches of Latin American and Latina/o studies to better understand processes that link peoples and ideas across borders as well as help students to conceptually and methodologically identify and design new objects of study and revisit traditional approaches. Core requirement for students pursuing the Parenthetical Notation in Latin American and Latino studies. Enrollment restricted to graduate students. *G. Arredondo*

210. Latina Feminisms: Theory and Practice. *

Through an interdisciplinary approach, explores Latina feminist social theory and scholarly practice—especially in representation and interpretation of Latina experiences. Examining key texts at different historical junctures, charts how Latinas of varied ethnic, class, sexual, or racialized social locations have constructed oppositional and/or relational theories and alternative epistemologies or political scholarly interventions and, in the process, have problematized borders, identities, cultural expressions, and coalitions. Enrollment restricted to graduate students. *P. Zavella*

212. Latina/o Ethnographic Practice. *

Interrogates the social construction of Latino cultures in their varied regional, national-ethnic, and gendered contexts. Assumes that culture is a dynamic process constructed within a context of hierarchical relations of group

power, in which Latino groups have been structurally subordinated and socially oppressed. Focuses more on how power relations create a context for the creation of specific Latino cultural expressions and processes than on unraveling the structures of oppression. Enrollment restricted to graduate students. *P. Zavella*

215. Latina Cultural Studies: Transborder Feminist Imaginaries. *

Interdisciplinary analysis of feminist theories that inform the field of Latina cultural studies in the Americas, with an emphasis on transnational and hemispheric dialogues. Designed for students pursuing the Parenthetical Notation in Latin American and Latino studies and those with interest in globality, transnational feminist theory, and critical race and postcolonial theories. Enrollment restricted to graduate students. *R. Fregoso*

220. Transnational Civil Society: Limits and Possibilities. *

Analyzes social, civic, and political actors that come together across borders to constitute transnational civil society, drawing from political sociology, political economy, comparative politics, and anthropology to address collective identity formation, collective action, institutional impacts, and political cultures. Enrollment restricted to graduate students. *J. Fox*

230. Political Ecology in Latin America. *

Examines the foundations and current literature on political ecology, with emphasis on issues in Latin America. Topics include the appropriation of "Nature;" degradation and deforestation; conservation policies and politics; land distribution and property; and indigenous resistance. Enrollment restricted to graduate students. *F. Lu*

240. Culture and Politics of Human Rights. F

Examines cultural, philosophical, and political foundations for human rights and provides students with critical grounding in the major theoretical debates over conceptualizations of human rights in the Americas. Addresses the role of feminist activism and jurisprudence in the expansion of human rights since the Universal Declaration of Human Rights. Addresses challenges of accommodating gender rights, collective rights, and social and economic rights within international human rights framework. (Also offered as Feminist Studies 240. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *R. Fregoso*

242. Globalization, Transnationalism, and Gender in the Americas. *

Explores how globalization, transnationalism, and the social construction of gender are interrelated, contingent, and subject to human agency and resistance. Examines particular configurations of globalization, transnationalism, and gender through the Americas and their implications for race, space, work, social movements, migration, and construction of collective memory. Enrollment restricted to graduate students. *P. Zavella, R. Fregoso*

244. U.S. Political Relations with Latin America. * Examines relations between the U.S. and Latin America. Emphasizes the domestic and global contexts within which U.S. leaders defined national economic, strategic, and ideological interests, and their regional policy objectives. Explores the impact of Latin Americans' nationalistic, anti-imperialist, class, racial, and gender struggles that often shaped policy outcomes in ways unanticipated by the U.S. Enrollment restricted to graduate students. *H. Perla*

297. Independent Study. F,W,S

Students submit a reading course proposal to a department faculty member who supervises independent study in the field. Faculty and student jointly agree upon reading list. Students expected to meet regularly with faculty to discuss readings. This independent study must focus on a subject not covered by current UCSC graduate curriculum. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Enrollment restricted to graduate students and permission of instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Latin Literature

Students wishing to pursue a course of study in Latin literature should consult the concentration in national/transnational literatures under Literature, page 361.

Legal Studies

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(831) 459-2056
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<http://zzyx.ucsc.edu/Poll/legal.html>

Faculty and Professional Interests

DANE ARCHER, Emeritus

DONALD BRENNIS, Professor of Anthropology
Linguistic anthropology, folklore, legal anthropology, ethnomusicology, overseas Indians, South Asia, disputing and dispute management, legal language, bureaucratic institutions

GINA DENT, Associate Professor, Feminist Studies, History of Consciousness, and Legal Studies
Africana literary and cultural studies, legal theory, popular culture

HIROSHI FUKURAI, Professor of Sociology
Global jury systems; international law; colonialism and genocide; lay justice systems in Japan, Mexico, China, and Korea; theories of democracy; advanced quantitative analysis, survey, and field methods

MARK FATHI MASSOUD, Assistant Professor of Politics

Law and society; politics of human rights; international law and development, with a special interest in Sudan; field research, with an emphasis on qualitative and ethnographic methods

TRILOKI NATH PANDEY, Professor of Anthropology
Native peoples of North America, cultures of India, political anthropology, anthropological theories and comparisons

DANIEL M. PRESS, Professor of Environmental Studies
U.S. environmental politics and policy, social capital and

democratic theory, industrial ecology, land and species conservation, regionalism

CRAIG REINARMAN, Professor of Sociology
Political sociology; law, crime, and social justice; drugs and society

MICHAEL E. URBAN, Professor of Politics
Russian politics, postcommunist transitions, U.S.-Russian relations, political language and ideology, revolution

DANIEL J. WIRLS, Professor of Politics
American politics, including national political institutions (Congress) and the President; public policy (military and foreign policy) and political history

DONALD A. WITTMAN, Professor of Economics
Economic theory, politics, law

JOHN DIZIKES, Emeritus

WALTER L. GOLDFRANK, Emeritus



CRAIG W. HANEY, Professor of Psychology,
Director of Legal Studies

Applications of social psychological principles to legal settings, assessment of the psychological effects of living and working in institutional environments, social contextual origins of violence, development of alternative legal and institutional forms

Program Description

Legal studies is an interdisciplinary major offered under the auspices of the Politics Department. It is designed for students who wish to use the methods and perspectives of various academic disciplines to study legal issues and to use the conceptual framework of the law to illuminate empirical and theoretical concerns in the various disciplines. For example, a student might use approaches from psychology and philosophy to study the legal problem of punishment; or draw on doctrinal categories from public and private law to study the changing historical role of market and nonmarket relations within ongoing institutions; or use approaches from critical race theory and feminist studies to better understand matters of civil rights and privacy.

To complete the major, students are required to take courses in legal institutions, constitutional law, and international law, as well as take courses in each of three broad themes: legal theory and philosophy, the role of law in society, and legal institutions. Each of these themes is intentionally broadly defined. Within legal theory, students may take courses in legal jurisprudence, logic, and theories of crime and punishment; within law and society, courses range from feminism and race to psychology and economics; within public law and institutions, courses range from environmental law to human rights law to an introduction to litigation. Students are also expected to take an introductory course in philosophy. To fulfill the senior exit requirement, students have the option to write a senior thesis or take a senior capstone seminar. The seminar topic changes quarterly.

Legal studies is intended to appeal to students who wish to take a concentration of courses on the law from a variety of disciplinary and methodological perspectives. The major is not intended as a substitute or preparation for any part of a law school curriculum but rather as a full field of study within the liberal arts curriculum. As such, it is a good preparation for a variety of future activities. Students graduating in legal studies are particularly well qualified to pursue graduate work on legal topics in humanities and social science disciplines or to attend professional school in fields such as public policy,

business administration, social work, and law. Students are also encouraged to participate in field work and law-related internships in the community, and to develop their own extensive independent research projects.

Declaring the major in legal studies is a four-step process: 1) complete and pass course 10 with a grade of C or better; 2) attend a declaration orientation workshop; 3) meet with your faculty adviser; 4) meet with the legal studies undergraduate adviser. Each student meets with an assigned faculty adviser to discuss an intended program of study, including its breadth and purpose.

The legal studies program offers a minor degree as well as the major degree.

Requirements for the Major

Lower-Division Course Requirements— 2 courses

Legal Studies 10 *Introduction to Legal Process*. All students are required to complete and pass legal studies 10 as a prerequisite to upper-division courses in legal studies and prior to declaring the major.

A student who has not been able to satisfy the pre-declaration requirement (a passing grade in Legal Studies 10) may petition the department for an exception. The letter of petition must explain and document the circumstances that might justify an exception. The department will consider the request and notify the student of its decision within two weeks of receiving the petition or within 10 days of the start of the following quarter, whichever is later.

Philosophy 9, 22, or 24. All legal studies majors are required to take one of the three listed Philosophy courses. (See the Philosophy section in this catalog for course descriptions.)

Upper-Division Course Requirements— 2 courses

111A *Constitutional Law or*

111B *Civil Liberties*

173 *International Law*

Core Course Requirements—6 courses

Students are required to take six core courses, two in each of three concentrations: theory, public law and institutions, and law and society.

Theory

103 *Feminist Interventions (Politics course)*

105A *Ancient Political Thought*

105B *Early Modern Political Thought*

105C *Modern Political Thought*

105D *Late 20th-Century Political Thought*

106 *Marxism as a Method*

107 *Political Morality of Survivorship and Recovery*

109 *Legal Theory*

109 *Orientalism (Politics course)*

115 *Law and the Holocaust*

128J *The World Jury on Trial*

144 *Social and Political Philosophy*

146 *Philosophy of Law*

155 *Topics in American Legal History*

157 *Political Jurisprudence*

Public Law and Institutions

111A *Constitutional Law*

111B *Civil Liberties*

111C *Issues in Constitutional Law*

- 115 *Law and the Holocaust*
 116 *Comparative Law*
 120A *Congress, President, and the Court in American Politics*
 120C *State and Capitalism in American Political Development*
 125 *History of U.S. Penal Law*
 128 *Poverty and Public Policy*
 128M *International Law and Global Justice*
 131 *Wildlife, Wilderness, and the Law*
 132 *California Water Law and Policy*
 133 *Law of Democracy*
 135 *Native Peoples Law*
 136 *Federal Indian Law and Tribal Sovereignty*
 137 *International Environmental Law and Policy*
 139 *War Crimes*
 149 *Environmental Law and Policy*
 152 *Courts and Litigation*
 155 *Topics in American Legal History*
 156 *Administrative Jurisprudence*
 159 *Property and the Law*
 171 *Law of War*
 175 *Human Rights*
- Law and Society**
 107 *Political Morality of Survivorship and Recovery*
 110 *Law and Social Issues*
 111B *Civil Liberties*
 112 *Women and the Law (Politics)*
 113 *Gay Rights and the Law*
 114 *Jews, Anti-Semitism, and the American Legal System*
 120B *Society and Democracy in American Political Development*
 120C *State and Capitalism in American Political Development*
 121 *Black Politics and Federal Social Policy*
 122 *The Sociology of Law*
 123 *Law, Crime, and Social Justice*
 126 *Law and Politics in Contemporary Japan and East Asian Societies*
 128I *Race and Criminal Justice*
 127 *Drugs and Society*
 135 *Native Peoples Law*
 138 *Political Anthropology*
 142 *Anthropology of Law*
 147A *Psychology and Law*
 147B *Psychology and Law*
 150 *Children and the Law*
 151 *Politics of Law*
 154 *The Legal Profession*
 155 *Topics in American Legal History*
 160 *Industrial Organization*
 162 *Legal Environment of Business*
 169 *Economic Analysis of the Law*
 180 *Power, Politics, and Protest*
 183 *Women in the Economy*

Disciplinary Communication (DC)

Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC)

Requirement. The DC Requirement in legal studies is satisfied by completing Legal Studies 196.

Comprehensive Requirement—1 course

Students can satisfy the comprehensive requirement in the legal studies major by successfully completing one of the following:

195ABC, *Senior Thesis*. Completion of a senior thesis project of approximately 50 pages with a substantial research content, supervised by a legal studies faculty member with a second reader.

196, *Senior Capstone*. The capstone course is designed to provide an interdisciplinary integration of themes related to the study of law and includes a substantial writing requirement.

Honors

Honors in the legal studies major are awarded to graduating seniors, based primarily on a review of grades and narrative evaluations, whose academic performance is judged to be consistently excellent by a faculty committee. Highest honors in the major are reserved for students with consistently outstanding academic performance.

Transfer Students

A student transferring to UCSC must meet with the legal studies undergraduate adviser as early as possible to discuss declaring the major and course enrollment. This ensures a smooth transition. Students should bring a copy of their UCSC Transfer Credit Summary, which may be printed from the student portal.

Requirements for the Minor

To complete a minor in legal studies, a student must take Legal Studies 10 and any five upper-division legal studies core courses.

Lower-Division Courses

10. Introduction to Legal Process. W

Introduction to U.S. and comparative legal institutions and practices. Examines diverse areas of law from torts to civil rights to international human rights. Why is America portrayed as having an activist legal culture; why is law used to decide so many questions from presidential elections to auto accidents; can law resolve disputes that, historically, have led to war and violence; is the legal system fair and/or effective, and, if so, for whom and under what conditions? (General Education Code(s): IS.) *The Staff*

Upper-Division Courses

105A. Ancient Political Thought. F

Ancient political ideas in context of tension between democracy and empire, emergence of the psyche, and shift from oral to written culture. Emphasis on Athens, with Hebrew, Roman, and Christian departures and interventions. Includes Sophocles, Thucydides, Socrates, Plato, Aristotle, Stoics, the Bible, and Augustine. (Also offered as Politics 105A. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority period. *D. Mathiowetz*

105B. Early Modern Political Thought. S

Studies republican and liberal traditions of political thought and politics. Authors studied include Hobbes, Locke, and Rousseau. Examination of issues such as authorship, individuality, gender, state, and cultural difference. (Also offered as Politics 105B. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority period. *V. Seth*

105C. Modern Political Thought. W

Studies in 19th- and early 20th-century theory, centering on the themes of capitalism, labor, alienation, culture, freedom, and morality. Authors studied include J. S. Mill, Marx, Nietzsche, Foucault, Hegel, Fanon, and Weber. (Also offered as Politics 105C. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority period. *M. Thomas*

105D. Late 20th Century Political Thought. *

The politics of identity and recognition as the basis for institutional legitimacy and social struggles in the late 20th century. Conflicting views of Hegel's master-slave dialectic are used to relate, e.g., Sartre, Fanon, Bataille, Merleau-Ponty, Foucault, Lacan, Levinas, Derrida, Deleuze, Zizek, and Badiou to present-day concerns. (Also offered as Politics 105D. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority period. *R. Meister*

106. Marxism as a Method. *

Examines Marx's use of his sources in political philosophy and political economy to develop a method for analyzing the variable ways in which social change is experienced as a basis for social action. Provides a similar analysis of contemporary materials. Contrasts and compares Marxian critiques of these materials and readings based on Nietzsche, psychoanalysis, cultural studies, and rational choice materialism. (Also offered as Politics 106. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment only. *R. Meister*

107. After Evil: Political Morality of Survivorship and Recovery. *

What are the continuing relationships between victims, perpetrators, and beneficiaries of a past that is recognized as evil? Focus on contrast between the competing moral logics of struggle and reconciliation, and various rationales for allowing beneficiaries to keep their gains in order to bring closure to the past. Theoretical perspectives drawn from law, philosophy, theology, and psychoanalysis. (Also offered as Politics 107. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment only. *R. Meister*

109. Legal Theory. *

Offers systematic exploration of alternative conceptions of the nature of law, including positivism, natural law, formalism, realism, pragmatism, and theories of justice. Additional focus on the nature of law; relation of law and morality, rights and other legal concepts; and philosophical debates such as critical legal studies and critical race theory. Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

110. Law and Social Issues. *

Examines current problems in law as it intersects with politics and society. Readings are drawn from legal and political philosophy, social science, and judicial opinions. (Also offered as Politics 110. Students cannot receive credit for both courses.) Enrollment restricted to politics, legal studies, and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

111A. Constitutional Law. S

An introduction to constitutional law, emphasizing equal protection and fundamental rights as defined by common law decisions interpreting the 14th Amendment, and also exploring issues of federalism and separation of powers. Readings are primarily court decisions; special attention given to teaching how to interpret, understand, and write about common law. (Formerly *Problems in Constitutional Law*.) (Also offered as Politics 111A. Students cannot receive credit for both courses.) Enrollment restricted

to legal studies majors during priority enrollment only. *The Staff*

111B. Civil Liberties. *

Explores the status of American civil liberties as provided by the Bill of Rights. Particular attention will be given to issues of concern relating to the aftermath of 9/11, including issues relating to detainees, freedom of information requests, wiretapping authority, watch lists, profiling, and creation of a domestic intelligence agency. Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

111C. Issues in Constitutional Law. W

Examines variety of topics in constitutional law that are not covered in courses 111A and 111B. Focuses primarily on Supreme Court decisions and common-law debates. Enrollment restricted to legal studies majors during priority enrollment. *The Staff*

113. Gay Rights and the Law. *

Examines relevant court cases as well as local, state, and federal laws that define boundaries for legal recognition of sexual orientation and personal sexuality. Explores legal assumptions behind current and historical cases defining personal sexuality and sexual orientation and considers the social and political impetus in each era that drove the courts and legislatures to make such decisions. *The Staff*

114. Jews, Anti-Semitism, and the American Legal System. *

Explores how Jews have influenced and been impacted by the American legal system. Students explore significant cases, debates, and trends in the law as it relates to Jewish identity, religious freedom, and conceptions of justice. Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

115. Law and the Holocaust. *

Examines the Nazi philosophy of law, and how it was used to pervert Germany's legal system in order to discriminate against, ostracize, dehumanize, and ultimately eliminate certain classes of human beings, and the role of international law in rectifying the damage. Enrollment restricted to legal studies majors during priority enrollment only. Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

116. Comparative Law. *

Explores legal systems and legal rules around the world, for a better understanding of the factors that have shaped both legal growth and legal change. Particular attention given to differences between common and civil law systems, changes brought about by the European Union, and expansion of legal norms around the globe. (Also offered as Politics 116. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

118. Law and Literature. *

Explores variety of texts including novels, short stories, and essays as a source for reflection about the nature of law and legal practice. Readings include such writers as Herman Melville, Harper Lee, Richard Wright, Arthur Miller, Nadine Gordimer, and James Alan McPherson, among others. (Formerly course 138.) Enrollment restricted to legal studies majors during priority period. *The Staff*

120A. Congress, President, and the Court in American Politics. W

Study of political development, behavior, performance, and significance of central governmental institutions of the U.S. Emphasizes the historical development of each branch and their relationship to each other, including changes in relative power and constitutional responsibilities. (Also offered as Politics 120A. Students cannot receive

credit for both courses.) Enrollment restricted to legal studies majors during priority period. Satisfies American History and Institutions Requirement. *D. Wirls*

120B. Society and Democracy in American Political Development. F

Examines role of social forces (e.g., race, class, and gender) in development of the American democratic processes and in the changing relationship between citizen and state. Course materials address ideas, social tensions, and economic pressures bearing on social movements, interest groups, and political parties. (Also offered as Politics 120B. Students cannot receive credit for both courses.) Enrollment restricted to sophomore, junior, and senior legal studies majors during priority period. Satisfies American History and Institutions Requirement. *M. Brown*

120C. State and Capitalism in American Political Development. S

Examines the relationship between state and economy in the U.S. from the 1880s to the present, and provides a theoretical and historical introduction to the study of politics and markets. Focus is on moments of crisis and choice in U.S. political economy, with an emphasis on the rise of regulation, the development of the welfare state, and changes in employment policies. (Also offered as Politics 120C. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority period. Satisfies American History and Institutions Requirement. *E. Bertram*

121. Black Politics and Federal Social Policy. *

Examination of changes in the political and economic status of African Americans in the 20th century; particular focus on the role of national policies since 1933 and the significance of racism in 20th-century U.S. political development. (Formerly course 127.) (Also offered as Politics 121. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment. (General Education Code(s): E.) *M. Brown*

122. The Sociology of Law. W

Explores the social forces that shape legal outcomes and the ways law, in turn, influences social life. Traces the history and political economy of American law; the relation between law and social change; how this relation is shaped by capitalism and democracy; and how class, race, and gender are expressed in welfare and regulatory law. (Also offered as Sociology 122. Students cannot receive credit for both courses.) *C. Reinerman*

123. Law, Crime, and Social Justice. *

Blends the latest research in criminology with that from social stratification, inequality, and social welfare policy with the objective of exploring the relationship between levels of general social justice and specific patterns of crime and punishment. The focus is primarily on the U.S. although many other industrialized democracies are compared. An introductory course in sociology is recommended as preparation. (Also offered as Sociology 123. Students cannot receive credit for both courses.) *The Staff*

125. History of the U.S. Penal Culture. *

Explores the history and theory of U.S. state punishment from its 17th-century beginnings to the present and notes evolving models of criminal deviance, focusing on how punishment systems legitimate particular models of criminal deviance, crime, and its "correction." Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

126. Law and Politics in Contemporary Japan and East Asian Societies. *

Introduction to contemporary analysis of Japan's race relations, ethnic conflicts, and a government's failure to

restore remedial justice for war victims in Japan, Asia, and the U.S. Specific issues include comfort women, national or state narratives on Hiroshima, forced labor during World War II, and Haydon legislation that allows war victims to sue Japanese government and corporations in California. (Also offered as Sociology 128. Students cannot receive credit for both courses.) Enrollment limited to 30. *H. Fukurai*

127. Drugs in Society. S

Explores the history of the use and abuse of consciousness-altering substances like alcohol and other drugs. Social-psychological theories of addiction are reviewed in tandem with political-economic analyses to identify the social conditions under which the cultural practices involved in drug use come to be defined as public problems. An introductory sociology course is recommended prior to taking this course. (Also offered as Sociology 127. Students cannot receive credit for both courses.) *The Staff*

128. Poverty and Public Policy. F

Studies the causes, consequences, and governmental response to urban poverty in the U.S. Topics include how public policy, the macroeconomy, race, gender, discrimination, marriage, fertility, child support, and crime affect and are affected by urban poverty. Emphasizes class discussion and research. (Also offered as Economics 128. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; ECON 100A & 113 or consent of instructor. Enrollment restricted to economics, business management economics, global economics, legal studies, or economics combined major Enrollment limited to 35. (General Education Code(s): W, E.) *L. Kletzer, R. Fairlie*

128I. Race and Justice. F

An introduction to comparative and historical analyses of the relations between race and criminal justice in the U.S. Emphasis on examinations of structural mechanisms that help maintain and perpetuate racial inequality in law, criminal justice, and jury trials. (Formerly *Race and Criminal Justice*) (Also offered as Sociology 128I. Students cannot receive credit for both courses.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 120. *H. Fukurai*

128J. The World Jury on Trial. *

Adoption of the jury and its varied forms in different nations provides ideal opportunities to examine differences between systems of popular legal participation. Course considers reasons why the right to jury trial is currently established in Japan or Asian societies, but abandoned or severely curtailed in others. American jury contrasted with other forms of lay participation in the legal process. (Also offered as Sociology 128J. Students cannot receive credit for both courses.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 30. *The Staff*

128M. International Law and Global Justice. S

Examines war crimes, crimes against humanity, and the evolution and role of the International Criminal Court (ICC). Examines the evolution of the concept of international law, the rationale for its birth and existence, roots of international conflicts and genocides, possible remedies available to victims, mechanisms for the creation and enforcement of international legal order, as well as the role of colonialism, migration, poverty, race/ethnic conflicts, gender, and international corporations in creating and maintaining conflicts and wars. (Also offered as Sociology 128M. Students cannot receive credit for both courses.) Enrollment restricted to juniors and seniors. Enrollment limited to 30. *The Staff*

130. Race and the Law. *

Explores the complex relationship between race and the law in American society. Included subjects are critical race theory, civil rights and voting rights law, issues of the criminal justice system, intersections with issues of class and gender, and the social construction of race through law and legal decisions. Enrollment restricted to legal studies majors during priority enrollment. *The Staff*

131. Wildlife, Wilderness, and the Law. *

Introduction to wildlife, wilderness, and natural resources law, policy, and management. Examines rules governing resource allocation and use including discussion of fundamental legal concepts. Explores laws and management policies affecting wildlife and wilderness, including their origins and impacts. Examines how conflicts over natural resources are being negotiated today. Enrollment restricted to sophomore, junior, and senior legal studies majors during the priority period. *R. Langridge*

132. California Water Law and Policy. *

Explores the rich history and fundamental legal concepts surrounding water in California. Students identify, evaluate, and debate some critical water policy questions faced by Californians today and in the future. (Also offered as Politics 132. Students cannot receive credit for both courses.) *R. Langridge*

133. Law of Democracy. *

Explores the role of law in both enabling and constraining the actions of elected politicians in the U.S. Among issues examined are voting rights, redistricting, and campaign finance. Course asks how the law shapes and limits our ability to choose our elected leaders, and in turn, how the law is shaped by political forces. (Also offered as Politics 133. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment. *The Staff*

135. Native Peoples Law. *

Explores the legal relationship between native peoples and the state. Examines the development of that relationship and several of the key legal issues currently confronting native peoples as they attempt to redress the injustices of the past. Enrollment restricted to legal studies majors during priority enrollment only. (General Education Code(s): E.) *The Staff*

136. Federal Indian Law and International Comparative Indigenous Peoples' Law. *

Indian law refers to the body of law dealing with the status of Indian tribes, their inherent powers of self-government, their special relationship to the federal government, and the actual or potential conflicts of governmental power. Primary objective will be to address tribal reassertion of aboriginal sovereignty over culture and land in the context of increasing world recognition of indigenous rights. Enrollment restricted to legal studies majors during priority period. (General Education Code(s): E.) *The Staff*

137. International Environmental Law and Policy. *

International environmental law (IEL) endeavors to control pollution and depletion of natural resources within a framework of sustainable development and is formally a branch of public international law—a body of law created by nation states for nation states, to govern problems between nation states. Examines landmark developments of IEL since 1972 within a historical continuum to better understand their strengths and weaknesses. Enrollment restricted to legal studies majors during priority period. *The Staff*

138. Political Anthropology. W

The ideas, in selected non-Western societies, about the nature of power, order, social cohesion, and the political

organization of these societies. (Also offered as Anthropology 138. Students cannot receive credit for both courses.) Offered in alternate academic years. *T. Pandey*

139. War Crimes. *

Explores complex international human rights/humanitarian law issues surrounding genocide and other mass violence, beginning with the Nuremberg trials following World War II up to recent atrocities in Rwanda, Bosnia, and elsewhere. Covers basic legal framework of human rights law, examines specific situations on a case by case basis, and discusses what options the international community, the nations themselves, and individuals have in the wake of such catastrophes. Enrollment restricted to legal studies majors during priority period. *The Staff*

142. Anthropology of Law. *

An ethnographically informed consideration of law, dispute management, and social control in a range of societies including the contemporary U.S. Topics include conflict management processes, theories of justice, legal discourse, and relations among local, national, and transnational legal systems. (Also offered as Anthropology 142. Students cannot receive credit for both courses.) Enrollment restricted to anthropology and legal studies majors. *D. Brenneis*

144. Social and Political Philosophy. *

A study of selected classical and contemporary writings dealing with topics such as the nature and legitimacy of the liberal state, the limits of political obligation, and theories of distributive justice and rights. (Also offered as Philosophy 144. Students cannot receive credit for both courses.) Prerequisite(s): one course in philosophy. Offered in alternate academic years. *D. Guevara*

146. Philosophy of Law. W

Exploration of selected problems in jurisprudence: "legal reasoning" and social policy, rules and individual cases, the mental element in the law, punishment and responsibility, causation and fault, liberty and paternalism, etc. (Also offered as Philosophy 146. Students cannot receive credit for both courses.) *J. Neu*

147A. Psychology and Law. *

Current and future relationships between law and psychology, paying special attention to gaps between legal fictions and psychological realities in the legal system. Topics include an introduction to social science and law, the nature of legal and criminal responsibility, the relationship between the social and legal concepts of discrimination, and the nature of legal punishment. (Also offered as Psychology 147A. Students cannot receive credit for both courses.) Psychology 3 or 100 and 40 are recommended prior to taking this course. Enrollment restricted to psychology, pre-psychology, and legal studies majors. *C. Haney*

147B. Psychology and Law. *

Continuing discussion of current and future relationships between law and psychology and to contrasting psychological realities with legal fictions. Special attention is given to the criminal justice system including crime causation, the psychology of policing and interrogation, plea bargaining, jury selection and decision making, eyewitness identification, and the psychology of imprisonment. (Also offered as Psychology 147B. Students cannot receive credit for both courses.) Prerequisite(s): course 147A. *C. Haney*

149. Environmental Law and Policy. S

Surveys a wide range of topics in environmental law, including population control, state and federal jurisdiction, land and resources control, public land management, pollution control, and private rights and remedies. Students read a large number of judicial cases and other legal documents. (Also offered as Environmental Studies 149. Students cannot receive credit for both courses.)

Enrollment restricted to junior and senior legal studies majors. *T. Duane*

150. Children and the Law. *

Explores the legal rights of children. Topics may include juvenile justice, gang offenses, free speech and Internet censorship, religious rights, child custody and support, adoption, foster care, abuse and sexual harassment, special needs, public benefits, and medical care. Enrollment restricted to legal studies majors during priority period. *The Staff*

151. Politics of Law. W

Uncovers the important debates in politics and law around the functions of courts, litigation, and rights—and the political nature of law itself. Course is interdisciplinary, and draws from literature in political science, law, and sociology. (Also offered as Politics 151. Students cannot receive credit for both courses.) Enrollment restricted to politics, legal studies, and Latin American and Latino studies/politics combined majors during priority period. *M. Massoud*

152. Courts and Litigation. *

A study of the role of courts in society and the uses of litigation to address and deflect social problems. Focus is on recent developments in American litigation, but comparative materials may be considered. Enrollment restricted to legal studies majors during priority period. *The Staff*

154. The Legal Profession. *

Lawyers stand between the legal system and those who are affected by it. Examines this relationship descriptively and normatively, and from the point of view of sociological theory. Concentrates on the U.S. profession, with some comparative material. Enrollment restricted to legal studies majors during priority period. *The Staff*

156. Administrative Jurisprudence. *

The rise of the regulatory state brings with it a host of questions regarding the exercise of state power and separation of powers. Takes up some of these questions; in particular, questions about administrative agencies and their relationship to the judiciary, the legislature and private individuals and groups. Enrollment restricted to legal studies majors during priority period. *The Staff*

157. Political Jurisprudence. F

Explores some themes in legal and political theory, especially on the relationship of theories of justice, law, and ethics. Enrollment restricted to legal studies majors during priority period. *The Staff*

159. Property and the Law. F

Beginning with an examination of the concept of property, the class covers how different cultures characterize property and determine "ownership" and the laws and policies that define property in modern society. Topics include theories of property law, common property, property and natural resources, zoning, regulatory takings, and property on the Internet. Enrollment restricted to legal studies majors during priority period. *R. Langridge*

160A. Industrial Organization. W

The structure and conduct of American industry with strong emphasis on the role of government, regulation, anti-trust, etc. The evolution of present-day industrial structure. The problems of overall concentration of industry and of monopoly power of firms. Pricing, output decisions, profits, and waste. Approaches include case study, theory, and statistics. (Also offered as Economics 160A. Students cannot receive credit for both courses.) Prerequisite(s): Economics 100A or 100M. *The Staff*

169. Economic Analysis of the Law. S

The application of the theories and methods of neoclassical economics to the central institutions of the legal system, including the common law doctrines of negligence,

contract, and property; bankruptcy and corporate law; and civil, criminal, and administrative procedure. (Also offered as Economics 169. Students cannot receive credit for both courses.) Prerequisite(s): Economics 100A or 100M or permission of instructor. *D. Wittman*

171. Law of War. *

Examines legal regulation of international violent conflict. Students examine development of normative standards within international law and creation of institutions to both adjudicate violations and regulate conduct. (Also offered as Politics 171. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment only. *The Staff*

173. International Law. F

Origins and development of international law: international law is examined both as a reflection of the present world order and as a basis for transformation. Topics include jurisdiction and sovereignty, treaties, the use of force, and human rights. (Also offered as Politics 173. Students cannot receive credit for both courses.) Enrollment restricted to legal studies majors during priority enrollment. *The Staff*

175. Human Rights. W

Embraces an interdisciplinary approach to the study of human rights. Captures the malleable nature of human rights and the contours of its dual role as both law and discourse. (Also offered as Politics 175. Students cannot receive credit for both courses.) Prerequisite(s): course 173 or Politics 173. Enrollment restricted to legal studies majors during priority enrollment. *M. Massoud*

183. Women in the Economy. *

Study of gender roles in economic life, past and present. Topics include occupational structure, human capital acquisition, income distribution, poverty, and wage differentials. The role of government in addressing economic gender differentials is examined. (Also offered as Economics 183. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; Economics 1, 2, and 100A; Economics 113 strongly recommended. (General Education Code(s): W.) *L. Kletzer*

193. Field Study. F,W,S

Field research performed off-campus, under the supervision of a member of the legal studies faculty. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195A. Senior Thesis. F,W,S

Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. When taken as a multiple-term course extending over two or three quarters, the grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students submit petition to sponsoring agency. *The Staff*

195B. Senior Thesis. F,W,S

Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. When taken as a multiple-term course extending over two or three quarters, the grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students submit petition to sponsoring agency. *The Staff*

195C. Senior Thesis. F,W,S

Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. When taken as a multiple-term course extending over two or three quarters, the grade

and evaluation submitted for the final quarter apply to each of the previous quarters. Students submit petition to sponsoring agency. *The Staff*

196. Senior Capstone. W,S

Examines related legal topics from an interdisciplinary perspective. Each focuses broadly on the relationship between law as a distinct system and law as an attempt to achieve justice, which requires that law remain open to claims of political morality generally. To what extent are legal norms internal to a separate system called "law" and to what extent are claims of political right in general relevant to question of what law is? Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior legal studies majors. (General Education Code(s): W.) *The Staff*

198. Independent Field Study. F,W,S

Individual studies undertaken off-campus for which faculty supervision is not in person, but by correspondence. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Individual studies undertaken off-campus for which faculty supervision is not in person, but by correspondence. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

A student normally approaches a faculty member and proposes a course 199 on a subject he or she has chosen. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

A student normally approaches a faculty member and proposes a course 199 on a subject he or she has chosen. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Linguistics

241 and 243 Stevenson College
(831) 459-2905
(831) 459-4988
<http://ling.ucsc.edu>

Faculty and Professional Interests

Professor

JUDITH AISSEN, Emerita

SANDRA CHUNG
Syntax, semantics, Austronesian languages

DONKA FARKAS
Semantics, morphology, syntax, Romance languages, Hungarian

JORGE HANKAMER
Syntax, morphology, computational linguistics, Turkish

JUNKO ITO
Phonology, morphology, Germanic languages, Japanese

WILLIAM A. LADUSAW
Semantics, syntax, pragmatics

JAMES McCLOSKEY
Syntax, semantics, sociolinguistics, Irish

ARMIN MESTER
Phonology, prosodic morphology, Japanese, Latin

JAYE PADGETT

Phonology, phonetics, Russian, Slavic

GEOFFREY K. PULLUM, Emeritus

WILLIAM F. SHIPLEY, Emeritus

Assistant Professor

PRANAV ANAND

Semantics, pragmatics, syntax

ADRIAN BRASOVEANU

Semantics, pragmatics, Optimality theory, Romance and Balkan languages, philosophical logic

GRANT MCGUIRE

Phonetics, phonology, psycholinguistics

MATTHEW WAGERS

Psycholinguistics, language comprehension, memory

Program Description

Linguistics is an exact and structured discipline. As the study of human language, it has connections to many other fields in the humanities (philosophy, literature), the social sciences (anthropology, psychology, sociology), the natural sciences (biology, neuroscience, acoustics), computer science, computer engineering, and artificial intelligence.

The central areas of linguistics investigate the knowledge that speakers of a language acquire about its structure. Syntax is concerned with the rules that combine words into larger units of phrases and sentences. Semantics studies the meanings of linguistic units and how they are combined to form the meanings of sentences. Phonetics deals with the physical properties of language sounds. Phonology investigates the ways in which these speech sounds pattern in the sound systems of particular languages. Morphology studies the way in which words are put together out of prefixes, roots, and suffixes. Pragmatics is the study of language use.

All faculty in the Linguistics Department have primary research and teaching interests in one or more of these areas. Other perspectives on language study represented include sociolinguistics, psycholinguistics, the study of poetic language, and the study of language change.

The programs offered by the Linguistics Department are designed to acquaint students with the central aspects of linguistic structure and the methodologies and perspectives of the field. The department offers two undergraduate majors, linguistics and language studies, and a graduate program in theoretical linguistics. The linguistics major leads to a bachelor of arts (B.A.) degree in linguistics; the language studies major leads to a B.A. degree in language studies (see Language Studies). The graduate program leads to the master of arts (M.A.) and doctor of philosophy (Ph.D.) degrees in linguistics.

The department also offers a combined B.A./M.A. program which makes it possible for certain students to complete the requirements for both degrees in five years rather than the usual six.

Requirements for the Linguistics Major

All students are required to complete the following 12 courses in linguistics and related disciplines.

- Seven foundation courses in linguistics:
 - 50, *Introduction to Linguistics: Sounds and Words*
 - 53, *Semantics I*
 - 101, *Phonology I*
 - 102, *Phonology II*
 - 112, *Syntax I*

113, *Syntax II*
116, *Semantics II*

- Five upper-division elective courses in linguistics.

Students may petition the department to have elective courses offered through other institutions or other UC programs applied toward the major requirements. At most three such courses can be applied toward the major. Such courses must be upper-division and clearly fit into a coherent program of study in linguistics

Foreign language/mathematics competency requirement: Linguistics majors are required to demonstrate either foreign-language or mathematics competency as follows:

- *Foreign-language competency:* students must successfully complete five quarters of language study at UCSC (three quarters for Latin or Greek) or demonstrate an equivalent level of competence through a recognized language test or evidence of credit from another institution.
- *Mathematics competency:* alternatively, students with a strong formal background can choose to satisfy the mathematics competency requirement by demonstrating sufficient preparation in mathematics for advanced formal work in linguistics. This requirement is satisfied by passing two courses chosen from the following list: Mathematics 11A, 19A, or 21; Computer Science 5C, 5J, or 5P; Computer Engineering 16; Economics 11A; or any course which has one of these courses as a prerequisite.

Senior exit requirement: In their senior year, linguistics majors must satisfy the senior exit requirement in one of two ways:

Option 1: Successful completion of a capstone course. Students may designate an appropriate upper-division linguistics course as their capstone course. Students must have senior standing, completed Linguistics 101, *Phonology I*, and 112, *Syntax I*.

Option 2: Successful completion of a senior thesis supervised by a linguistics faculty member.

- The proposal for a senior thesis must be submitted for departmental approval at least three quarters prior to the quarter of graduation.
- Students enroll in Linguistics 195, *Senior Thesis*.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in linguistics is satisfied by completing courses 101 and 112.

Requirements for the Minor

To graduate with a minor in linguistics, students must complete eight linguistics courses:

- 50, *Introduction to Linguistics: Sounds and Words*
- 53, *Semantics I*
- 101, *Phonology I*
- 112, *Syntax I* or 111, *Syntactic Structures*
- Four upper-division electives in linguistics

There is no senior exit requirement and no foreign language/mathematics competency requirement for the minor.

Courses

Courses numbered 80 are lower-division courses, which treat the phenomenon of language from a variety of perspectives:

- 80B, *Modern English Grammar*. A modern non-prescriptive approach to English grammar.
- 80C, *Language, Society, and Culture*. An exploration of ways in which language structure and use reflect societal distinctions and cultural practice.
- 80D, *Language and Mind*. A critical examination of the view of human language underpinning the research program initiated by Noam Chomsky and of its implications for theories of the human mind and brain.
- 80V, *Structure of the English Vocabulary*. A systematic study of the elements of English words: their historical origins and their sound, meaning, spelling, and function.

These courses have no prerequisites. They are intended to introduce the concepts of linguistics through their relation to other areas of general interest.

Courses 50, *Introduction to Linguistics: Sounds and Words*; 112, *Syntax I*; 111, *Syntactic Structures*; and 53, *Semantics I* are "disciplinary introductions." These courses have no linguistics prerequisites and serve as entry courses to the specialized upper-division sequences. Upper-division courses generally have at least one of these courses as a prerequisite.

Courses 101, *Phonology I*; 102, *Phonology II*; 113, *Syntax II*; and 116, *Semantics II* are the core upper-level courses in linguistic structure and are offered each year. The two phonology courses (101 and 102) provide an introduction to the study of the sound systems of languages. These courses use a problem-solving approach to developing understanding of phonological theory and phonological regularities in various languages. The intermediate syntax course (113), which has course 112, *Syntax I*, and course 53, *Semantics I*, as prerequisites, continues the development of syntactic theory begun in course 112, extending the range to more complex constructions and rules and introducing alternative theoretical approaches. The semantics course (116), which has as prerequisites course 53, *Semantics I*, and either course 112, *Syntax I*, or course 111, *Syntactic Structures*, addresses advanced problems in the analysis of meaning.

Several upper-division elective courses are offered each year. For a list of these courses, contact the Linguistics Department.

To enroll in the graduate (200-level) courses, undergraduates need special permission from the instructor. Permission is usually granted only to especially motivated undergraduates who have completed all the core course requirements for the major with excellent performance.

Disqualification Policy

The Linguistics Department has adopted a major disqualification policy for linguistics and language studies majors that is intended to encourage students to take seriously their performance in the introductory courses and to make a strong effort to pass those courses.

Students who receive more than one No Pass, D, W, and/or F in the following introductory courses will not be permitted to major in linguistics or language studies:

- Linguistics 50, *Introduction to Linguistics Sounds and Words*
- Linguistics 53, *Semantics I*
- Linguistics 101, *Phonology I*
- Linguistics 111, *Syntactic Structures*
- Linguistics 112, *Syntax I*

Students who fail one of these courses will be sent a letter reminding them of this policy and warning them that they are at risk of disqualification should they fail to pass a subsequent introductory course.

Students may appeal their disqualification by writing a formal letter to the department chair. This letter should explain any extenuating circumstances that influenced their poor performance in the introductory courses. For example, if some event led to poor performance in multiple courses in a single quarter, a student has a potential case for appeal. In contrast, academic dishonesty or poor performance spanning multiple quarters will be considered evidence that a student is ill suited for the majors.

The letter of appeal must be submitted to the Linguistics Department office (Stevenson 243) no later than 15 days from the date the disqualification notice was mailed, or the 10th day of classes in the quarter of their disqualification, whichever is later. The department will subsequently notify the student and the student's college of the appeal decision no later than 15 days after the submission of the appeal.

Honors

Students who wish to be considered for honors should meet the deadline posted by the Office of the Registrar for declaring the intent to graduate. Determination of honors is based on a close reading of (1) the student's grades and narrative evaluations for all courses relevant to the major; (2) the results of the senior exit requirement; (3) other factors relevant to an assessment of academic excellence, such as research papers of professional quality. Generally, honors in the major are awarded to the top 10 percent of those graduating in the major. Only those students whose narratives are consistently excellent, and whose performance on the senior exit requirement is excellent, will qualify. Highest honors are rarely awarded, and then only to students whose performance in coursework is outstanding and who have completed an outstanding senior thesis.

Preparation for the UCSC Master's Degree

Each year a number of UCSC students who have B.A. degrees in linguistics or language studies are admitted into the graduate program to pursue the M.A. in theoretical linguistics. Interested students should discuss the possibility with one or more faculty members and formally apply online to the graduate program during the fall quarter of the senior year. For up-to-date information about the application process, consult our web site (<http://ling.ucsc.edu/>); and see the Linguistics Department manager. The combined B.A./M.A. program (see below) provides another pathway to the M.A. program.

Graduate Program

The graduate program in linguistics at UCSC is a small, focused five-year program in linguistic theory leading to the degree of doctor of philosophy (Ph.D.). The research interests of faculty and students draw on the framework of generative grammar, with a primary focus on theoretical and experimental approaches to syntax, semantics, phonetics, and phonology. Research strengths also

include the structure of various languages, theoretical and computational morphology, mathematical foundations, and the philosophy of linguistics.

Each year the department admits approximately five new students to the doctoral program and a smaller number of new students to the M.A. program. The master's degree can be completed in one or two years, depending on the student's previous background in linguistics.

While committed to training in theoretical depth, the program makes possible an unusual breadth of theoretical and experimental understanding. Research in syntax focuses on ways in which generative theory and language-particular analysis inform one another. Faculty expertise covers principles and parameters theory, minimalism, optimality theoretic syntax, and experimental approaches. Research in phonetics and phonology is pursued in various current frameworks, including optimality theory and dispersion theory. It ranges from issues in phonetics and the phonetics-phonology relationship to prosodic theory, prosodic morphology and the syntax-phonology relationship. Research in semantics applies formal, model-theoretic techniques to illuminate the interface between syntactic structure and interpretation and the role of semantic competence in the pragmatics of utterance interpretation. Experimental research in these areas reaches out to a broad range of issues in psycholinguistics and cognitive science.

The faculty have expertise in a variety of languages, including Chamorro, German, Hungarian, Irish, Japanese, Latin, Rumanian, Russian, Spanish, Turkish, and Tzotzil.

From the beginning of their studies, students are engaged in original research and critical evaluation since the aim of the program is to provide sophisticated training as a foundation for a career in academic research and teaching. The program begins with a sequence of foundation and core courses in linguistic theory. Subsequent coursework emphasizes theoretical depth; it is increasingly centered around the doctoral student's own research, culminating in the presentation of a dissertation on some aspect of linguistic theory and analysis.

Undergraduate Preparation

Applications are invited from students who have completed an undergraduate linguistics major or who have demonstrated excellence in some related discipline (psychology, mathematics, computer science, anthropology) and have the equivalent of a minor in linguistics. A student applying for admission to this program should, in any case, have a good foundation in at least one of the central fields of linguistic structure: phonetics, phonology, morphology, syntax, or semantics. Students entering the program with a deficiency in one or more areas will make up the deficiency by taking appropriate undergraduate courses at UCSC during the first year of graduate study.

Requirements for the M.A.

Courses. A minimum of 45 credits of graduate-level work. This must include the core courses in phonetics, phonology, syntax, and semantics. Electives are chosen from upper-division or graduate courses offered by linguistics and related disciplines, in addition to independent study with linguistics faculty.

Languages. Reading competence in one foreign language, to be demonstrated by examination.

Research paper. Submission of a research paper in a core area of theoretical linguistics and approval of a committee of two faculty.

Requirements for the Ph.D.

Courses. A minimum of 65 credits of graduate-level work. This includes foundation sequences in phonetics, phonology, syntax, and semantics.

Languages. Reading competence in one foreign language, to be demonstrated by examination.

Qualifying papers and examination. By the end of the third year, two research papers, one in phonetics/phonology/morphology and one in syntax/semantics/pragmatics, are to be presented as part of the requirements for admission to candidacy. At this time, the prospective candidate is examined by the faculty on topics related to the student's major area of research, as part of the qualifying examination. The student is expected to defend a dissertation prospectus by the end of the fourth year.

Dissertation. The final requirement for the Ph.D. degree is the presentation of a dissertation representing a significant contribution in some central area of linguistic research.

Application and Admission

To apply, please consult the Department of Linguistics web site (<http://ling.ucsc.edu>).

The Combined B.A./M.A. Program

The B.A./M.A. program in linguistics is a demanding and selective option which allows students who are well prepared and well motivated to complete the requirements for both degrees in five years rather than the usual six.

Admission to the program has two stages. In the first stage, interested students apply to be admitted to the program in consultation with the undergraduate adviser no later than the first quarter of their junior year. Transfer students must apply for admission by the end of their second quarter at UCSC. In order to be accepted at this first stage, students must have demonstrated excellence in the undergraduate major in at least three courses that are named requirements for the linguistics major.

Students accepted at this initial stage are assigned a faculty mentor who monitors their progress closely.

At the second stage of the admission procedure, students apply in their senior year to be admitted through UCSC's normal graduate admissions process. If accepted, they complete the course requirements for the M.A. and write and defend the M.A. paper by the end of the fifth year.

Students in the B.A./M.A. program take a number of graduate courses in their senior year, which are selected in close consultation with the faculty mentor. Performance in these courses forms a central part of the ongoing evaluation process. If a student's performance does not meet the standards set for the program, he or she completes the B.A. at the end of the senior year in the normal way and does not proceed to the M.A.

Graduate courses required for the M.A. are taken partly in the senior year and partly in the fifth year. The M.A. paper is written in the fifth year. Thus, by the end of their fifth year, the students in the program will have fulfilled the requirements for both the B.A. and the M.A. degrees.

Lower-Division Courses

50. Introduction to Linguistics: Sounds and Words. W

An introduction to the major areas, problems, and techniques of modern linguistics. (General Education Code(s): SL, IH.) *G. McGuire*

53. Semantics I. F,W

Introduction to the logical foundations of natural language semantics. Logical and semantic relations, simple set theory, logical representations (propositional and predicate calculi, modal and tense logics) and their interpretations. A basic literacy course in the language of logical representation. (General Education Code(s): IH.) *P. Anand, A. Brasoveanu*

80B. Modern English Grammar. *

Elementary introduction to modern standard English grammar, both formal and informal, both written and spoken. Stresses the importance of linguistic evidence in understanding grammatical correctness; offers a demystification and critique of older traditional grammar in the light of recent research. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

80C. Language, Society, and Culture. S

The study of language from a sociological perspective. Multilingualism, language change and variation, pidgins and creoles, the origin and diversification of dialects. (General Education Code(s): CC, T5-Humanities and Arts or Social Sciences.) *J. Padgett*

80D. Language and Mind: Chomsky's Program. *

A critical overview of the research program initiated by Noam Chomsky and its implications for theories of the human mind and brain. (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *The Staff*

80G. Introduction to Unix. *

Introduction to computing, the Internet, and the World Wide Web through the language of the Unix operating system. Oriented to the beginner, the course presupposes no previous acquaintance with any particular sort of computer. It covers the basic concepts of text editing and formatting, writing Web pages in basic HTML, and promotes a rigorous understanding of Unix commands and shell scripts. Views communication with a computer as a matter of learning a few simple though powerful languages. (Also offered as Computer Science 80G. Students cannot receive credit for both courses.) (General Education Code(s): T2-Natural Sciences.) *A. Van Gelder*

80V. Structure of the English Vocabulary. *

A systematic study of the elements of English words: besides the practical goal of vocabulary consolidation and expansion, explores the historical origin and development of word elements, as well as their sound, meaning, and function in the contemporary language. Offered in alternate academic years. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

101. Phonology I. S

Introduction to how sounds pattern in grammars—why they vary, how they combine, etc. Emphasis is on developing theories to explain the patterns. Topics include distinctive feature theory, phonemic analysis, autosegmental phonology, and principles of syllabification and stress. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, course 50. (General Education Code(s): W.) *R. Mester*

102. Phonology II. F

Advanced phonological theory. Topics include markedness; underspecification theories; advanced topics in feature geometry, syllable theory, and stress theory; and optimality theory. Readings include published articles. Emphasis on theory construction and argumentation based on data. Prerequisite(s): course 101. *J. Padgett*

105. Morphology. W

Study of the principles of word formation: derivation, inflection, and compounding; cross-linguistic study of morphological processes, morphological investigation and analysis. Prerequisite(s): course 52 or 55, and course 101. Offered in alternate academic years. *The Staff*

108. Poetry and Language. *

An introduction to the linguistic aspects of poetry, e.g., rhyme, meter, and larger-scale organization of poetic form. The emphasis is on English poetry, complemented by brief sketches of other poetic traditions. Students taking this course should have some basic knowledge of language structure (e.g., as provided by course 50). Offered in alternate academic years. (General Education Code(s): TA.) *The Staff*

111. Syntactic Structures. S

Provides a basic introduction to the methods and results of generative grammar. It simultaneously provides an overview of the major syntactic constructions of English. (Formerly course 55.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): IH.) *M. Wagers*

112. Syntax I. F,W

An introduction to syntactic investigation, developed through the study of central aspects of English syntax. A major purpose is to introduce students to the study of language as an empirical science. (Formerly course 52.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): IH.) *S. Chung, J. Hankamer*

113. Syntax II. S

Further aspects of English syntax; universal and language-particular constraints on syntactic structures and rules. Further developments and extensions of generative theory. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, course 52 and 53. (General Education Code(s): W.) *J. Hankamer*

114. Syntax III. W

Advanced topics in syntax and semantics. Prerequisite(s): course 113 and satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): W.) *J. Hankamer, J. McCloskey*

116. Semantics II. W

Major issues in natural language semantics: nature of lexical entries, thematic relations, propositional representation or "logical form"; relation between semantic interpretation and syntactic representations, quantification and scope relations, reference and presupposition, coreference and anaphoric relations. Prerequisite(s): course 53, and either course 52 or 55. *D. Farkas*

117. Pragmatics. *

Covers topics central in the study of pragmatics, the interpretation of language use. Topics include conversational implicature, speech acts and discourse understanding, and social deixis. Prerequisite(s): course 53. Offered in alternate academic years. *The Staff*

118. Semantics III. *

Uses the tools learned in courses 53 and 116 (Semantics I and Semantics II), giving students the opportunity to explore important topics with heavy emphasis placed on reading primary-source literature. Readings form the basis for weekly lectures and the discussion section. Prerequisite(s): course 116. Enrollment limited to 25. *The Staff*

120. Structure of English. *

Survey of grammatical structure of English and terminology of grammatical description. Covers phonological, morphological, and syntactic structure of English and

contrasts it with other languages. Prerequisite(s): course 52 or 55, and 101. *The Staff*

124. Language Typology. F

Introduces the branch of linguistics whose goal is to describe and explain the structural diversity of the world's languages. Focuses on what is known about variation in particular domains (e.g., syllable structure, word order, evidentiality), and how it might be explained. Prerequisite(s): course 52 or 55, and course 101. Enrollment limited to 40. *The Staff*

125. Foundations of Linguistic Theory. *

Survey of some of the history and foundational assumptions of generative grammar; also looks at some of the influence of generative linguistic theorizing on disciplines outside linguistics, notably psychology and philosophy. Prerequisite(s): course 113 or 116. Enrollment limited to 25. *The Staff*

140. Language Change. S

Methods and problems in the study of change in linguistic systems. Reconstruction of proto-languages; the comparative method. Theories of change and implications for the theory of grammar. Prerequisite(s): course 102. Enrollment limited to 25. *R. Mester*

151. Phonetic Analysis. W

Introduction to instrumental phonetic analysis—analysis using experimental methods. Emphasis is on the acoustics and perception of speech. Prerequisite(s): course 101. *J. Padgett*

152. Applied Phonetics. *

Examines areas in which phonetic analysis and experimentation are used in practice. Emphasizes problem-solving, experiments, and analytical tasks. Prerequisite(s): course 151. Enrollment limited to 25. *The Staff*

154. Language and Social Identity. F

Introduction to sociolinguistics exploring the relationship between language and such social parameters as social status, ethnicity, race, gender, etc., including the role of language differences in the creation of social stereotypes. Emphasis on gathering, examining, and reporting data. Prerequisite(s): course 50. Enrollment restricted to senior language studies majors. Enrollment limited to 25. *G. McGuire*

155. Language and Cognition. S

Introduces and examines some of the foundational assumptions, practices, and methods of generative grammar in comparison to those of other areas of cognitive science, notably psychology and philosophy. Prerequisite(s): courses 52 or 55, 53, and 101. *J. McCloskey*

157. Psycholinguistics and Linguistic Theory. F

Theory and methods in psycholinguistics, covering perception, production, and acquisition of language and linguistic structure. A hands-on, laboratory-style introduction to the topic, focusing on the relation between experimental findings and linguistic theory. Students cannot receive credit for this course and course 257. Prerequisite(s): course 102 or 105 or 113 or 116. Enrollment restricted to linguistics and language studies majors. Enrollment limited to 20. (General Education Code(s): SR.) *M. Wagers*

158. Advanced Psycholinguistics. *

Advanced topics in psycholinguistics and experimental linguistics, contemporary memory models, computational models of comprehension and production, and neurolinguistic findings and methodologies. Student work revolves around an extended research project in which students learn to apply advanced analytical techniques. Prerequisite(s): course 157. Enrollment restricted to linguistics and language studies majors. Enrollment limited to 12. *The Staff*

160. Language Engineering. W

Addresses a particular problem in language engineering, chosen for its practical and theoretical interest and its tractability. The entire course focuses on a team project to design a solution to the problem. Permission of instructor required. *The Staff*

181. Structure of Romance Languages. F

Examines the phonological and syntactic structures of Romance languages. Some knowledge of Italian, French, or Spanish is required. Prerequisite(s): course 55 or 52, and 101. *The Staff*

182. Structure of Spanish. *

The phonology and syntax of Spanish, studied from a modern linguistic perspective. Some knowledge of Spanish is required. Prerequisite(s): course 55 or 52, and 101. *The Staff*

183. Structure of French. *

The phonology, morphology, and syntax aspects of French. Some knowledge of French is helpful. Prerequisite(s): course 55 or 52, and 101. *The Staff*

184. Structure of Irish. *

Integrated Irish-language course for beginners, combining both instruction in the language itself (linguistic) and seminars about the current social, political, and cultural state of the language (sociolinguistic). Enrollment by permission of instructor. Enrollment limited to 25. *The Staff*

185. Structure of Russian. *

The phonology, morphology, and syntax of Russian. Some knowledge of Russian is helpful. Prerequisite(s): course 52 or 55, and course 101. Enrollment limited to 30. Offered in alternate academic years. *The Staff*

186. Structure of German. *

Phonological, morphological, and syntactic aspects of the structure of the German language. Some knowledge of German is required. Prerequisite(s): course 55 or 52, and 101. *The Staff*

187. Structure of Japanese. W

The phonology, morphology, and syntax of Japanese. Some knowledge of Japanese is required. Prerequisite(s): course 55 or 52, and 101. Offered in alternate academic years. *J. Ito*

188. Structure of Turkish. *

The phonology, morphology, and syntax of Turkish. Prerequisite(s): course 52 or 55, and 101. *The Staff*

190. Senior Research (2 credits). F,W,S

Students produce a research paper or other significant project to satisfy the capstone requirement. Prerequisite(s): course 101, and either course 52 or 55. Concurrent enrollment in a specified upper division course is required. Enrollment restricted to senior linguistics and language studies majors. *The Staff*

193. Field Study. F,W,S

Students submit petition to sponsoring agency. *The Staff*

195. Senior Thesis. F,W,S

Deadline for submission of thesis proposal is one year in advance of proposed completion. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

197. Squib Writing. *

Students write one squib (one to ten pages) per week except for weeks three and seven, when they write two squibs. A selection of the squibs is presented in class; one or two will be rewritten. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to senior linguistics and language studies majors with an advanced understanding of linguistics.

Enrollment limited to 15. (General Education Code(s): W.) *J. Hankamer*

198. Independent Field Study. F,W,S

Provides for department-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision by correspondence). Preparation and approval must be completed by the fifth day of instruction of any given quarter. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

211. Phonology A. F

First part of a three quarter introduction to phonology. Topics of the sequence include fundamentals of acoustic phonetics; introduction to optimality theory; theories of syllabification, stress, and prosodic organization; prosodic morphology; advanced issues in faithfulness and correspondence; segmental and suprasegmental processes. Enrollment restricted to graduate standing or consent of instructor. *G. McGuire*

212. Phonology B. W

Second part of a three quarter introduction to phonology. Topics of the sequence include fundamentals of acoustic phonetics; introduction to optimality theory; theories of syllabification, stress, and prosodic organization; prosodic morphology; advanced issues in faithfulness and correspondence; segmental and suprasegmental processes. Prerequisite(s): course 211. Enrollment restricted to graduate standing or consent of instructor. *R. Mester*

213. Phonology C. S

Third part of a three quarter introduction to phonology. Topics of the sequence include fundamentals of acoustic phonetics; introduction to optimality theory; theories of syllabification, stress, and prosodic organization; prosodic morphology; advanced issues in faithfulness and correspondence; segmental and suprasegmental processes. Prerequisite(s): course 212. Enrollment restricted to graduate standing or consent of instructor. May be repeated for credit. *J. Ito*

216. Phonology Proseminar. *

One or more topics in phonological theory. Topics vary from year to year, covering literature and current research in phonology. Prerequisite(s): course 212. Enrollment restricted to graduate standing or consent of instructor. May be repeated for credit. *The Staff*

219. Phonology Seminar. W

Advanced topics in phonology drawn from the current research interests of the instructor. Prerequisite(s): course 212. Enrollment restricted to graduate standing or consent of instructor. May be repeated for credit. *J. Ito, R. Mester*

221. Syntax A. F

Introduction to syntactic theory. Phrase structure; subcategorization; lexical entries; passive; infinitival constructions. Enrollment restricted to graduate standing or consent of instructor. *S. Chung*

222. Syntax B. W

Continuation of Syntax A. The syntax of unbounded dependencies, including constituent questions, relative clauses, clefts, topicalization. Constraints on extraction; unbounded versus successive cyclic movement; the li-

censing of gaps. Prerequisite(s): course 221. Enrollment restricted to graduate standing or consent of instructor. *J. McCloskey*

223. Syntax C. S

Continuation of Syntax B. The syntax of anaphora. Topics vary from year to year, and may include the following: coreference in antecedent-pronoun relations; reflexives and reciprocals; disjoint reference; bound-variable anaphora; ellipsis; semantic and pragmatic constraints on anaphora. Prerequisite(s): course 222. Enrollment restricted to graduate standing or consent of instructor. *J. Hankamer*

226. Proseminar in Syntax. *

In-depth investigation of some topic in syntactic theory. Topics vary from year to year, covering literature and current research in grammatical structure from varying theoretical perspectives. Prerequisite(s): course 222. *The Staff*

229. Syntax Seminar. W

Advanced topics in syntax drawn from the current research interests of the instructor. Prerequisite(s): course 222. Enrollment restricted to graduate standing or consent of instructor. May be repeated for credit. *J. McCloskey*

231. Semantics A. F

Introduction to linguistic semantics: nature of lexical entries, thematic relations, representation of logical form; relation between semantic interpretation and syntactic representation, quantification and scope relations, reference and presupposition. Enrollment restricted to graduate standing or consent of instructor. *P. Anand*

232. Semantics B. W

Model-theoretic semantics for natural language. Truth-conditional, compositional semantics. Various logical ontologies and their application to natural language categories. Dynamic interpretation of discourse and anaphoric relations. Treatment of illocutionary force. Prerequisite(s): course 231. Enrollment restricted to graduate standing or consent of instructor. *A. Brasoveanu*

233. Semantics C. *

Third and final course in the graduate introduction to semantics, focusing on questions at the border between semantics and pragmatics. Concerns include: modality, conditionals, non-declarative meaning, and context and context structure viewed from a dynamic perspective. Prerequisite(s): course 232. Enrollment restricted to graduate students. *The Staff*

236. Proseminar in Semantics. *

In-depth investigation of some topic in semantics and pragmatics. Topics vary from year to year, covering literature and current research in linguistic semantics and pragmatics. Prerequisite(s): course 231. Enrollment restricted to graduate standing or consent of instructor. *The Staff*

239. Semantics Seminar. F

Advanced topics in semantics drawn from the current research interests of the instructor. Prerequisite(s): course 232. Enrollment restricted to graduate standing or consent of instructor. May be repeated for credit. *D. Farkas*

240. The Pedagogy of Linguistics (1 credit). F,W,S

Provides training for graduate students in university-level pedagogy in general and in the pedagogy of linguistics specifically. Under the supervision of a faculty member, coordinated by a graduate student with substantial experience as a teaching assistant. May be repeated for credit. *The Staff*

245. Computational Models of Discourse and Dialogue. S

Focuses on classic and current theories and research topics in the computational modeling of discourse and dialogue, with applications to human-computer dialogue interac-

tions; dialogue interaction in computer games and interactive story systems; and processing of human-to-human conversational and dialogue-like language such as e-mails. Topics vary depending on the current research of the instructor(s) and the interests of the students. Students read theoretical and technical papers from journals and conference proceedings and present class lectures. A research project is required. (Also offered as Psychology 245. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. May be repeated for credit. *The Staff*

249. Morphology Seminar. *

Presents theoretical and descriptive issues, particularly those raised by the framework of distributed morphology and its current competitors. Course work consists of readings, squibs, and a term paper. Enrollment restricted to graduate students. *The Staff*

257. Psycholinguistics and Linguistic Theory. F

Theory and methods in psycholinguistics, covering perception, production, and acquisition of language and linguistic structure. A hands-on, laboratory-style introduction to the topic, focusing on the relation between experimental findings and linguistic theory. Graduate students have separate evaluation criteria. Students cannot receive credit for this course and course 157. Enrollment restricted to graduate students. *M. Wagers*

258. Advanced Psycholinguistics. *

Advanced topics in psycholinguistics and experimental linguistics. Contemporary memory models. Computational models of comprehension and production. Neurolinguistic findings and methodologies. Student work revolves around an extended research project in which students learn to apply advanced analytical techniques. Graduate students have separate evaluation criteria. Prerequisite(s): course 257. Enrollment restricted to graduate students. *The Staff*

259. Phonetics Seminar. *

Advanced topics in acoustic and articulatory phonetics. Prerequisite(s): course 213. Enrollment restricted to graduate students. *The Staff*

265. Mathematical Foundations of Linguistics. *

A survey of the basic mathematical notions fundamental to the understanding of work in theoretical syntax, semantics, and phonology. Topics covered include basic set theory, formal logic, boolean algebra, graph theory, and formal language theory. Enrollment restricted to graduate standing or consent of instructor. *The Staff*

280. Proseminar in Experimental Linguistics. S

Examines experimental design and analysis for gathering linguistic data; the advantages and disadvantages of major response measures, including reaction times; interaction with extra-grammatical factors; and statistics on categorical and continuous measures. Students present results in research papers. Enrollment restricted to graduate students. *M. Wagers*

290. Research Seminar. W

A research seminar for undergraduate and graduate students to develop the skills of the profession. Critical reading, reviewing, teaching, presentation, and writing. Students submit petition to sponsoring agency. Enrollment restricted to graduate standing or consent of instructor. Enrollment limited to 10. *D. Farkas*

295. Directed Reading. F,W,S

Directed reading which does not involve a term paper. Enrollment restricted to graduate standing or consent of instructor. *The Staff*

296. Linguistics Colloquium (2 credits). F,W,S

Independent graduate-level activities and assignments relating to development of familiarity with professional activities in academic linguistics: organizing and attending colloquia and conferences, both on- and off-campus; participation in discussions at such events; and preparation of commentaries on academic papers and other papers. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Enrollment restricted to graduate standing or consent of instructor. *The Staff*

299. Thesis Research. F,W,S

The Staff

Literature

303 Humanities 1
(831) 459-4778
<http://literature.ucsc.edu/>

Faculty and Professional Interests

Professor

JORGE ALADRO FONT

Spanish mysticism; theory and historical developments of imagery in the Middle Ages to the baroque period; Renaissance and baroque Hispanic literature; Italian ideas in the Spanish Renaissance; Cervantes

GEORGE T. AMIS, Emeritus**KAREN BASSI**

Greek and Latin literatures; gender; literary and cultural theory; pre- and early modern studies; historiography; visual and performance studies

MURRAY BAUMGARTEN

Dickens; Victorian literature and culture; the Bible; translation; modern Jewish writing; the Holocaust

HARRY BERGER, JR., Emeritus**MARGARET R. BROSE, Emerita****JULIANNE BURTON-CARVAJAL, Emerita****CHRISTOPHER CONNERY**

World literature and cultural studies; globalism and geographical thought; the 1960s; Marxism; pre-modern and modern Chinese cultural studies; cultural revolution

NATHANIEL DEUTSCH

Hebrew Bible; rabbinic literature; Jewish mysticism; Hasidism; Eastern European Jewish life; ethnography

ROBERT M. DURLING, Emeritus**JOHN M. ELLIS, Emeritus****CARLA FRECCERO**

Renaissance studies; French and Italian language and literature; early modern studies; postcolonial theories and literature; contemporary feminist theories and politics; queer theory; U.S. popular culture; posthumanism; animal studies

PASCAL GAITET

Nineteenth- and 20th-century French literature; sociolinguistics; political history; Celine; Genet

MARY-KAY GAMEL

Performance studies; ancient Mediterranean performance; Greek and Latin literatures; myth; reception of Greek and Roman texts and artifacts; film; feminist approaches to

literature and performance

SUSAN GILLMAN

Nineteenth-century American literature and culture; theories of culture, race, and gender; world literature and cultural studies

WLAD GODZICH

Theory of literature; philosophy and literature; emergent literature; translation theory; globalization and culture; European integration; knowledge society; literatures of Africa, the Caribbean, Europe (Central, Eastern, and Western), Brazil, Canada; detective and crime fiction; science fiction; medicine and literature

KIRSTEN SILVA GRUESZ

Transnational Americas studies; Chicano/Latino literatures and cultures; 19th-century U.S. and Latin American literature; poetry; history of the book; reading and literacy; bilingualism

MARGO HENDRICKS, Emerita**JOHN O. JORDAN**

Dickens; Victorian literature and culture; the English novel; literature of South Africa; narrative theory

SHARON KINOSHITA

Medieval Mediterranean studies (literary, historical, art historical); the Francophone Middle Ages; empires; postcolonial and globalization theory; Marco Polo; world literature and cultural studies

NORMA KLAHN

Latin American literary and cultural studies (specialization: Mexico); Chicano/Latino literature and culture from a cross-border perspective; modernity/postmodernity; poetics and politics; genre theory (novel, poetry, autobiography); contemporary critical theories (i.e., border, ethnic, feminist, transnational/global)

H. MARSHALL LEICESTER, JR.

Psychoanalysis; poststructuralism; gender theories; theory of cultural change; cultural studies and popular culture: opera, film, American country music

JOHN P. LYNCH, Emeritus**NATHANIEL E. MACKAY**

Twentieth-century American literature; Afro-American literature; creative writing

TYRUS MILLER

Modernist, avant-garde, and postmodernist literature; the interrelations of the arts in the 20th century; aesthetics; cinema and film theory; the Frankfurt School; philosophy and social theory; contemporary poetry and language arts

HELENE MOGLEN, Emerita**MADELINE MOORE, Emerita****MARTA MORELLO-FROSCH, Emerita****DANIEL SELDEN**

Afroasiatic languages and literatures; Greek and Latin; Hellenistic culture; the classical tradition; history of criticism; literary theory

PRISCILLA W. SHAW, Emerita**DEANNA SHEMEK**

Early modern Italian literature and culture; Renaissance feminism; humanism and gender production; letter-writing and epistolary culture; early modern literacy; historical "ideas of the Renaissance;" Renaissance drama; the northern court circles

PAUL N. SKENAZY, Emeritus**GRETA SLOBIN, Emerita****S. PAGE STEGNER, Emeritus****RICHARD TERDIMAN**

Nineteenth- and 20th-century French and European

literature and culture; literary and cultural theory; contemporary critical theory; cultural globalization; digital humanities and digital publication

THOMAS A. VOGLER, Emeritus**MICHAEL J. WARREN, Emeritus****ROB WILSON**

Transnational and postcolonial literatures; especially as located in Asia/Pacific emergences as posited against American empire of globalization; cultural poetics of America; the sublime; Longinus to Hiroshima; mongrel poetics of experimental writing, especially poetry

KAREN TEI YAMASHITA

History and anthropology of Japanese immigration to Brazil; Asian American literature; modern fiction; playwrighting

Associate Professor

VILASHINI COOPAN

Postcolonial studies; comparative and world literature; literatures of slavery and diaspora; globalization studies; cultural theory of race and ethnicity

JODY GREENE

Seventeenth- and 18th-century British and French literature and culture; pre- and early modern studies; critical theory; gay and lesbian cultural studies; gender studies; history of authorship; history of the book; human property

LOURDES MARTÍNEZ-ECHAZÁBAL

Latin American and Caribbean literatures; Afro-Latin American literatures, cultures, and societies; found(n)ational narratives; Brazilian literature; literatures of Cuba and the Cuban diaspora; critical race theory

LOISA NYGAARD

Eighteenth- and early 19th-century German literature; Goethe; Romantic fiction; landscape and landscape aesthetics; xenophobia in Germany

MICAH PERKS

Reading and writing contemporary fiction; memoir; historical fiction; gender, literature, and culture; alternative communities

JUAN POBLETE

Latin(o) American literatures; transnational/global cultures (literature, radio, film); Latin(o) American cultural studies; 19th-century studies; the history of reading practices

Assistant Professor

DORIAN BELL

Nineteenth- and 20th-century French literature and intellectual history; histories of empire and anti-Semitism; literature and science; film studies; digital humanities

A. HUNTER BIVENS

Twentieth- and 21st-century German literature and film; Marxism and critical theory; psychoanalysis; lyric poetry; literary realism; the novel

CHRISTINE HONG

Asian American literature and cultural criticism; African American literature and black freedom studies; Korean diasporic cultural production; Pacific Rim studies; postcolonial theory; critical race theory; human rights discourse; law and literature; narrative theory; film and visual studies

G.S. SAHOTA

Post-colonial studies, Indian literary cultures and intellectual spheres (Urdu, Sanskrit, Punjabi, Hindi, English); religion and modernity (Islam, Hinduism, Sikhism); imperialism and culture; romanticism; Marxism and critical theory; world literature and cultural studies; translation theory/practice

Lecturer

GEORGE P. HITCHCOCK, Emeritus

**Professor**

MICHAEL H. COWAN (American Studies)

American cultural theory and history; history of American studies; symbolic expression in American life; urban cultural studies; American literary studies; studies in the institutional culture of higher education

TERESA DE LAURETIS, Emerita

CHARLES W. HEDRICK JR. (History)

Greek and Roman history; epigraphy; historiography; political theory

AKASHA HULL, Emerita

GARY B. MILES, Emeritus

FORREST G. ROBINSON (Humanities)

Nineteenth- and 20th-century American literature; including Mark Twain; the American West; and popular culture; biography and American culture theory

DAVID SWANGER, Emeritus

Lecturer

ROSWELL SPAFFORD, Emerita

Program Description

The study of literature at UCSC is organized as an interdisciplinary field coordinated through a single Department of Literature, rather than through separate departments of English, modern languages, and classics. This structure fosters innovative and comparative approaches to literature among both faculty and students. Courses in the major encompass traditional literary history and interpretation as well as cross-cultural inquiry and current theoretical debates.

The literature major permits focused work in national literary traditions. Students may concentrate in English-language literatures; in French, German, or Italian; in Latin and/or Greek; or in Spanish/Latin American/Latino literatures. Alternatively, students may organize their studies by historical period. Students who choose pre- and early modern studies focus on early literary traditions from antiquity through the Middle Ages, the Renaissance, and the neo-classical period, while those engaged in modern literary studies concentrate on literature of the 18th, 19th, 20th, and 21st centuries. In addition, the world literature and cultural studies concentration emphasizes non-Western literatures, literature in a global context, as well as non-literary forms of cultural production. Finally, the Literature Department also offers a concentration in creative writing in which, in addition to studying literature, students work with faculty in upper-division workshops to improve their own creative writing skills.

Literature majors at UCSC are trained in critical reading, writing, and thinking, as well as in literary interpretation. These skills have wide applicability: they may lead to careers in other media such as film, theater, video, the visual arts, and electronic media; and they offer avenues into related disciplines such as history, philosophy, psychology, sociology, anthropology, politics, and history of art and visual culture. Literature majors traditionally enter a wide variety of careers ranging from law and journalism to management, government, international studies, publishing, technical writing, and teaching at all levels.

The Literature Department faculty requires that

all literature majors have proficiency in a second language. Proficiency in more than one language enhances understanding of any literature and culture. Graduate programs in literature and other humanities disciplines generally require competence in a language other than English.

Letter Grade Requirement

Letter grades are required for 75 percent of courses applied toward the literature major, including the senior seminar or thesis, which must be taken for a letter grade.

Declaring the Major or Minor

Students must complete Literature 1 or its equivalent prior to declaring the major or minor. Students declare a major or minor in literature by completing and submitting a Proposed Study Plan and Declaration of Major/Minor petition. All students considering a literature major or minor should consult with staff and/or faculty advisers as early as possible and declare the major or minor before the end of their sophomore year. Transfer students are urged to declare the major or minor in the first quarter at UCSC.

Literature Major Options

Students wishing to major in literature may choose either the standard literature major or the intensive literature major. The intensive literature major is recommended particularly for students who plan to continue their studies in graduate school. The requirements for the intensive major include the study of literature in two languages; proficiency in a second language is therefore required.

The Standard Literature Major

The literature major requires: (1) proficiency in a second language; and (2) 12 courses in literature.

- *Language proficiency:* One year (three quarters or equivalent) of college level study of a non-English language or demonstrated reading ability at this level.
- The 12 required courses must include two lower-division and 10 upper-division courses.

Lower-Division Courses

Lower-division courses are introductions to critical reading and writing. Students should complete their lower-division coursework before beginning upper-division work.

Two lower-division courses are required:

- Literature 1, *Literary Interpretation*: close reading and analysis of literary texts
- One Literature 61-series course: categories, methodologies, and problems of literary study, or one Literature 80-series course: topical, thematic, and comparative studies of literary texts

Language proficiency: One year (three quarters or equivalent) of college level study of a non-English language or demonstrated reading ability at this level

Upper-Division Courses

Upper-division courses provide more detailed treatment of literary and theoretical problems, themes, and periods. Students are strongly encouraged to take courses across chronological periods and national boundaries. Students must successfully complete the language proficiency requirement before enrolling in Literature 102.

Ten upper-division courses are required:

- Literature 101, *Theory and Interpretation*: approaches to literary and cultural theories
- Literature 102, *Translation Theory*: approaches to literary and cultural translation, or one upper-division non-English literature course studied in the original language. Students must successfully complete the language proficiency requirement before enrolling in Literature 102
- six upper-division courses in an area of concentration (described below)
- two upper-division electives in literature

Distribution requirements. Among the 10 upper-division courses, at least two must focus on literature written prior to the year 1750; one course must focus on non-Western literature or literature in a global perspective; and one course must focus on poetry. One of the upper-division courses must be a senior seminar, which can be used to satisfy the campus comprehensive (exit) requirement. Some courses fulfill more than one distribution requirement. A list of annual course offerings indicating distribution codes for each course is available in the department office and on the Literature Department web page at <http://literature.ucsc.edu/courses>.

With prior permission from the literature undergraduate program director, one upper-division literature elective may be replaced by an upper-division course related to the student's area of concentration and chosen from another program in the humanities, arts, or social sciences.

The Intensive Literature Major

The Intensive Literature major requires (1) proficiency in a second language, and (2) 14 courses in literature.

- *Language proficiency:* in addition to the Standard Literature major requirement of one-year (three quarters or equivalent) of college-level study of a non-English language, or demonstrated reading ability at this level, students must complete at least two upper-division courses in a second-language literature studied in the original language. In many languages, two years of college-level study (or comparable ability) are needed before a student is prepared to enter an upper-division course. In a few languages (Greek, Latin, Middle Egyptian Hieroglyphs), less time is needed for this purpose.
- The 14 required courses must include two lower-division and 12 upper-division courses.

Lower-Division Courses

The same requirements apply as for the standard literature major. Students who choose the intensive literature major are required to achieve competence in a second-language literature. Upper-division literature coursework requires completion of a lower-division language sequence or the equivalent.

Upper-Division Courses

The intensive major requires 12 upper-division courses. Distribution requirements for the intensive major are the same as those for the standard literature major. In addition, students must complete at least two courses in a second-language literature studied in the original language. As in the standard major, with prior permission from the literature undergraduate program director, one upper-division literature elective may be replaced by an upper-division course related to the student's area of concentration and chosen from another program in the humanities, arts, or social sciences.

The Concentrations

The purpose of the upper-division area of concentration is to help students shape a coherent program of study. The department provides several defined concentrations, described below. For all concentrations except national/transnational literatures, texts may be read in the original or in translation.

National/Transnational Literatures

These concentrations examine literature within the frameworks of particular languages or national and regional traditions. National/transnational concentrations require that texts be read in the original language.

- English-language literatures
The study of American and British literature, as well as literatures of other English-speaking peoples around the world.
- French literature
The study of French and Francophone literatures, languages, and cultural practices of France, Africa, and the Caribbean.
- German literature
The study of the literature, language, and cultural practices of the German-speaking areas of central Europe including Germany, Austria, and Switzerland.
- Greek and Latin literature
The study of the literature, languages, and cultural practices of ancient Greece and Rome. Students may choose to concentrate in Greek or Latin or both.
- Italian literature
The study of Italian literature, language, and cultural practices from the Middle Ages to the present.
- Spanish/Latin American/Latino literatures
The study of literatures, language, and cultural practices of Spain, Latin America, and Latino populations in the United States.

Creative Writing

The Department of Literature offers a sequence of workshops from introductory through advanced levels in both poetry and fiction. Other activities available to interested students include participation in the production of literary journals on campus, attendance at readings by visiting writers, and use of a creative writing reading room.

Admission to this concentration is selective. Interested students are required to take one lower-division creative writing workshop at UCSC before applying to the creative writing concentration; however, students are strongly encouraged to complete two lower-division workshops (at least one at UCSC) before applying.

Students accepted into the concentration must complete three advanced writing workshops and a senior project (e.g., a group of stories, a significant portion of a novel, a collection of poems). To apply for admission to the creative writing concentration, students should submit a completed application form (available at the Literature Department office) and a thoughtful selection from their work (8–10 pages of poetry or fiction). Once accepted into the concentration, students are required to declare (or redeclare) the major in literature. At that time, students should meet with their adviser to discuss plans for a senior project.

Pre- and Early Modern Studies

The interdisciplinary study of literatures and cultures from antiquity through the early eighteenth century,

especially in Europe. This concentration includes the study of popular culture and everyday life as well as readings in masterpieces of classical, medieval, early modern (Renaissance), and neo-classical literature.

Modern Literary Studies

The study of literature of the eighteenth, nineteenth, twentieth, and twenty-first centuries. This concentration examines ways in which modernity in general and literary modernism and postmodernism in particular emerge and develop in different countries and cultures.

World Literature and Cultural Studies

The study of literature and cultural production both within a global context and within specific histories and economies. Courses move beyond the literary text to include nonverbal forms of representation such as social movements and everyday life practices.

Disciplinary Communication (DC)

Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. Literature majors must satisfy the Disciplinary Communication requirement by passing Literature 101.

Comprehensive Requirement

Students must successfully complete Literature 101 before taking any comprehensive requirement. Seniors must select one of the following options to satisfy the campus exit requirement:

- Senior seminar. The senior seminar may be counted as one of the required upper-division courses. The senior seminar need not be in the student's area of concentration. Several senior seminars are offered each quarter; extensive writing is required in all seminars.
- Senior thesis. A student who wishes to propose a senior thesis (30–40 pages) must apply to a Literature Department faculty sponsor at least two quarters before the projected date of graduation. The application must include a proposed subject, a brief outline, a bibliography, and a sample of previous written work. Only those students who have received written permission from a faculty supervisor may complete a thesis to satisfy the senior exit requirement. A student whose application has been approved may receive course credit toward the major for one independent study (course 195) in a literature concentration.

For students in the creative writing concentration, a creative writing project under the supervision of a faculty member (Literature/Creative Writing 194 or 195) is required.

The Literature Minor

The minor in literature requires seven courses. Two lower-division courses are required:

- Literature 1, Literary Interpretation: close reading and analysis of literary texts
 - One Literature 61-series course: categories, methodologies, and problems of literary study, or one Literature 80-series course: topical, thematic, and comparative studies of literary texts
- Five upper-division courses are required:

- Literature 101, Theory and Interpretation
- Four other upper-division literature courses (except Creative Writing)

The Literature minor does not require second-language proficiency or a senior seminar.

General Information

Transfer Credit

A student may petition to receive credit toward the lower-division requirements of the major or minor for up to two courses taken at other institutions. An introduction to literature course may be used to satisfy the Literature 1 course requirement. Any other literature course may be applied toward the Literature 61 or the Literature 80 course requirement.

Transfer students planning to major in literature are urged to complete the equivalent of one year of college-level study of a language other than English before entering UCSC.

Creative Writing Courses

Any qualified student may take creative writing courses for credit toward graduation. Only students accepted into the creative writing concentration, however, may use Literature/Creative Writing 180, 183, 194, and 195 to satisfy major requirements.

Credit For Repeated Courses

Courses that vary significantly in material or methodology from one presentation to the next may be repeated for credit and are so designated in the course description in the UCSC General Catalog.

Advising

Faculty advisers are available in the Literature Department office throughout each academic term; students may make appointments in advance to meet with them. Staff advisers are available by appointment and on a drop-in basis. Students are encouraged to consult with a faculty adviser once a quarter.

Senior Checklist

Three quarters before anticipated graduation, all literature majors must complete a checklist in collaboration with a department adviser. The purpose of the checklist is to confirm progress toward graduation and the satisfaction of all major requirements. Completion and approval of a senior checklist are required for graduation.

Opportunities for Study Abroad

The University of California's Education Abroad Program (EAP) operates study centers in countries throughout the world, all associated with host institutions of high academic standing. EAP serves over 1500 upper-division students from the nine UC campuses every year. Students who participate in a UC Education Abroad Program study year may petition to apply up to three upper-division courses from EAP toward the literature major, or two upper-division courses toward the literature minor.

Latin American and Latino Studies and Literature Combined Major

The departments of Latin American and Latino Studies and Literature offer a combined major. See Latin American and Latino Studies for additional information.

The Graduate Programs

The Doctoral Program

The UCSC doctoral program in Literature offers an innovative multilingual and multidisciplinary approach to literary studies. The program is relatively small; stu-

dents are able to work closely with faculty throughout their graduate careers. They are encouraged to take advantage of the rich array of intellectual and cultural events, research clusters, and lectures offered on campus.

The doctoral program combines critical and independent thought with multilingual training and global perspectives. Students work within and across five areas, each of which cuts across linguistic, national, and period boundaries: technologies of narrative; trans/post/emergent nationalisms; poetics, poetry, and experimental writing; materialism and material culture; and critical theory. In combination they allow students to blend critical approaches, literary traditions, and/or cultural archives in comparative, multilingual, and interdisciplinary projects. Students may elect to participate in cooperative programs between literature and feminist studies, Latin American and Latino studies, or American studies and receive a designated emphasis on their doctoral degree. Applications and requirements are available at the respective department offices.

The program requires significant literary work in two languages. All students are required to complete a minimum of two courses in a second-language literature in which 50 percent or more of the reading is done in the original language. The second literature must serve as a component of the qualifying examination.

The common requirements are:

- Literature 200, *Proseminar*, to be taken in fall quarter of the first year;
- A one-quarter Literature 201, *Pedagogy of Teaching/ Teaching Assistant Training*, to be taken prior to or in conjunction with the first teaching assistant appointment;
- Twelve courses leading to the definition of an area of concentration. At least two of these must be in a second-language literature; at least one must focus on pre-1750 literature and culture. Up to four courses may be taken in other departments; up to three may be independent studies;
- One two-credit advising course, Literature 291F, per quarter;
- Three quarters of supervised teaching experience;
- The Literature Department's intensive three-week Graduate Summer Language Program or equivalent;
- A qualifying examination (with written, oral, and translation components);
- A prospectus outlining and defining the dissertation project;
- A dissertation (written in conjunction with Literature 299, *Thesis Research*).

A master of arts (M.A.) degree is conferred upon request to doctor of philosophy (Ph.D.) candidates who have successfully completed the literature Ph.D. qualifying examination or who have completed the coursework required for the doctorate (teaching assistant training and supervised teaching experience exempted) and written a master's thesis under the supervision of a faculty adviser.

More detailed information for prospective graduate students, including procedures for application and admission to graduate studies, examinations, and requirements for the doctor of philosophy degree, is available from the Division of Graduate Studies (<http://graddiv.usc.edu>) and on the department web site: <http://literature.usc.edu>.

The Master's Program

A separate master of arts degree program is intended for students whose aim is to deepen and expand their literary/critical training and to prepare for entry into a Ph.D. program at another institution. Priority for admission is given to students interested in underrepresented areas of study within the Literature Department's offerings, such as the non-English language literatures and, more broadly, critical theory.

The M.A. program requirements may not be completed in less than one year; the maximum time to obtain a degree is two years.

The common requirements are as follows:

- Literature 200, *Proseminar*, to be taken in fall quarter of the first year;
- Seven courses leading to the definition of an area of concentration. Up to two of these may be taken in other departments. One may be an independent study course;
- One two-credit advising course, Literature 291F, per quarter;
- A thesis (written in conjunction with Literature 299, *Thesis Research*). Typically, a thesis will range in length from 35–50 pages, plus a bibliography.

The Literature Department does not normally provide financial support to students pursuing the M.A. degree; however, teaching assistantships are sometimes available. Admission to the M.A. program does not constitute admission to the Ph.D. program. Students may not automatically transfer from the M.A. program into the Ph.D. program, but must reapply. Further information and application materials are available from the Division of Graduate Studies (<http://graddiv.usc.edu>) and on the department web site (<http://literature.usc.edu>).

Literature

Lower-Division Courses

1. Literary Interpretation. F,S

Close reading and analysis of literary texts, including representative examples of several different genres and periods. An introduction to practical criticism required of all literature majors; should be completed prior to upper-division work in literature. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to first-year students and sophomores, or literature and proposed literature majors and literature minors. (General Education Code(s): TA, IH, W.) *J. Poblete, S. Gillman*

42. Student-Directed Seminar. *

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

61. Introduction to Literary Genres.

61D. Introduction to Reading Drama. *

Introduction to the Western theatrical tradition through the study of dramatic form in social context. (General Education Code(s): IH.) *M. Gamel*

61E. Introduction to Ethnic Literature. *

An introduction to the study of ethnic literatures, addressing issues of voice, political agency, and the construction of subjectivity across racial, ethnic, and cultural boundaries in the U.S. Topic: Slavery and the literary imagination. (General Education Code(s): IH, E.) *The Staff*

61F. Introduction to Reading Fiction. F

Close reading of short stories and some novels with the aim of developing critical methods for the analysis and interpretation of prose fiction. Topics include character, plot, narrative structure, and the poetics of prose. (General Education Code(s): IH.) *S. Foster*

61J. Introduction to Jewish Literature and Culture. *

Surveys 3,000 years of Jewish literature and culture. Themes includes origins of the Jews in the ancient world; formation and persistence of the Jewish diaspora; coherence and diversity of Jewish experience; Jewish narrative and textual traditions; interaction between Jews and other cultures; tensions between tradition and modernity. (General Education Code(s): IH, E.) *M. Baumgarten*

61R. Race in Literature. *

An investigation into the various uses and abuses of "race" in 20th-century fiction. Authors may include Jean Rhys, Paul Bowles, Mark Twain, Russell Banks, Darius James, Joseph Conrad, Nella Larsen, LeRoi Jones/Amiri Baraka, Leslie Marmon Silko, and V.S. Naipaul. (General Education Code(s): ER, IH, E.) *The Staff*

80. Topics in Literature.

80I. Topics in American Popular Culture. *

History of one or more popular cultural genres in written, visual, and/or musical forms and their relation to ongoing public debates. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

80L. The Holocaust: The Destruction of European Jewry. W

Focus is on the destruction of the Jews of Europe by Nazi Germany. Issues are historically grounded, and include works of literature, social sciences, philosophy, and film. (Also offered as History 80W. Students cannot receive credit for both courses.) (General Education Code(s): ER, T4-Humanities and Arts, E.) *M. Baumgarten, P. Kenez*

80N. Latino Expressions in the U.S. F

An introduction to Latino literature and culture in the U.S. A study of the creative expressions of Chicanos/as, Nuyoricans, Cuban Americans, and other Latin Americans in the U.S. (General Education Code(s): ER, T4-Humanities and Arts, E.) *K. Gruesz*

80P. Topics in Latin American Culture. *

Through films, literary texts, historical, sociological, and anthropological writings, explores topics pertaining to Latin American culture and society. Course topic changes; please see the Schedule of Classes for current topic. May be repeated for credit. (General Education Code(s): T4-Humanities and Arts, E.) *L. Martinez-Echazabal*

80V. Literature and History. *

Examines literature's relationship to the past and to the experience of history. Course topic changes; please see the Schedule of Classes for current topic. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

80Z. Introduction to Shakespeare. S

Study of representative plays. No previous experience with Shakespeare is assumed. (General Education Code(s): TA, T4-Humanities and Arts.) *M. Frangos*

99. Tutorial. F,W,S

The Staff

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

*Upper-Division Courses***101. Theory and Interpretation. W,S**

Contemporary approaches to literary and cultural theory, with emphasis on how theoretical perspectives advance and broaden the reading of literary texts. Introduction to important new theoretical developments and their antecedents. Literature majors should complete this course as early as possible. Course topic changes; see the *Schedule of Classes* for current topic. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to literature and proposed literature majors and literature minors. May be repeated for credit. (General Education Code(s): W.) *J. Greene, C. Freccero*

102. Translation Theory. W

Promotes the understanding of translation and its role in redefining meanings across epochs and cultures, in establishing common norms, and in advancing mutual intelligibility; but also providing encounters with absolute alterity. Actual translations are used as case studies. One year of college-level, non-English language study or the equivalent reading ability in a non-English language required. (General Education Code(s): TA.) *W. Godzich*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Creative Writing*Lower-Division Courses***10. Introduction to Creative Writing. F,W,S**

Introduction to the crafts and techniques of poetry, fiction, and creative non-fiction, identifying and exploring traditional and non-traditional literary forms and genres while working on individual creative writing projects. An author reading and two workshop sections per week. Prerequisite: satisfaction of the Entry Level Writing requirement. Enrollment restricted to first-year students, sophomores, and juniors. May be repeated for credit. (General Education Code(s): PR-C, A.) *The Staff*

52. Intermediate Fiction Writing. F,W,S

An intermediate-level course in fiction designed for prospective creative writing majors. Prerequisite(s): submission of writing at first class meeting. May be repeated for credit. (General Education Code(s): PR-C, A.) *M. Sanders-Self, M. Perks, K. Yamashita*

53. Intermediate Poetry Writing. F,W,S

An intermediate-level course in poetry designed for prospective creative writing majors. Prerequisite(s): submission of writing at first class meeting. May be repeated for credit. (General Education Code(s): PR-C, A.) (F) *G. Young, (WS) S. Foster*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

*Upper-Division Courses***170. Methods and Materials. W**

Focuses on a particular process or subject used in the production of a literary text. Course is intended to work as a bridge between invention and scholarship. Course topic changes; please see the *Schedule of Classes* for current topic. Enrollment restricted to creative writing literature majors. May be repeated for credit. (General Education Code(s): A.) *S. Foster*

180. Advanced Writing: Fiction. F,W,S

Intensive work in writing fiction. Satisfies the Creative Writing Literature concentration. Enrollment restricted to creative writing literature majors or by permission of

instructor. May be repeated for credit. (General Education Code(s): A.) (W) *M. Perks, (FS) K. Yamashita*

183. Advanced Writing: Poetry. F,W,S

Intensive work in writing poetry. Satisfies the Creative Writing Literature concentration. Enrollment restricted to creative writing literature majors or by permission of instructor. May be repeated for credit. (General Education Code(s): A.) *R. Wilson, G. Young, S. Foster*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) *The Staff*

194. Creative Project Seminar.

Seminar for students beginning work on their creative writing senior project. Led by a faculty member, the seminar helps prepare each student to complete the project. Attention is given to focusing of creative topics, review of work in progress, work rhythms, and revision. *The Staff*

194A. Poetry. S

Satisfies the Creative Writing Literature concentration. Prerequisite(s): Literature 101. Enrollment restricted to senior creative writing literature majors. *G. Young*

194B. Fiction. S

Satisfies the Creative Writing Literature concentration. Prerequisite(s): Literature 101. Enrollment restricted to senior creative writing literature majors. *M. Perks*

195. Senior Essay. F,W,S

Prerequisite(s): Literature 101. Students submit petition to sponsoring agency. *The Staff*

198. Group Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

English-Language Literatures*Upper-Division Courses***102. Canons.****102A. The Traditional British Canon, Part I. S**

The constitution of the "canon" of English literature from Chaucer to Cowper. Satisfies the English and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. (General Education Code(s): TA.) *M. Frangos*

102D. The Traditional U.S. Canon, 1900 to the Present. F

Major works from 1900 to the present, with attention to their social and cultural context. Satisfies the English and Modern Literature concentrations. *The Staff*

103. Periods and Movements.**103A. British Literature and Culture to 1740. F**

Literature and society to 1740. Satisfies the English and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern Studies distribution requirement. May be repeated for credit. (General Education Code(s): TA.) *M. Frangos*

103J. Contemporary American Literature. *

A selective examination of major writings since WWII, with attention to both literary issues and historical context. Satisfies the English and Modern Literature

concentrations. May be repeated for credit. *The Staff*

110. Prose.**110A. Studies in the English Novel. W**

From the 18th to the 20th century. Texts include work by Fielding, Austen, Brontë, Dickens, Conrad, and Woolf. Satisfies the English and Modern Literature concentrations. (General Education Code(s): TA.) *J. Jordan*

110C. The 19th-Century English Novel. *

The 19th-century novel: Austen to Brontë. Satisfies the English and Modern Literature concentrations. *J. Jordan*

110F. Nineteenth-Century American Fiction. *

Examination of selected fiction written between the end of the 18th century and the Civil War, with attention to historical and cultural as well as literary issues. Satisfies the English and Modern Literary Studies concentrations. *K. Gruesz*

110I. American Prose: Modern and Contemporary Non-Fiction. *

Explores the strands and streams of creative non-fiction in postwar American literature. Topics range from the "non-fiction novel" and "the New Journalism," to experiments in autobiography, media, art, and cultural criticism that make up the world of publishing today. Satisfies the English and Modern Literary Studies concentrations. *The Staff*

120. Poetry.**120E. Modern British Poetry. ***

A survey of selected British poets from the late 19th century through the present. Satisfies the English, and Modern Literature concentrations; also satisfies the Poetry distribution requirement. (General Education Code(s): TA.) *T. Miller*

120H. Beat Literature and the World. W

Explores the sources and context of Beat writing, emphasizing the Beats' intense interest in and engagement with the world at large. Includes works by major and minor Beat writers. Satisfies the English and Modern Literary Studies concentration; also satisfies the Poetry distribution requirement. (General Education Code(s): TA.) *R. Wilson*

130. Drama.**130B. English Drama: 1576–1642. ***

Study of representative plays. Course topic changes; please see the *Schedule of Classes* for current topic. Satisfies the English and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern distribution requirement. *The Staff*

140. Visual Media/Popular Culture.**140C. The Films of John Carpenter. ***

Study of development and central themes of preeminent genre director of the "post-Hollywood" era, concentrating on central core of major works in horror/science fiction genres from *Halloween* to *In the Mouth of Madness*, with attention to the comedies and action films. Satisfies the English and Modern Literature concentrations. *H. Leicester*

140I. British Film. F

Films are considered both as texts in their own right and as expressions and contributions to larger social discourses around the specific tensions of British society and culture. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the English and Modern Literature concentrations. May be

repeated for credit. (General Education Code(s): IM.)
H. Leicester

150. Ethnic Writing.

150A. Afro-American Literature. *

Examination of major Afro-American writing of the past 150 years, with attention to the historical, cultural, and general literary context out of which it emerged and upon which it commented. Satisfies the English and Modern Literature concentrations. (General Education Code(s): ER, E.) *The Staff*

150C. Asian American Literature. *

Examination of Asian American literary works (fiction, poetry, dramatic essays) in the context of the historical presence of Asian Americans in the United States from the 1850s. Emphasis on comparison of select works from ethnic Asian writings. Satisfies the English and Modern Literature concentrations. (General Education Code(s): E.) *K. Yamashita*

155. Regional Writing.

155B. Regions in American Literature. *

Examines development of regional writing in the U.S. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the English and Modern Literature concentrations. May be repeated for credit. *The Staff*

155D. Studies in South African Literature. S

A survey of writing from South Africa since 1948, focusing on social and political themes. Authors include Paton, Gordimer, Mphahlele, Fugard, Ndebele, Head, Brutus, Coetzee, and others. Satisfies the English, Modern, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): ER, E.) *J. Jordan*

160. Transnational Writing.

160E. Caribbean Literature. *

A study of major writing from the English-speaking Caribbean, with attention to the historical and cultural context out of which it arises and to which it responds. Satisfies the English, and Modern and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): E.) *The Staff*

160F. Contemporary Transnational Literatures. *

Examines contemporary cultural production, including literature, music, and film, with close attention to social and political issues. Course topic changes; please see the *Schedule of Classes* for current topic. Satisfies the English, Modern, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): CC.) *The Staff*

170. Individual Authors.

170A. Geoffrey Chaucer. W

Close study of Chaucer's poetry, with some attention to relevant cultural, philosophical, and historical issues in the context of the late medieval period. Particular emphasis on *The Canterbury Tales*. Satisfies the English and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. (General Education Code(s): TA.) *H. Leicester*

170C. William Shakespeare. W

Satisfies the English and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern distribution requirement. May be re-

peated for credit. (General Education Code(s): TA.)
M. Frangos

170D. John Milton. *

Selected poetry and prose. Satisfies the English and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. *H. Leicester*

170F. Charles Dickens. *

Study of representative work by Charles Dickens. Satisfies the English and Modern Literary Studies concentrations. May be repeated for credit. *J. Jordan*

180. Topics.

180B. The Gothic Imagination in Fiction, Film, and Theory. W

Readings include theoretical essays by Freud and Lacan and such fictions as *The Monk*, *Frankenstein*, *Dracula*, *Maus*, *The Yellow Wallpaper*, and *Beloved*. Films change each year, but may include *Alien* and *Blue Velvet*. Satisfies the English and Modern Literature concentrations. May be repeated for credit. (General Education Code(s): TA.) *H. Moglen*

180D. Twain, Slavery, and the Literary Imagination. *

Using Mark Twain's later writings and other literary/non-literary materials, explores responses to popular and legal discourse on "blood," race, sex, resurgence of racism, and imperialism. Satisfies the English and Modern Literature concentrations. (General Education Code(s): ER.) *S. Gillman*

180H. Women's Literature. F

Works by women from the 18th century to the present, with special attention to the relationship of literature to history, psychology, and aesthetics. Course topic changes; please see the *Schedule of Classes* for the current topic. Satisfies the English and Modern Literature concentrations. May be repeated for credit. (General Education Code(s): TA.) *C. Lupo*

180K. War in Contemporary American Culture. F

Considers the treatment of war in American literature since World War II. Close attention paid to both literary form and relevant historical context. Also provides perspectives on, and critical tools for thinking about, contemporary armed conflict. Course topic changes; please see the *Schedule of Classes* for the current topic. Satisfies the English and Modern Literature concentrations. (Formerly *War and 20th-Century American Culture*.) (General Education Code(s): TA.) *S. Carter*

190. Senior Seminars.

190A. Individual Authors. W

Intensive examination of works by individual authors. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the English Literature concentration; also satisfies the Senior Seminar distribution requirement. Prerequisite(s): Literature 101. Enrollment restricted to senior literature majors. May be repeated for credit. *H. Leicester*

190C. Studies in 19th-Century British Literature. *

Study of selected authors or issues in 19th-century British literature. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the English and Modern Literature concentrations; also satisfies the Senior Seminar distribution requirement. Prerequisite(s): Literature 101. Enrollment restricted

to senior literature majors. May be repeated for credit.
J. Jordan

190D. New World Poetics. *

A study of a number of poets from the United States, Latin America, and the Caribbean, with particular attention to the ways in which the New World locale occasions a call to reorder society, perception, history, and poetic practice. Satisfies the English and Modern Literature concentrations; also satisfies the Poetry and Senior Seminar distribution requirements. Prerequisite(s): Literature 101. Enrollment restricted to senior literature majors. (General Education Code(s): E.) *The Staff*

190G. Black Pulp Fiction. *

Investigates the ways black writers in the 20th century have exploited and transformed genre fiction. Authors include George Schuyler, Octavia Butler, Samuel Delany, Steven Barnes, Jewelle Taylor Gomez, Rudolph Fisher, Chester Himes, Barbara Neely, Victor Headley, and others. Satisfies the English and Modern Literature concentrations; also satisfies the Senior Seminar distribution requirement. Prerequisite(s): Literature 101. Enrollment restricted to senior literature majors. (General Education Code(s): E.) *The Staff*

190K. Studies in Poetry. *

Studies in English-language poetry. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the English and Modern concentrations; also satisfies the poetry and senior seminar distribution requirements. Prerequisite(s): Literature 101. Enrollment restricted to senior literature majors. *The Staff*

190L. Studies in English Language Literature. W

Studies of selected authors or issues in English language literature. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the English and Modern Literature concentrations; also satisfies the senior seminar distribution requirement. Prerequisite(s): Literature 101. Enrollment restricted to senior Literature majors. *V. Cooppan*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. Students submit petition to sponsoring agency. *The Staff*

195. Senior Essay. F,W,S

Students submit petition to sponsoring agency. Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

French Literature

Upper-Division Courses

131. The Middle Ages. F

Speaking, reading, and writing proficiency in French required. Study of 12th- and 13th-century texts, with attention to problems of history and social change. In modern translations with selected readings in Old French or Provençal. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the French and Pre- and Early

Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. Taught in conjunction with course 230. May be repeated for credit. *S. Kinoshita*

135. Author and Culture. *

Speaking, reading, and writing proficiency in French required. Designed to provide an in-depth study of a given author's literary oeuvre and its cultural context. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the French and Modern Literature concentrations. May be repeated for credit. *The Staff*

141. Studies in Narrative. *

Speaking, reading, and writing proficiency in French required. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the French and Modern Literary Studies concentrations. May be repeated for credit. *The Staff*

152. Texts and Contexts. W,S

Speaking, reading, and writing proficiency in French required. Examines implications of social and political change in terms of literary theory and practice. Places equal emphasis on literary and other kinds of cultural texts: historical, political, and cinematic. Spring course taught in conjunction with course 230. Satisfies the French and Modern Literature concentrations. May be repeated for credit. *D. Bell, C. Freccero*

195. Senior Essay. F,W,S

Speaking, reading, and writing proficiency in French required. Prerequisite(s): Literature 101. Students submit petition to sponsoring agency. *The Staff*

198. Group Tutorial. F,W,S

Speaking, reading, and writing proficiency in French required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Speaking, reading, and writing proficiency in French required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Speaking, reading, and writing proficiency in French required. Students submit petition to sponsoring agency. *The Staff*

German Literature

Upper-Division Courses

102. Introduction to German Literature. F

Speaking, reading, and writing proficiency in German required. Wide reading of works representing the major authors, periods, and genres of German literature. Satisfies the German and Modern Literature concentrations. *L. Nygaard*

120. Fear of the Foreign: Xenophobia in German Literature and Culture. *

Speaking, reading, and writing proficiency in German required. Considers recent violence against immigrants and asylum-seekers in Germany, and moves on to examine images of people perceived as "foreign" or alien in German literature and culture from early times to the present. Satisfies the German and Modern Literature concentrations. *L. Nygaard*

150. German Romanticism. W,S

Speaking, reading, and writing proficiency in German required. A study of the emergence and development of German Romanticism. Central concerns are the Romantics' attitude toward the role of the imagination in literature and their attempts to revitalize myth and folklore in their works. Authors read include Tieck, Novalis, Hoffmann,

Eichendorff, and Heine. Satisfies the German and Modern Literature concentrations. *L. Nygaard*

159. German Comedy. *

Speaking, reading, and writing proficiency in German required. A study of a series of comic works by authors writing in German. In addition to discussing the texts in depth, we also look at theories of humor and laughter developed by thinkers such as Freud, Schopenhauer, and Bergson. Satisfies the German and Modern concentrations. *The Staff*

162. Modern German Lyric Poetry. *

Speaking, reading, and writing proficiency in German required. Intensive analysis of selected poems is complemented by broader reading in certain authors and periods. Satisfies the German and Modern Literary Studies concentrations; also satisfies the Poetry distribution requirement. *A. Bivens*

166. Contemporary German Literature and Film. W,S

Speaking, reading, and writing proficiency in German required. A survey of contemporary German culture in the context of the current debate on postmodernism and the avant-garde. Course topic changes; please see the *Schedule of Classes* for current topic. Satisfies the German and Modern Literature concentrations. May be repeated for credit. *A. Bivens*

195. Senior Essay. F,W,S

Speaking, reading, and writing proficiency in German required. Prerequisite: Literature 101. *The Staff*

198. Group Tutorial. F,W,S

Speaking, reading, and writing proficiency in German required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Speaking, reading, and writing proficiency in German required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Greek Literature

Upper-Division Courses

100. Introduction to Greek Literature. S

Reading proficiency in Ancient Greek required. Satisfies the Greek and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern distribution requirement. May be repeated for credit. (General Education Code(s): IH.) *K. Bassi*

102. Greek Poetry. W

Reading proficiency in Ancient Greek required. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Greek and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. May be repeated for credit. *K. Bassi*

103. Greek Drama. *

Reading proficiency in Ancient Greek required. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Greek and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern Studies distribution requirement. May be repeated for credit. *M. Gamel*

104. Prose Authors. F

Reading proficiency in Ancient Greek required. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Greek and Pre- and Early Modern Literature concentrations; also satisfies the Pre- and Early Modern

distribution requirement. May be repeated for credit. *J. Lynn*

193. Field Study. F,W,S

Provides for an individual program of study sponsored by a faculty member and carried on off campus. May be taken concurrently or consecutively for up to three courses of credit. Designed for upper-division students, with proposal supported by a faculty member willing to supervise, and approval of the chair of the Literature Department. Students submit petition to sponsoring agency. *The Staff*

195. Senior Thesis. F,W,S

Reading proficiency in Ancient Greek required. Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

Reading proficiency in Ancient Greek required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Reading proficiency in Ancient Greek required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Reading proficiency in Ancient Greek required. Students submit petition to sponsoring agency. *The Staff*

Italian Literature

Upper-Division Courses

102. Italian Literary Genres. F

Close readings of a small number of texts representing major authors, periods, and genres (lyric, dramatic, narrative) of Italian literature. Intensive practice in spoken and written Italian. Satisfies the Italian and Modern Literature concentrations. (Formerly *Introduction to Italian Literature*.) May be repeated for credit. *D. Shemek*

130. Author and Contexts.

Designed to give an in-depth study of a given author's literary production and its cultural context.

130B. Boccaccio. *

Speaking, reading, and writing proficiency in Italian required. Critical study of *The Decameron*. Satisfies the Italian and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. *D. Shemek*

130D. Dante's Divine Comedy. W

Speaking, reading, and writing proficiency in Italian required. Reading of the *Inferno*, the *Purgatorio*, and selected canti of the *Paradiso*, along with selections from Dante's lyrics and from medieval Italian and French poetry. Taught in conjunction with LTPR 183. Satisfies the Italian and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. *M. Brose*

165. Studies in Italian Literature and Culture. *

Speaking, reading, and writing proficiency in Italian required. In-depth examination of a topic in Italian literary and cultural studies. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Italian and Modern Literary Studies concentrations. May be repeated for credit. *D. Shemek*

180. Women in Italy: Nineteenth and Twentieth Centuries. *

Speaking, reading, and writing proficiency in Italian required. Explores the specificity of Italian women's writing and studies their literary activities in historical and social context. Readings include Italian feminist and some his-

tory as well as literary texts. Periods and readings may vary from year to year. Satisfies the Italian and Modern Literature concentrations. *D. Shemek*

195. Senior Thesis. F,W,S

Speaking, reading, and writing proficiency in Italian required. Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

Speaking, reading, and writing proficiency in Italian required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Speaking, reading, and writing proficiency in Italian required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Latin Literature

Upper-Division Courses

100. Introduction to Latin Literature. S

Reading proficiency in Latin required. Satisfies the Latin and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern distribution requirements. May be repeated for credit. (General Education Code(s): IH.) *M. Gamel*

102. Roman Poetry. F,W

Reading proficiency in Latin required. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Latin and Pre- and Early Modern Studies Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. May be repeated for credit. *C. Hedrick, D. Selden*

103. Prose Authors. S

Reading proficiency in Latin required. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Latin and Pre- and Early Modern Studies Literature concentrations; also satisfies the Pre- and Early Modern distribution requirement. May be repeated for credit. *J. Lynn*

193. Field Study. F,W,S

Provides for an individual program of study sponsored by a faculty member and carried on off campus. May be taken concurrently or consecutively for up to three courses of credit. Designed for upper-division students, with proposal supported by a faculty member willing to supervise, and approval of the chair of the Literature Department. Students submit petition to sponsoring agency. *The Staff*

195. Senior Thesis. F,W,S

Reading proficiency in Latin required. Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

Reading proficiency in Latin required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Reading proficiency in Latin required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Reading proficiency in Latin required. Students submit petition to sponsoring agency. *The Staff*

Modern Literary Studies

Upper-Division Courses

103. Constructions of the Modern. S

Definitions of the "modern" (after 1750) are developed within historically and culturally specific contexts. Satisfies the Modern and Critical Theory Literature concentrations. (General Education Code(s): TA.) *R. Terdiman*

124. The European Novel.

124A. Eighteenth Century to Modernism. S

Major works of European fiction in their social, cultural, and intellectual contexts. Emphasizes the 19th- and 20th-century novels. Works are read in translation. Satisfies the Modern Literature concentration. (General Education Code(s): TA.) *R. Terdiman*

144. Modern Jewish Cultures.

Modernity transformed Jewish culture: we will explore the ways in which changed social, political, and economic conditions produced new gender roles; professional, personal, communal, and cultural experiences; and generated powerful fictions, autobiographies, films and poems. Among the writers we will read are Isaac Bashevis Singer, Rebecca Goldstein, Saul Bellow, Martin Buber, Hannah Arendt, and S.Y. Agnon.

144A. Jewish Diaspora, Ethnicity, and Urban Life. *

Focuses on modern Jewish diaspora, ethnicity, and urban life. Satisfies the Modern Literature concentration. (General Education Code(s): E.) *B. Thompson*

144B. Modernity as Jewish Challenge and Catastrophe: The American Experience. F

Examines modernity as Jewish challenge and catastrophe, and focuses on the American experience. Satisfies the English and Modern Literature concentrations. (General Education Code(s): ER, E.) *B. Thompson*

144D. Jewish Writers and the American City. S

An examination of some major Jewish writers and their responses to the American city. Major writers: Henry Roth, Saul Bellow, Bernard Malamud, J. Kaplan, Philip Roth. A look at Yiddish and other minority writers, and including sociological and historical materials on the American city. Satisfies the English and Modern concentrations. (General Education Code(s): E.) *B. Thompson*

144E. Hebrew Poetry. *

Hebrew poetry—Biblical, medieval, modern—explores cultural and literary issues central to our contemporary world. Texts and discussion focus on Jewish and Israeli literary traditions. Satisfies the Modern Literature concentration; also satisfies the Poetry distribution requirement. May be repeated for credit. (General Education Code(s): CC.) *M. Baumgarten*

144G. Global Jewish Writing. *

Comparative analysis of modern Jewish writers from Western and non-Western diasporas. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): E.) *M. Baumgarten*

144H. Jewish Writers and the European City. S

Interrogates the master narrative of a specific European city and discusses the ways in which Jewish life and Jewish actions helped to shape that story and were shaped by it. Satisfies the Modern Literary

Studies concentration. May be repeated for credit. *M. Baumgarten*

144J. Jewish Travel Narratives. W

Exploration of the idea of the Diaspora as a "moving" condition, and of the multi-dimensional character of global Jewish culture, covering authors who traveled across the Jewish world from medieval times to the present. Satisfies the Modern Literary studies and Pre- and Early Modern Studies Literature concentration; also satisfies the Pre- and Early Modern distribution requirement. *The Staff*

145. Special Topics in Modern Literature.

145B. Modern Literature. S

Study of 19th- and/or 20th-century literature, with attention to its literary and historical context. Course topic changes; please see the *Schedule of Classes* for current topic. Satisfies the Modern Literary Studies concentration. May be repeated for credit. (General Education Code(s): TA.) *W. Godzich*

145H. Detective Fiction. *

Representative works of 19th- and 20th-century detective fiction, including works by Poe, Conan Doyle, Christie, Sayers, Hammett, Chandler, P.D. James, Paretsky, and others. Satisfies the English and Modern Literary Studies concentrations. *J. Jordan*

145I. The Historical Novel. *

Traces major developments in the historical novel, looking at how this popular genre has taken up a series of different forms, concerns, and questions about history and the different senses of historicity that fiction can express. Satisfies the English and Modern Literature concentrations. *The Staff*

155. Russian Literature in Translation.

155B. Russian Literature in Revolution. F

Survey of 20th-century Soviet literature, from the revolution to the death of Stalin. Readings include modernist and avant-garde texts of the 1920s and socialist realism. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. (Formerly *Soviet Literature*.) (General Education Code(s): CC.) *W. Nickell*

155F. Women in Russian Literature. *

Survey of women's writing and representations of women in Russian and Slavic literature from the medieval folk tale through the contemporary period. Topics include Baba Yaga tales, woman as subject in 19th-century literature, Soviet memoir literature, and evolution of the persona of the female author. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. *W. Nickell*

155I. The Literatures of Russian and African-American Soul. *

Views the literatures of slavery and emancipation in relation to cultural paradigms of soul, virtue, and "élan vital," with particular attention to the ways that Russian peasant and African-American cultures have been mined as sources of purity and vitality. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. *W. Nickell*

155J. Soviet Everyday Life. S

Examines the theories, realities, and representations of everyday Soviet life, beginning with the utopian designs of the 1920s and concluding with the dystopian, postmodern iterations of the 1980s and 1990s. Satisfies the Modern and World Literature concentra-

tions; also satisfies the Global distribution requirement. (General Education Code(s): CC.) *W. Nickell*

160B. French Women Writers. *

Offers an introduction to the work and thought of three 20th-century French women writers: Simone de Beauvoir, Marguerite Duras, and Monique Wittig. Satisfies the Modern Literary Studies concentration. *The Staff*

167. German Authors in Translation.

167K. Kafka in Translation. *

An intensive study of the works of Franz Kafka, with reference to the literary, social, and historical context in which his work emerged. Course topic changes; please see the *Schedule of Classes* for current topic. Satisfies the Modern Literature requirement. May be repeated for credit. (General Education Code(s): TA.) *A. Bivens*

168. German Literature in Translation.

168D. Germany in War and Peace. *

Study of selected texts reflecting German society at war or in that ambiguous state called "peace." Attention is given to the place of literature in German cultural life and its special role in the formation of national identity. Satisfies the Modern Literature concentration. *L. Nygaard*

187. Modern Literature. W

Students may count any combination of 2-credit or 3-credit literature courses, together totaling at least 5 credits, toward satisfaction of the literature major requirements.

187E. Heidegger and Poetry (2 credits). W

Focuses on reading and discussion of Martin Heidegger's major texts on poetry. *W. Godzich*

190. Senior Seminar.

Seminar offered to literature majors as a way to satisfy the senior exit requirement. Offered at different times by different instructors, focus is on topics of interest in modern literary studies. All students are required to complete an essay of significant length as part of the seminar coursework. Prerequisite: Literature 101. May be repeated for credit.

190N. Topics in Modern Literary Studies. F,W,S

Selected authors or issues in modern literary and cultural studies. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Modern Literature concentration; also satisfies the Senior Seminar distribution requirement. Enrollment restricted to senior literature majors. May be repeated for credit. (F) *M. Baumgarten*, (F) *A. Bivens*, (W) *L. Nygaard*, (S) *J. Jordan*, (S) *D. Bell*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) *The Staff*

195. Senior Essay. F,W,S

Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Pre- and Early Modern Literature

Upper-Division Courses

102. Ancient Literature in Cross-Cultural Perspective. W

Comparative approaches to the study of ancient literature and cultures. Topic changes; see the *Schedule of Classes* for current topic. Satisfies the Pre- and Early Modern and World Literature concentrations; also satisfies the Global and Pre- and Early Modern distribution requirement. May be repeated for credit. (General Education Code(s): CC.) *G. Hamel*

107A. Reading Egyptian Hieroglyphs, Part 1. W

Introduction to Egyptian hieroglyphs as a graphic, conceptual, and communicative system. Covers the basic elements of classical Egyptian grammar, drawing primarily on inscriptions from extant Egyptian monuments. Students read one prose and one poetical text from the Middle Kingdom. Satisfies the Pre- and Early Modern Studies and World Literature concentrations; also satisfies the Global and Pre- and Early Modern distribution requirements. Strongly recommended: two years previous study of a foreign language at the college level or the equivalent. (General Education Code(s): CC.) *D. Selden*

107B. Reading Egyptian Hieroglyphs, Part 2. S

Advanced Middle Egyptian grammar (2 weeks). Close reading of the Tale of Sinuhe in Egyptian, selected hymns and love poetry from the New Kingdom. Satisfies the Pre- and Early Modern Studies and World Literature concentrations; also satisfies the Global, Pre- and Early Modern, and Poetry distribution requirements. Together, Egyptian Hieroglyphs 1 and 2 fulfill the language requirements for the intensive major. Prerequisite(s): course 107A or permission of instructor. (General Education Code(s): CC.) *D. Selden*

111. Monsters, Barbarians, and Women: Topics in Ancient Ethnography. *

Focus is on the construction of race and gender in ancient Greek culture. Literary, historical, philosophical, dramatic, and medical texts (Homer, Hesiod, Herodotus, Euripides, Hippocrates, Plato, Aristotle) as well as visual media (vase painting, sculpture) are studied. *J. Lynn*

113. Power, Pleasure, and Danger in Ancient Athens. *

Works by Aeschylus, Sophocles, Euripides, Thucydides, and Plato will be read as products of their own time and culture, as sources of Western artistic, intellectual, and moral traditions, and as works still meaningful today. Topics include heroism, relationships between thought and action, conflicts between the individual and society, the nature of divinity and its relationship to human beings. Satisfies the Pre- and Early Modern Studies concentration; also satisfies the Pre- and Early Modern Studies distribution requirement. *J. Lynn*

137. Modern Ancient Drama. S

The study of 20th- and 21st-century productions and adaptations of ancient Greek drama in theater, dance, music, and film, including Stravinsky, Graham, Pasolini, Breuer, and von Trier, discussing artists' goals, the sociopolitical context, ideas of authenticity, and audience response. Satisfies the Pre- and Early Modern Studies Literature concentration; also satisfies the Pre- and Early Modern distribution requirement. (General Education Code(s): IM.) *M. Gamel*

144. Pre- and Early Modern Jewish Cultures.

144B. Hebrew Bible. *

Introduction to textual, source, redaction, historical, and literary criticism of individual books of the Hebrew Bible and to exegesis as science and ideology. Covers texts and iconography of neighboring mythological traditions (Mesopotamian, Ugaritic, Egyptian, Greek) when appropriate. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Pre- and Early Modern Studies Literature concentration; also satisfies the Pre- and Early Modern distribution requirement. May be repeated for credit. *N. Deutsch*

148. The Beloved in Medieval Poetry. *

The figure of the Beloved is a medieval invention. Course traces its development from the Mozarabic Jarchas to Petrarch, and includes Provençal Troubadours, German Minnesaenger, French Trouveres, the Spanish "Libro de Buen Amor," and "The Romance of the Rose." Satisfies the Pre- and Early Modern Literature concentrations; also satisfies the Poetry and Pre- and Early Modern distribution requirements. *W. Godzich*

151. Aesthetics of Astonishment. *

Traces an aesthetics of astonishment that runs from antiquity to the early modern period, with special attention to the pre-Enlightenment discourse of the sublime. Readings in Plato, Aristotle, Longinus, Sidney, Erasmus, Spenser, Shakespeare, and Milton. Satisfies the Pre- and Early Modern Studies concentration; also satisfies the Pre- and Early Modern Studies distribution requirement. *The Staff*

152. Continental Renaissance. *

Introductory survey of great prose writings of the continental Renaissance in their cultural and historical contexts. Authors include: Machiavelli, Castiglione, Erasmus, Rabelais, Montaigne, and Cervantes. Satisfies the Pre- and Early Modern Studies concentration; also satisfies the Pre- and Early Modern Studies distribution requirement. *The Staff*

167. Spanish Literature in Translation.

An introduction to great works of Spanish literature from various genres that provide a profound and enduring experience of Hispanic life transfigured by the literary artist into what may be interpreted as formal and exemplary perfection. *The Staff*

167B. Spanish Golden Age Theater. *

Analyzes theater during the Golden Age (16th and 17th centuries) of Spanish literature, when the theater was a "democratic" meeting point and a social barometer. The popularity of playwrights such as Lope de Vega and Calderón de la Barca is comparable to the stars of Hollywood of today. Satisfies the Pre- and Early Modern Studies concentration; also satisfies the Pre- and Early Modern distribution requirement. *J. Aladro Font*

167C. Don Quixote de la Mancha. F

A close study of Books I and II of the Cervantes novel together with an examination of some of the criticism on this work written in English throughout the centuries. Satisfies the Pre- and Early Modern Literature concentration; also satisfies the Pre- and Early Modern distribution requirement. (General Education Code(s): CC.) *J. Aladro Font*

177. Discourses in Early Modern Cultures.

177A. "Race" in Early Modern Cultures. *

Examines the literary, linguistic, visual, scientific, and theological histories of the modern notion of race. Course topic changes; see the *Schedule of Classes* for

current topic. Satisfies the Pre- and Early Modern Studies Literature concentration; also satisfies the Pre- and Early Modern distribution requirement. *The Staff*

183. Dante's *Divine Comedy*. W

Reading of the Inferno, the Purgatorio, and selected canti of the Paradiso, along with selections from Dante's lyrics and from medieval Italian and French poetry. Satisfies the Pre- and Early Modern Literature concentration; also satisfies the Poetry and Pre- and Early Modern distribution requirements. (General Education Code(s): TA.) *M. Brose*

190. Senior Seminar.

Seminar offered to literature majors as a way to satisfy the senior exit requirement. Offered at different times by different instructors, focus is on topics of interest in pre- and early modern studies. All students are required to complete an essay of significant length as part of the seminar coursework. Prerequisite: Literature 101. May be repeated for credit.

190P. Topics in Pre- and Early Modern Studies. W

Examination of individual authors or critical problems in ancient, medieval, or early modern/Renaissance literature. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Pre- and Early Modern Literature concentration; also satisfies the Pre- and Early Modern and Senior Seminar distribution requirements. Prerequisite(s): Literature 101. Enrollment restricted to senior literature majors. May be repeated for credit. *M. Frangos*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) *The Staff*

195. Senior Essay. F,W,S

Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Russian Literature

Upper-Division Courses

199. Tutorial. F,W,S

Speaking, reading, and writing proficiency in Russian required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Speaking, reading, and writing proficiency in Russian required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Spanish/Latin American/Latino Literature

Lower-Division Courses

60. Introduction to Literary Genres. W

Speaking, reading, and writing proficiency in Spanish required. The study of poetry, drama, and prose in Spain and Latin America. (General Education Code(s): TA, IH, E.) *J. Aladro Font*

Upper-Division Courses

102. Introduction to Hispanic American Literature.

102A. From the Conquest to Sor Juana. *

Speaking, reading, and writing proficiency in Spanish required. A study of Hispanic American literature from the chronicles of the conquest through the 17th century. Readings deal with transformations in both the idea of empire and the rights of the conquered. Includes the works of Colón, Cortés, El Inca Garcilaso de la Vega, Sor Juana Inés de la Cruz, and others. Satisfies the Global, Pre- and Early Modern Studies and Spanish Literature concentrations; also satisfies the Global and Pre- and Early Modern distribution requirements. *N. Klahn*

102B. Romanticism to Modernism. *

Speaking, reading, and writing proficiency in Spanish required. Follows the literary manifestations of the growing consciousness of the Latin American writer: discovery of native themes, imitation of European models, search for a "new language" literally and figuratively. Relates historical events with literary movements. Satisfies the Modern, Spanish, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): E.) *J. Poblete*

130. Studies in Latin American Literary Genres.

130A. Contemporary Spanish American Prose. *

Speaking, reading, and writing proficiency in Spanish required. Examines contemporary Spanish American prose. Course topic changes; please see the *Schedule of Classes* for the current topic. Satisfies the Modern, Spanish, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): CC, E.) *N. Klahn*

130E. Latin American Poetry. S

Speaking, reading, and writing proficiency in Spanish required. Poets from "modernismo" to the present in Spanish America. Studies how this poetry attempts to define Latin America, its past, its present history, and its vision for the future. Satisfies the Modern, Spanish, and World Literature concentrations; also satisfies the Global and Poetry distribution requirements. (General Education Code(s): CC, E.) *N. Klahn*

131. National Literatures of Latin America.

Speaking, reading, and writing proficiency in Spanish required. A study of the literary expression of a particular Latin American country or region, with texts representing a variety of authors, periods, and genres. *The Staff*

131B. The Novel of the Mexican Revolution. F

Speaking, reading, and writing proficiency in Spanish required. A study of the literary depiction of the Mexican Revolution as seen in six novels that span the 20th century. (General Education Code(s): CC, E.) *N. Klahn*

131D. Chile. *

Speaking, reading, and writing proficiency in Spanish required. Examines narrative and poetry in Chile within the general context of the relationships between literature, nation, and representation. Satisfies the Modern, Spanish, and World Literature concentrations; also satisfies the Global Distribution requirement. (General Education Code(s): E.) *J. Poblete*

131H. Cuba. S

Speaking, reading, and writing proficiency in Spanish required. Satisfies the Modern, Spanish, and World Lit-

erature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): CC, E.) *L. Martínez-Echazábal*

134. Special Topics in Latin American Literature.

134G. Popular Culture in Latin American Narrative. F

Speaking, reading, and writing proficiency in Spanish required. Explores short stories and novels that have been greatly influenced by popular culture, not only in theme, but also by appropriation of popular forms of language and modes of representation. Includes works by authors from Mexico, Argentina, Cuba, and Colombia. Satisfies the Modern, Spanish, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): CC, E.) *J. Poblete*

134M. Modernidad y literatura: El Boom de la novela latinoamericana. *

Speaking, reading, and writing proficiency in Spanish required. Explores the relationships between literature and mass culture, modernization, and globalization through the study of the so-called Boom of Latin American narrative. Course satisfies the Modern, Spanish, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): E.) *N. Klahn*

151. Literature and Life in "Don Quijote" and Other Cervantes Texts. *

Speaking, reading, and writing proficiency in Spanish required. A close reading of the works of Cervantes, with particular attention to "Don Quijote," in an attempt to discover how these works reflect the conflictive period in which the author lived. Also looks closely at the Cervantine view of the relationship of literature to life, as manifested in the works under study. Satisfies the Pre- and Early Modern Studies and Spanish Literature concentrations; also satisfies the Pre- and Early Modern distribution requirement. *J. Aladro Font*

153. The Picaresque Novel. W

Speaking, reading, and writing proficiency in Spanish required. The picaresque novel of 16th-century Spain considers the fictive environment as reality in order to introduce its protagonist as a rebel against social dominion. The picaresque novel is the only literary genre comparable to what is now called "literature of social protest." Satisfies the Pre- and Early Modern and Spanish Literature concentrations; also satisfies the Pre- and Early Modern distribution requirement. (General Education Code(s): CC.) *J. Aladro Font*

195. Senior Essay. F,W,S

Speaking, reading, and writing proficiency in Spanish required. Prerequisite(s): Literature 101. *The Staff*

198. Group Tutorial. F,W,S

Speaking, reading, and writing proficiency in Spanish required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Speaking, reading, and writing proficiency in Spanish required. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Speaking, reading, and writing proficiency in Spanish required. Students submit petition to sponsoring agency. *The Staff*

World Literature and Cultural Studies

Upper-Division Courses

109. Topics in Cultural Studies. F,S

Studies in the theory of cultural studies. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. May be repeated for credit. (General Education Code(s): E.) *A. Khan*

115. Modern Literature in a Global Context.

115A. Fiction in a Global Context. W

Comparative examination of fiction in the modern world and of fictional responses to social change and crisis. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. May be repeated for credit. (General Education Code(s): TA.) *C. Hong, V. Cooppan*

118. Literature of the Asian Diaspora. F

Study of literature of the Asian diaspora, attempting to discover and define a growing body of contemporary writing under this rubric, including immigrant/migrant histories, memories of exile and refuge, as well as the fiction of imagined homelands. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): E.) *K. Yamashita*

126. Metamorphoses: Pre/Post Modern Transformations. *

Examines transformations between god, human, and animal from ancient literature to medieval, renaissance, modern, and postmodern (especially science) fiction and poetry. Satisfies the Pre- and Early Modern and World Literature concentrations; also satisfies the Poetry, Pre- and Early Modern, and Global distribution requirements. *C. Freccero*

127. Chicano/Mexicano Geographies. W

Considers the historical, current, and future directions of Chicano/a literary culture within the context of the long-standing exchanges of culture and politics across the U.S.-Mexican border and the challenges of globalization. Includes novels, essays, and films. Satisfies the English, Modern, and World Literature concentrations; also satisfies the Global distribution requirement. (General Education Code(s): ER, E.) *K. Gruesz*

128. Afro-Asian Cultural Production. *

Charts, through examination of literature, film, and historical documents, the legacy of Afro-Asian encounters within the Americas and on the global stage with a focus on comparative racialization, slavery, and colonialism, Third World liberation, and inter-ethnic tensions. Satisfies the English, Modern and World Literature concentrations; also satisfies the Global Distribution requirement. (General Education Code(s): ER.) *C. Hong*

136. Classical Chinese Culture and Literature, Sixth Century through 16th Century. S

Survey of writing and culture from the Tang through early Ming dynasties (sixth century C.E. through 16th century C.E.). Themes include literary, religious, and philosophical innovation; courtly life; cultural contacts with non-Chinese people; and transformations of state and society. Satisfies the Pre- and Early Modern and World Literature concentrations; also satisfies the Global, Poetry, and Pre- and Early Modern distribution requirements.

(Also offered as History 141B. Students cannot receive credit for both courses.) (General Education Code(s): E.) *D. Keenan*

150. World Literature and Cultural Studies Core Sequence.

150A. Worldings. *

How to think about the world as a whole: representations, networks, systems, taxonomies, versions of globalization. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Modern and World Literature concentrations; also satisfies the Global requirement. May be repeated for credit. *The Staff*

150B. Space/Time. *

The world as understood through spatial and temporal divisions: regions, nations, empires, periods in a worlded perspective. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Modern and World Literature concentrations; also satisfies the Global distribution requirement. May be repeated for credit. *The Staff*

150C. Problems. *

Considers a range of phenomena from a critical world perspective: subject formation; human activity on a global scale; questions that demand a worlded answer. Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the Modern and World literature concentrations; also satisfies the Global requirement. May be repeated for credit. *The Staff*

188. World Literature and Cultural Studies. W

Students may count any combination of 2-credit or 3-credit literature courses, together totaling at least 5 credits, toward satisfaction of the literature major requirements.

188A. Twenty-First Century Novels (3 credits). W

Examines novels from around the world published since 2000. Class discussion focuses on the novel form and its condition at the beginning of the new millennium. *W. Godzich*

190. Senior Seminar.

Seminar offered to literature majors as a way to satisfy the senior exit requirement. Offered at different times by different instructors; focus is on topics of interest in world literature and cultural studies. All students are required to complete an essay of significant length as part of the seminar coursework. Prerequisite(s): Literature 101.

190A. Topics in World Literature and Cultural Studies. F,W,S

Course topic changes; see the *Schedule of Classes* for current topic. Satisfies the World Literature concentration; also satisfies the Global and Senior Seminar distribution requirements. "Medieval Mediterranean" additionally satisfies the Pre- and Early Modern Studies concentration and distribution requirements; "Black Britain" additionally satisfies the English and Modern Literary Studies concentrations. Prerequisite(s): Literature 101. Enrollment restricted to senior literature majors. May be repeated for credit. (General Education Code(s): E.) (F) *C. Hong*, (W) *S. Gillman*, (S) *V. Cooppan*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. *The Staff*

195. Senior Essay. F,W,S

Prerequisite(s): Literature 101. May be repeated for credit. *The Staff*

198. Group Tutorial. F,W,S

The Staff

199. Tutorial. F,W,S

May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Literature: Graduate Courses

200. Proseminar. F

The proseminar provides a common experience for entering students, facilitates exchange of ideas and approaches to literary and extra-literary texts, critical issues, and theoretical problems. It focuses on broad aspects of the history of theory and criticism, on the students' critical writing, and on aspects of professional development. Enrollment restricted to graduate students. *D. Selden*

201. The Pedagogy of Literature (1 credit). F

Provides training for graduate students in university-level pedagogy in general and in the pedagogy of literature specifically. Coordinated by a graduate student who has had substantial experience as a teaching assistant, under the supervision of a faculty member. Enrollment restricted to graduate students. May be repeated for credit. *N. Klahn*

202. Colloquium (2 credits). F,W,S

Student receives credit for attending a designated number of freestanding lectures, colloquia, symposia, or conferences during the term and reports orally, or in writing, to instructor. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

204. Readings in Literature (2 credits). *

Focuses on selected texts or authors in literature and/or theory. Students meet with instructor to discuss readings and deepen their knowledge on a particular author, critic, theorist, or text. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

205. Dissertation Writing Practicum (2 credits). *

Introduces the methods and practice of dissertation writing in literature. Workshop format. Meets one hour per week. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

291F. Advising (2 credits). F,W,S

Independent study formalizing the advisee-advisor relationship. Regular meetings to plan, assess, and monitor academic progress and to evaluate coursework as necessary. May be used to develop general bibliography of background reading and trajectory of study. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

English-Language Literatures: Graduate Courses

203. Periods and Movements. W

Examines a particular historical period or literary movement. Course topic changes; see the *Schedule of Classes* for current topic. Enrollment restricted to graduate students. May be repeated for credit. *K. Gruesz*

260. Transnational Literatures. *

Investigation of English language literature which transcends national boundaries. Course topic changes; see the *Schedule of Classes* for current topic. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

280. Topics in English Language Literature. S

Course topic changes; see the *Schedule of Classes* for current topic. Enrollment restricted to graduate students. May be repeated for credit. *J. Greene*

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with teaching of undergraduates. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

295. Directed Reading. F,W,S
Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

French Literature: Graduate Courses

230. Studies in Literary and Cultural History. F,W,S

In-depth examination of one period of French literature. Course topic changes; see the *Schedule of Classes* for current topic. Fall course taught in conjunction with course 131; spring course taught in conjunction with course 152; winter course taught in conjunction with LTMO 231. Enrollment restricted to graduate students. May be repeated for credit. (F) *S. Kinoshita*, (W) *R. Terdiman*, (S) *C. Freccero*

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. *The Staff*

295. Directed Reading. F,W,S
Directed reading which does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

German Literature: Graduate Courses

275. Special Topics in German Literature. W
Examination of topics within German literature. Course topic changes; see the *Schedule of Classes* for current topic. May be repeated for credit; actual content will vary from year to year. *A. Bivens*

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. *The Staff*

295. Directed Reading. F,W,S
Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Greek Literature: Graduate Courses

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with the teaching of undergraduates. *The Staff*

295. Directed Reading. F,W,S
Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Italian Literature: Graduate Courses

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

295. Directed Reading. F,W,S
Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Latin Literature: Graduate Courses

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with the teaching of undergraduates. *The Staff*

295. Directed Reading. F,W,S
Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Modern Literary Studies: Graduate Courses

230. Texts and Bodies: Representations of Desire in Four Texts, Three Media. S

1. *Psychoanalysis*: Barthes and Lacan; 2. Chaucer and fabliau: *The Miller's Tale*; 3. Verdian opera; 4. films of John Carpenter. Enrollment restricted to graduate students. Enrollment limited to 20. *H. Leicester*

231. Studies in Literary and Cultural History. F,W,S

Course topic changes; see the *Schedule of Classes* for current topic. Winter section taught in conjunction with LTR 230, section 02. Enrollment restricted to graduate students. May be repeated for credit. *T. Miller, N. Deutsch, R. Terdiman*

280. Topics in Theory. *
Explores issues arising in both the modern practice of criticism and in writings on the theory of criticism. Course topic changes; see the *Schedule of Classes* for current topic. Taught in conjunction with Spanish, Latin American and Latino Literatures 226. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

294. Teaching-Related Independent Study. F,W,S
Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. *The Staff*

295. Directed Reading. F,W,S
Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S
Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Pre- and Early Modern Literature: Graduate Courses

204. Studies in Early Modernity. *

In-depth examination of a topic in Early Modern Studies. Course topic changes; see the *Schedule of Classes* for current topic. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

294. Teaching-Related Independent Study. F,W,S

Directed graduate research and writing coordinated with the teaching of undergraduates. Students submit petition to sponsoring agency. *The Staff*

295. Directed Reading. F,W,S

Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Spanish/Latin American/Latino Literature: Graduate Courses

206. Topics in Spanish Golden Age Literature. *

Focuses on different genres of the Renaissance period that flourished before the creation of Cervantes' *Don Quixote*. Course topic changes; see the *Schedule of Classes* for current topic. Enrollment restricted to graduate students. *J. Aladro Font*

213. Latin American Film and Cultural Theory. S

An examination of Latin American and Latino films in connection with relevant social and cultural issues and theories. Reading knowledge of Spanish is required. (Formerly *Latin American Film: Gender, Genre, Race, and Nation*.) Enrollment restricted to graduate students. *J. Poblete*

226. Teoria Critica en America Latina. W

Overview of contemporary theoretical issues in Latin American cultural critique. Course topic changes; please see the *Schedule of Classes* for the current topic. Taught in conjunction with World Literature and Cultural Studies 209, section 02. Enrollment restricted to graduate students. May be repeated for credit. *N. Klahn*

230. Citiscapes. *

Theories of space/place poetics and politics, and the literary and visual re-presentations of urban spaces in Latin/o America. Questions of identity and location in modern-

ist poetics, and the ways difference (gender, ethnicity, and sexuality) inhabit and imagine the post-modern lettered city. Enrollment restricted to graduate students. *N. Klahn*

231. National Literatures of Latin America.**231A. Cuba. F**

Course topic changes; please see the *Schedule of Classes* for the current topic. Enrollment restricted to graduate students. May be repeated for credit. *L. Martinez-Echazabal*

295. Directed Reading. F,W,S

Directed reading that does not involve a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

World Literature and Cultural Studies: Graduate Courses

201. Theory and Methods. S

Global theories of history and cultural production. Course topic changes; see the *Schedule of Classes* for current topic. Enrollment restricted to graduate students. May be repeated for credit. *S. Gillman*

209. Topics in Cultural Studies. F,W,S

Course topic changes; see the *Schedule of Classes* for current topic. Winter section 02 taught in conjunction with Spanish/Latin American/Latino Literatures 226; spring section 01 taught in conjunction with German Literature 275. Enrollment restricted to graduate students. May be repeated for credit. (F) *C. Hong*, (W) *N. Klahn*, (W) *C. Freccero*, (W) *A. Bivens*, (S) *V. Cooppan*

287. World Literature and Cultural Studies. W**287A. Analytics of Power After Foucault (2 credits). F**

Examines the nexus formed by theories of action and narrative and theories of power. Describes the situation prior to Michel Foucault's discussion of power and examines the incidence of his intervention in the field. Enrollment restricted to graduate students. *W. Godzich*

288. World Literature and Cultural Studies. W**288A. Analytics of Power After Foucault (3 credits). F**

Three-credit seminar which is companion to the two-credit course 287A, Analytics of Power After Foucault. Concurrent enrollment in course 287A required. Enrollment restricted to graduate students. Enrollment limited to 12. *W. Godzich*

295. Directed Reading. F,W,S

Directed reading which does not require a term paper. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for

credit. *The Staff*

296. Special Student Seminar. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

Marine Biology

See Biological Sciences, page 151.

Marine Sciences

See Ocean Sciences, page 395.

Mathematics

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Faculty and Professional Interests

Professor

ROBERT BOLTJE
Group theory, algebraic number theory

BRUCE N. COOPERSTEIN
Groups of Lie type, incidence geometry

CHONGYING DONG
Infinite-dimensional Lie algebras and their representations, conformal field theory

ALEXANDER GAMBURD
Spectral problems in number theory, probability, and combinatorics

VIKTOR GINZBURG
Global analysis, symplectic topology; Hamiltonian dynamical systems, Poisson geometry, symmetries, and group actions

DEBRA LEWIS
Geometric Hamiltonian mechanics, geometric integration, bifurcation theory, applications of variational methods, control theory

GEOFFREY MASON
Vertex operator algebras and applications to conformal field theory and string theory; modular forms; group theory; quasi-Hopf algebras

RICHARD MONTGOMERY
Celestial mechanics, differential geometry, gauge theory, mechanics (quantum and classical), and singularity theory

JIE QING
Nonlinear analysis, harmonic analysis, partial differential equations with applications to differential geometry, mathematical physics

MARIA SCHONBEK
Nonlinear partial differential equations, with emphasis on fluid equations

HIROTAKE TAMANOI

Algebraic topology, string topology, topological quantum field theory, mathematical aspects of string theory

ANTHONY J. TROMBA

*Global nonlinear analysis, calculus of variations, minimal surfaces and Plateau's problem, Riemann surfaces***Associate Professor**

TORSTEN EHRHARDT

*Functional analysis, operator theory, random matrix theory, Banach algebras, Wiener-Hopf factorization, Toeplitz and Hankel operators***Assistant Professor**

SAMIT DASGUPTA

Algebraic number theory, arithmetic geometry, special values of L-functions

MARTIN H. WEISSMAN

*Representation theory, automorphic forms, number theory***Emeriti**

RALPH H. ABRAHAM

NICHOLAS BURGOYNE

ARTHUR E. FISCHER

MARVIN J. GREENBERG

AL KELLEY

EDWARD M. LANDESMAN

TUDOR S. RATIU

GERHARD RINGEL

MARSHALL SYLVAN

HAROLD WIDOM

Lecturer

FRANK BÄUERLE

NANDINI BHATTACHARYA

MARK R. EASTMAN

YONATAN KATZNELSON

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Program Description

Mathematics is both a fundamental discipline and an essential tool for students of biology, chemistry, computer engineering, computer science, Earth sciences, economics, electrical engineering, information systems management, physics, and psychology. Researchers in all these areas are constantly developing new and cutting-edge ways of applying mathematics to their fields. A strong mathematics background is vital to the advanced study of the physical and biological sciences and plays an integral role in studying the social sciences.

The UCSC mathematics program offers a wide variety of undergraduate mathematics courses:

- Courses 2 and 3 do not require thorough preparation in mathematics at the high school level. However, students interested in studying mathematics are strongly encouraged to take algebra, geometry, and trigonometry before entering the university. Students requiring mathematics courses are encouraged to take the mathematics placement examination (MPE) as early as possible. Students concerned about their ability to place into courses above Mathematics 2 or Mathematics 3 should consider taking these

courses before they enter UCSC. Failure to begin the calculus series in the fall could delay progress in some majors.

- Lower-division courses with numbers in the range 11A-B through 30 (calculus, linear algebra, multivariable calculus, differential equations, and problem solving) prepare students for further study in mathematics, the physical and biological sciences, or quantitative areas of the social sciences. Science majors take a combination of these courses as part of their undergraduate studies.
- Upper-division courses, with numbers in the range 100-199, are intended for majors in mathematics and closely related disciplines. Some of these courses provide students with a solid foundation in key areas of mathematics such as algebra, analysis, geometry, and number theory, whereas others introduce students to more specialized areas of mathematics. Calculus, linear algebra, multivariable calculus, and proof and problem solving are prerequisite to most of these advanced courses.

Within the major, there are three concentrations leading to the bachelor of arts (B.A.) degree: pure mathematics, computational mathematics, and mathematics education. These programs are designed to give students a strong background for graduate study, for work in industry or government, or for teaching. Each concentration requires nine courses, one of which must be a senior thesis or senior seminar. Please read the pure mathematics, computational mathematics, and mathematics education program descriptions below for specific information about course requirements. A minor in mathematics is also offered.

The mathematics program also provides an excellent liberal arts background from which to pursue a variety of career opportunities. UCSC graduates with degrees in mathematics hold teaching posts at all levels, as well as positions in law, government, civil service, insurance, software development, business, banking, actuarial science, forensics, and other professions where skills in logic, numerical analysis, and computing are required. In particular, students of mathematics are trained in the art of problem-solving, a skill absolutely essential to all professions.

Academic Advising

Academic advising is available at the Undergraduate Affairs office. The undergraduate adviser provides information about requirements, prerequisites, policies and procedures, learning support, scholarships, and special opportunities for undergraduate research. In addition, the adviser assists with the drafting of study plans, as well as certifying degrees and minors. Students are urged to stay informed and involved with their major, as well as to seek advice should problems arise.

The Undergraduate Affairs web site (<http://undergrad.pbsci.ucsc.edu>) is a critical resource for students. Here you will find a link to the undergraduate program; the materials at that link constitute the undergraduate handbook. Students should visit this first to seek answers to their questions, because it hosts a wealth of information. Each student in the major is encouraged to regularly review the materials posted to stay current about requirements, course curriculum, and departmental policy.

Requirements

Students who plan to take a mathematics course at UCSC must demonstrate sufficient preparation by their

score on either the mathematics placement examination (MPE), the College Entrance Examination Board Advanced Placement (AP) calculus examination, the International Baccalaureate Higher Level Mathematics Examination, or by passing the appropriate prerequisite course.

UCSC Mathematics Placement Examination

Mathematics placement examination scores are valid for one year. Students may take the examination a maximum of two times during the course of their academic career. Additionally, if a student receives a D, F, or NP in a course, the placement examination may not be used to place them out of that course. Students whose areas of study require precalculus or calculus courses are strongly advised to take the placement examination and the required courses early in their academic careers. The placement examination is given at the beginning of each quarter and in the sixth or seventh week of each quarter and at prospective-student orientations. Bring photo identification for entry into the placement examination. Calculators are not permitted.

| If your MPE score is | May enroll in this course |
|----------------------|---------------------------|
| 12-19 | 2 |
| 20-30 | 3 |
| 31-39 | 11A* |
| 40-45 | 19A |
| 46 or higher | 19A or 20A |

* Students who plan to major in computer engineering, computer science, electrical engineering, information systems management, mathematics, or physics and who receive a score in the range 31-39 on the MPE should take courses 3 and 19A-B rather than courses 11A-B.

College Board Advanced Placement Calculus Examinations

Students who have received 4 credits for the College Entrance Examination Board Advanced Placement (AP) calculus examination should normally enroll in course 19B, and those with 8 credits should normally enroll in course 23A. However, students who received a score of 3 on the calculus AB or BC AP examination, should enroll in course 19A or 19B, respectively, to improve their knowledge of calculus before continuing their studies. Students who wish to challenge themselves, and who received a score of 4 or 5 on the AB or a score of 3, 4, or 5 on the BC examination may choose course 20A, *Honors Calculus*. Non-mathematics majors should consult their major departments before enrolling in a mathematics course.

| If your AP AB score is | May enroll in this course |
|------------------------|-------------------------------|
| 3 | Mathematics 11A or 19A |
| 4 or 5 | Mathematics 20A or 11B or 19B |

| If your AP BC score is | May enroll in this course |
|------------------------|-------------------------------|
| 3 | Mathematics 11B or 19B or 20A |
| 4 or 5 | Mathematics 20A or 22 or 23A |

International Baccalaureate Higher Level Examination in Mathematics

Students who have received a score of 5, 6, or 7 on the International Baccalaureate (IB) Higher Level Examination in Mathematics may enroll in course 20A, *Honors Calculus*; 22, *Calculus of Several Variables*; or 23A, *Multivariable Calculus*. Non-mathematics majors should consult their major departments before enrolling in a mathematics course.

Prerequisite Courses

Students who have passed course 2 may enroll in course 3. Students who have passed course 3 may enroll in

course 11A or 19A. Students who have passed an articulated precalculus course at a college or university may enroll in course 11A or 19A, but they must verify eligibility of the course and course completion with the Mathematics Department staff.

Introductory Requirements

Introductory requirements for all concentrations in the major are courses 20A-B, *Honors Calculus*; or 19A-B, *Calculus for Science, Engineering, and Mathematics*; 21, *Linear Algebra*; and 23A-B, *Multivariable Calculus*. The mathematics education concentration has one additional introductory requirement, Applied Mathematics and Statistics (AMS) 5, *Statistics*. For some non-mathematics majors, courses 11A-B can be substituted for 19A-B, but they are not recommended for students planning to major in computer engineering, computer science, electrical engineering, information systems management, or physics. Although not considered an introductory requirement, course 100 is a prerequisite for most upper-division mathematics courses.

It should be emphasized that the nature of mathematics changes dramatically between lower-division and upper-division courses. Students often find that the material becomes far more abstract and theoretical. In addition, the role of computation in assignments diminishes and a greater weight is placed on deductive reasoning and the integral role of mathematical proofs. Therefore, it is strongly recommended that only students who earn grades of B- or better in Mathematics 100 consider applying to the major in mathematics.

Major Requirements

Pure Mathematics

This concentration is intended for students who desire a comprehensive understanding of mathematics, including those considering graduate studies in the natural sciences. Students are required to complete at least nine courses (with laboratories, if appropriate) from among those numbered 100 or higher.

Seven of these courses must be:

- Mathematics 100, *Introduction to Proof and Problem Solving*;
- Mathematics 103, *Complex Analysis*;
- Mathematics 105A, *Real Analysis*;
- Mathematics 111A, *Algebra*;
- Mathematics 117, *Advanced Linear Algebra*;
- one of Mathematics 121A, *Differential Geometry*, Mathematics 124, *Introduction to Topology*, or Mathematics 128A, *Classical Geometry: Euclidean and Non-Euclidean*;
- and either Mathematics 194, *Senior Seminar*, or Mathematics 195, *Senior Thesis*.

The remaining two courses are selected by the student from among Mathematics 24 and any mathematics course numbered above 100 (excluding Mathematics 188).

A typical program for a pure mathematics major might include the following:

| | |
|----------|--|
| 1st year | Mathematics 20A-B or 19A-B, 21, 23A |
| 2nd year | Mathematics 23B, 24, 100, 103, 110 or 128A |
| 3rd year | Mathematics 105A-B, 111A-B, 106 |
| 4th year | Mathematics 107, 117, 121A, 194 |

The first two years of a typical program for a pure mathematics major who begins mathematics studies

with precalculus might include the following:

| | |
|----------|--------------------------------|
| 1st year | Mathematics 3, 19A-B |
| 2nd year | Mathematics 21, 23A-B, 24, 100 |

Computational Mathematics

This concentration is intended to prepare students for technical careers in industry or government while providing a solid mathematical background. Students are required to complete a minimum of seven mathematics courses (with laboratories, if appropriate) as follows:

- Mathematics 24, *Ordinary Differential Equations*;
- Mathematics 100, *Introduction to Proof and Problem Solving*;
- Mathematics 103, *Complex Analysis*, or Mathematics 105A, *Real Analysis*;
- Mathematics 110, *Introduction to Number Theory*;
- Mathematics 111A, *Algebra*;
- Mathematics 145, *Introductory Chaos Theory*, or Applied Mathematics and Statistics 114, *Introduction to Dynamical Systems*, or Applied Mathematics and Statistics 147, *Computational Methods and Applications*;
- and either Mathematics 194, *Senior Seminar*, or Mathematics 195, *Senior Thesis*.

In addition, students must complete two courses selected from the following:

- Applied Mathematics and Statistics 113, 131, 147, 162
- Biomolecular Engineering 110
- Computer Engineering 107, 108, 117, 153, 177
- Computer Science 101, 102, 104A, 109, 112, 122, 130, 132, 142
- Economics 113
- Electrical Engineering 103, 130, 135, 151, 154

Mathematics majors who wish to enroll in Computer Science 101 or Computer Science 122 should contact the instructor to request a permission code.

A typical program for a computational mathematics major might include the following:

| | |
|----------|-------------------------------------|
| 1st year | 19A-B, 23A, CMPS 12A/L and 12B/M |
| 2nd year | 21, 23B, 24, 100, 110, CMPE 16 |
| 3rd year | 103; 105A; 145 or AMS 147; CMPS 101 |
| 4th year | 106, 111A, CMPS 109, 194 |

Mathematics Education

This concentration is intended to prepare students for teaching kindergarten through high school (K-12) mathematics. In addition to the pre-major requirements (which for this track include Applied Mathematics and Statistics 5, *Statistics*), students are required to complete the following nine courses:

- Mathematics 100, *Introduction to Proof and Problem Solving*;
- either Mathematics 103, *Complex Analysis*, or 105A, *Real Analysis*;
- Mathematics 110, *Introduction to Number Theory*;
- Mathematics 111A, *Algebra*;
- Mathematics 128A, *Classical Geometry: Euclidean and Non-Euclidean*;

- Applied Mathematics and Statistics 131, *Introduction to Probability Theory*;
- Mathematics 181, *History of Math*;
- Mathematics 188, *Supervised Teaching Experience*;
- and either Mathematics 194, *Senior Seminar*, or Mathematics 195, *Senior Thesis*.

UCSC students can pursue a degree in mathematics while preparing to teach at the secondary level. In California, students seeking a single-subject credential (for secondary teaching) in mathematics are required to take the CSET, a series of examinations that must be passed in order to enter a teaching-credential program (formerly The National Teachers Examination). Students who complete the mathematics education track, plus three additional specified courses, qualify for the California Single Subject Program, exempting themselves from the CSET. Both the Mathematics Department undergraduate adviser and the Education Department advising office have more information about the additional required courses.

A typical program for a mathematics education major might include the following:

| | |
|----------|---|
| 1st year | Mathematics 19A-B, 23A |
| 2nd year | Mathematics 21, 23B, 100; Applied Mathematics and Statistics 5 |
| 3rd year | Mathematics 30, 103, 110, 181; Applied Mathematics and Statistics 131 |
| 4th year | Mathematics 111A, 128A, 188, 194 |

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in mathematics is satisfied by Mathematics 100, *Introduction to Proof and Problem Solving*, and either Mathematics 194, *Senior Seminar*, or Mathematics 195, *Senior Thesis*.

Honors

Honors in the Mathematics Department are awarded to graduating students whose academic performance in the major demonstrates excellence at a GPA of 3.5 or above. Highest Honors are determined by review of departmental narrative evaluations for all students considered for honors. Highest Honors will be awarded to those students whose performance demonstrates the highest level of excellence in the major as reflected in their narrative evaluations.

Minor Requirements

The minor is intended for students who are interested in mathematics and want a strong mathematical foundation for studying in areas that rely heavily on analytical skills. Students are required to complete at least eight courses as follows:

- Mathematics 21, *Linear Algebra*;
- Mathematics 23A and 23 B, *Multivariable Calculus*;
- and any five courses numbered 100 and above.

No senior seminar or thesis is required.

A typical mathematics minor program for a physics major might be:

| | |
|----------|--|
| 1st year | Mathematics 19A-B, 23A |
| 2nd year | Mathematics 21, 23B, 24, 100 |
| 3rd year | Mathematics 103, 105A, 106A, 121A or 124 |

4th year Mathematics 107, 145 or Applied Mathematics and Statistics 114

Disqualification from the Major or Minor

The Mathematics Department has adopted a major disqualification policy that is intended to encourage students to take their performance in the introductory requirements seriously and to make a strong effort to pass these courses.

Students who receive more than one No Pass, D, and/or F in the following introductory requirements will not be permitted to major in any concentration of the mathematics major.

Introductory Requirements

- Mathematics 19A, *Calculus for Science, Engineering, and Mathematics*
- Mathematics 19B, *Calculus for Science, Engineering, and Mathematics*
- Mathematics 21, *Linear Algebra*
- Mathematics 23A, *Multivariable Calculus*
- Mathematics 23B, *Multivariable Calculus*
- Mathematics 100, *Introduction to Proof and Problem Solving*

Students will be assessed for disqualification after grades are submitted each quarter and at the end of each summer session.

Students may appeal their disqualification within the appeal period by writing a letter to the department chair. This appeal must be submitted to the advising office no later than 15 days from the date the disqualification notification was mailed, or the 10th day of classes in the quarter of their disqualification, whichever is later. The advising office will subsequently notify the student, the college, and the Office of the Registrar of the decision, no later than 15 days after the submission of the appeal.

A student who has been disqualified from the major may, no earlier than three months from the date of the disqualification, petition to be reinstated. This application will be considered only if there is substantial new evidence that the student is capable of making normal progress in the major.

Combined Majors

The combined major, requiring fewer courses than a double major, is administered through the Economics Department.

Economics and Mathematics

The major in economics and mathematics is designed to meet the needs of undergraduate students who plan to pursue doctoral study in economics or business, or who wish to pursue a career as an actuary or other professional requiring a sophisticated understanding of economics and mathematics. The major combines the main undergraduate content of both economics and mathematics within a programmatic structure that joins the two disciplines. It provides a coursework combination required to prepare for a modern economics Ph.D. program, or for technically demanding professional careers. A full description can be found in the economics section of this catalog.

Graduate Program

The Mathematics Department offers programs leading to the master of arts (M.A.) and doctor of philosophy

(Ph.D.) degrees. Contact the Division of Graduate Studies for further information on the M.A. and Ph.D. programs, as well as on university application procedures.

M.A. Degree Requirements

Students are required to complete two of Mathematics 200, 201, 202, 203; two of Mathematics 204, 205, 206; one of Mathematics 208, 209, 210; and complete five additional courses in mathematics or a related subject by approval. In addition, students must do one of the following:

- pass an M.A.-level preliminary examination;
- write a master's thesis.

Ph.D. Degree Requirements

All of the following are required:

- obtain a Ph.D.-level pass on two of the three written preliminary examinations, or a Ph.D.-level pass on one and a master's-level pass on the remaining two. Students who opt for the Ph.D.-level pass on two of the three preliminary examinations must complete the full sequence in the track associated with the preliminary examination they did not pass;
- satisfy the foreign-language requirement;
- pass the oral qualifying examination;
- complete three quarters as a teaching assistant;
- complete six graduate courses in mathematics other than Mathematics 200, 201, 202, 203, 204, 205, and 206. No more than three courses may be independent study or thesis research courses;
- write a Ph.D. thesis and present the thesis defense.

Students admitted to the Ph.D. program may receive an M.A. degree en route to the Ph.D.; students admitted to the M.A. program may transfer to the Ph.D. program upon passing the required preliminary examinations at the Ph.D. level.

Course Information

Mathematics 2, *College Algebra for Calculus*, is designed for students who do not meet the requirements for admission to Mathematics 3, *Precalculus*, and who need comprehensive and careful preparation for calculus. Mathematics 2 emphasizes algebra, graphs, and functions. The prerequisite for course 2 is a minimum placement examination score of 12.

Mathematics 3, *Precalculus*, is recommended for students who need some preparation in algebra and trigonometry prior to taking calculus. This course covers functions and their inverse, exponentials, logarithms, and trigonometry.

Mathematics 11A and 11B, *Calculus with Applications*, are intended for biology and Earth sciences majors. However, students in these majors who score 40 or more points on the mathematics placement examination are strongly encouraged to take the 19A-B sequence, which is required for most upper-division mathematics courses. Laboratory sections are strongly advised.

Mathematics 19A and 19B, *Calculus for Science, Engineering, and Mathematics*, are intended for chemistry, computer engineering, computer science, electrical engineering, information systems management, mathematics, and physics majors. Laboratory sections are strongly advised.

Mathematics 20A and 20B, *Honors Calculus*, are intended for students who would enjoy delving particularly deeply into the foundational and theoretical issues of calculus. Laboratory sections are strongly advised.

Mathematics 21, *Linear Algebra*, covers vector spaces, matrices, determinants, systems of linear equations, and eigenvalues. It is intended for students in the physical and biological and social sciences and is prerequisite to Mathematics 111A.

Mathematics 22, *Introduction to Calculus of Several Variables*, is intended for science students whose schedules do not permit a full and comprehensive two quarters of multivariable calculus. Students who intend to pursue further studies in mathematics must take Mathematics 23A-B and not 22. Laboratory sections are strongly advised.

Mathematics 23A and 23B, *Multivariable Calculus*, are intended for mathematics majors and minors and students in computer engineering, computer science, electrical engineering, information systems management, and physics majors which require more rigorous mathematical training. Laboratory sections are strongly advised.

Mathematics 100, *Introduction to Proof and Problem Solving*, is an introduction to the methodology of advanced mathematics, emphasizing proof techniques. Basic areas such as set theory and logic are introduced, together with extensive applications within mathematics. This course serves as a prerequisite for nearly all upper-division courses.

Mathematics 200+, Graduate-level courses. All graduate courses are open to undergraduates who have taken the recommended prerequisites; students should consult with the course instructor. Advanced undergraduates are strongly advised to take or audit graduate courses that interest them.

Lower-Division Courses

2. College Algebra for Calculus. F,W

Operations on real numbers, complex numbers, polynomials, and rational expressions; exponents and radicals; solving linear and quadratic equations and inequalities; functions, algebra of functions, graphs; conic sections; mathematical models; sequences and series. Prerequisite(s): placement exam score of 12 or higher. *The Staff*

2S. College Algebra for Calculus (2 credits). F

This two-credit, stretch course offers students two quarters to master material covered in course 2: operations on real numbers, complex numbers, polynomials, and rational expressions; exponents and radicals; solving linear and quadratic equations and inequalities; functions, algebra of functions, graphs; conic sections; mathematical models; sequences and series. After successful completion of this course in the first quarter, students enroll in course 2 the following quarter to complete the sequence and earn an additional 5 credits. Prerequisite(s): placement exam score of 12 or higher. *N. Bhattacharya*

3. Precalculus. F,W,S

Inverse functions and graphs; exponential and logarithmic functions, their graphs, and use in mathematical models of the real world; rates of change; trigonometry, trigonometric functions, and their graphs; and geometric series. Students cannot receive credit for both course 3 and Applied Mathematics and Statistics 3. Applied Mathematics and Statistics 3 can substitute for course 3. Prerequisite(s): course 2 or placement exam score of 20 or higher. (General Education Code(s): ME, Q.) *The Staff*

4. Mathematics of Choice and Argument. *

Techniques of analyzing and creating quantitative arguments. Application of probability theory to questions in justice, medicine, and economics. Analysis and avoidance of statistical bias. Understanding the application and limitations of quantitative techniques. Prerequisite(s): course 2, or placement exam score of 12 or higher, or AP Calculus AB exam score of 3 or higher. Enrollment limited to 54. (General Education Code(s): SR, Q.) *The Staff*

11A. Calculus with Applications. F,W,S

A modern course stressing conceptual understanding, relevance, and problem solving. The derivative of polynomial, exponential, and trigonometric functions of a single variable is developed and applied to a wide range of problems involving graphing, approximation, and optimization. Students cannot receive credit for both this course and course 19A or Applied Mathematics and Statistics 11A and 15A, or Economics 11A. Prerequisite(s): course 3 or Applied Mathematics and Statistics 3; or placement exam score of 31 or higher; or AP Calculus AB exam score of 3 or higher. (General Education Code(s): ME, IN, Q.) *The Staff*

11B. Calculus with Applications. F,W,S

Starting with the fundamental theorem of calculus and related techniques, the integral of functions of a single variable is developed and applied to problems in geometry, probability, physics, and differential equations. Polynomial approximations, Taylor series, and their applications conclude the course. Students cannot receive credit for this course and course 19B, or Applied Mathematics and Statistics 11B and 15B, or Economics 11B. Prerequisite(s): course 11A or Applied Mathematics and Statistics 15A or AP Calculus AB exam score of 4 or 5, or BC exam score of 3 or higher, or IB Mathematics Higher Level exam score of 5 or higher. (General Education Code(s): ME, IN, Q.) *The Staff*

19A. Calculus for Science, Engineering, and Mathematics. F,W,S

The limit of a function, calculating limits, continuity, tangents, velocities, and other instantaneous rates of change. Derivatives, the chain rule, implicit differentiation, higher derivatives. Exponential functions, inverse functions, and their derivatives. The mean value theorem, monotonic functions, concavity, and points of inflection. Applied maximum and minimum problems. Students cannot receive credit for both this course and course 11A or Applied Mathematics and Statistics 11A and 15A, or Economics 11A. Prerequisite(s): course 3 or Applied Mathematics and Statistics 3 or placement exam score of 40 or higher or AP Calculus AB exam score of 3 or higher. (General Education Code(s): ME, IN, Q.) *The Staff*

19B. Calculus for Science, Engineering, and Mathematics. F,W,S

The definite integral and the fundamental theorem of calculus. Areas, volumes. Integration by parts, trigonometric substitution, and partial fractions methods. Improper integrals. Sequences, series, absolute convergence and convergence tests. Power series, Taylor and Maclaurin series. Students cannot receive credit for both this course and course 11B, Applied Math and Statistics 11B and 15B, or Economics 11B. Prerequisite(s): course 19A or AP Calculus AB exam score of 4 or 5, or BC exam score of 3 or higher, or IB Mathematics Higher Level exam score of 5 or higher. (General Education Code(s): ME, IN, Q.) *The Staff*

20A. Honors Calculus. F

Challenging course designed to approach single-variable calculus from the perspective of modern mathematics. Emphasis is on the evolution and historical develop-

ment of core concepts underlying calculus and analysis. Prerequisite(s): placement exam score of 46 or higher; or AP Calculus AB exam score of 4 or 5; or BC exam of 3 or higher; or IB Mathematics Higher Level exam score of 5 or higher. Enrollment limited to 60. (General Education Code(s): ME, IN, Q.) *The Staff*

20B. Honors Calculus. W

Challenging course designed to approach single-variable calculus from the perspective of modern mathematics. Emphasis is on the evolution and historical development of core concepts underlying calculus and analysis. Prerequisite(s): course 20A. Enrollment limited to 60. (General Education Code(s): ME, IN, Q.) *The Staff*

21. Linear Algebra. F,W,S

Systems of linear equations, matrices, determinants. Introduction to abstract vector spaces, linear transformation, inner products, geometry of Euclidean space, and eigenvalues. One quarter of college mathematics is recommended as preparation. Prerequisite(s): course 2 or above, or placement exam score of 20 or higher. (General Education Code(s): ME, Q.) *The Staff*

22. Introduction to Calculus of Several Variables. F,W,S

Functions of several variables. Continuity and partial derivatives. The chain rule, gradient and directional derivative. Maxima and minima, including Lagrange multipliers. The double and triple integral and change of variables. Surface area and volumes. Applications from biology, chemistry, earth sciences, engineering, and physics. Students cannot receive credit for this course and course 23A. Prerequisite(s): course 11B or 19B or 20B or Applied Mathematics and Statistics 15B or AP calculus BC exam score of 4 or 5. (General Education Code(s): ME.) *The Staff*

23A. Multivariable Calculus. F,W,S

Vectors in n -dimensional Euclidean space. The inner and cross products. The derivative of functions from n -dimensional to m -dimensional Euclidean space is studied as a linear transformation having matrix representation. Paths in 3-dimensions, arc length, vector differential calculus. Taylor's theorem in several variables, extrema of real-valued functions, constrained extrema and Lagrange multipliers, the implicit function theorem, some applications. Students cannot receive credit for this course and course 22. Prerequisite(s): course 19B or 20B or AP calculus BC exam score of 4 or 5. (General Education Code(s): ME.) *The Staff*

23B. Multivariable Calculus. F,W,S

Double integral, changing the order of integration. Triple integrals, maps of the plane, change of variables theorem, improper double integrals. Path integrals, line integrals, parametrized surfaces, area of a surface, surface integrals. Green's theorem, Stokes theorem, conservative fields, Gauss' theorem. Applications to physics and differential equations, differential forms. Prerequisite(s): course 23A. (General Education Code(s): ME.) *The Staff*

24. Ordinary Differential Equations. S

First and second order ordinary differential equations, with emphasis on the linear case. Methods of integrating factors, undetermined coefficients, variation of parameters, power series, numerical computation. Students cannot receive credit for this course and Applied Mathematics and Statistics 27. Prerequisite(s): course 22 or 23A; course 21 is recommended as preparation. *The Staff*

30. Mathematical Problem Solving. F

Students learn techniques of problem solving such as induction, contradiction, exhaustion, dissection, analogy, generalization, specialization, and others in the context of solving problems drawn from number theory, prob-

ability, combinatorics, graph theory, geometry, and logic. Prerequisite(s): course 11A or 19A or 20A or Math Placement Exam score of 40 or higher. (General Education Code(s): PR-E.) *B. Cooperstein*

99. Tutorial. F,W,S

The Staff

99F. Tutorial (2 credits). F,W,S

May be repeated for credit. *The Staff*

*Upper-Division Courses***100. Introduction to Proof and Problem Solving. F,W,S**

Students learn the basic concepts and ideas necessary for upper-division mathematics and techniques of mathematical proof. Introduction to sets, relations, elementary mathematical logic, proof by contradiction, mathematical induction, and counting arguments. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; courses 11A and 11B or 19A and 19B or 20A and 20B. Enrollment limited to 50. (General Education Code(s): ME.) *The Staff*

103A. Complex Analysis. W,S

Complex numbers, analytic and harmonic functions, complex integration, the Cauchy integral formula, Laurent series, singularities and residues, conformal mappings. (Formerly course 103.) Prerequisite(s): course 23B; and either course 100 or Computer Science 101. *The Staff*

103B. Complex Analysis II (2 credits). *

Conformal mappings, the Riemann mapping theorem, Mobius transformations, Fourier series, Fourier and Laplace transforms, applications, and other topics as time permits. Prerequisite(s): course 103A. *The Staff*

105A. Real Analysis. F,W

The basic concepts of one-variable calculus are treated rigorously. Set theory, the real number system, numerical sequences and series, continuity, differentiation. Prerequisite(s): course 23B and either course 100 or Computer Science 101. *The Staff*

105B. Real Analysis. S

Metric spaces, differentiation and integration of functions. The Riemann-Stieltjes integral. Sequences and series of functions. Prerequisite(s): course 105A. *The Staff*

105C. Real Analysis. *

The Stone-Weierstrass theorem, Fourier series, differentiation and integration of functions of several variables. Prerequisite(s): course 105B. *The Staff*

106. Systems of Ordinary Differential Equations. F

Linear systems, exponentials of operators, existence and uniqueness, stability of equilibria, periodic attractors, and applications. (Formerly course 106A.) Prerequisite(s): courses 21 and 24 (preferred) or Applied Mathematics and Statistics 10 and 20; and either course 100 or Computer Science 101. *The Staff*

107. Partial Differential Equations. W

Topics covered include first and second order linear partial differential equations, the heat equation, the wave equation, Laplace's equation, separation of variables, eigenvalue problems, Green's functions, Fourier series. (Formerly course 106B.) Prerequisite(s): courses 21 and 24 (preferred) or Applied Mathematics and Statistics 10 and 20; and either course 100 or Computer Science 101; course 106 is recommended as preparation. *The Staff*

110. Introduction to Number Theory. F

Prime numbers, unique factorization, congruences with applications (e.g., to magic squares). Rational and irrational numbers. Continued fractions. Introduction to Diophantine equations. An introduction to some of the ideas and outstanding problems of modern mathematics. Prerequisite(s): course 100 or Computer Science 101. (General Education Code(s): Q.) *The Staff*

111A. Algebra. F,W

Group theory including the Sylow theorem, the structure of abelian groups, and permutation groups. Prerequisite(s): course 21 or Applied Mathematics and Statistics 10 and either course 100 or Computer Science 101. *The Staff*

111B. Algebra. S

Introduction to rings and fields including polynomial rings, factorization, the classical geometric constructions, and Galois theory. Prerequisite(s): course 111A. *The Staff*

114. Introduction to Financial Mathematics. *

Financial derivatives: contracts and options. Hedging and risk management. Arbitrage, interest rate, and discounted value. Geometric random walk and Brownian motion as models of risky assets. Ito's formula. Initial boundary value problems for the heat and related partial differential equations. Self-financing replicating portfolio; Black-Scholes pricing of European options. Dividends. Implied volatility. American options as free boundary problems. Corequisite(s): Applied Mathematics and Statistics 131 or Computer Engineering 107. *The Staff*

115. Graph Theory. W

Graph theory, trees, vertex and edge colorings, Hamilton cycles, Eulerian circuits, decompositions into isomorphic subgraphs, extremal problems, cages, Ramsey theory, Cayley's spanning tree formula, planar graphs, Euler's formula, crossing numbers, thickness, splitting numbers, magic graphs, graceful trees, rotations, and genus of graphs. Prerequisite(s): course 21 or Applied Mathematics and Statistics 10 and either course 100 or Computer Science 101. *The Staff*

117. Advanced Linear Algebra. W

Review of abstract vector spaces. Dual spaces, bilinear forms, and the associated geometry. Normal forms of linear mappings. Introduction to tensor products and exterior algebras. Prerequisite(s): course 21 or Applied Mathematics and Statistics 10 and either course 100 or Computer Science 101. *The Staff*

118. Advanced Number Theory. W

Topics include divisibility and congruences, arithmetical functions, quadratic residues and quadratic reciprocity, quadratic forms and representations of numbers as sums of squares, Diophantine approximation and transcendence theory, quadratic fields. Additional topics as time permits. Prerequisite(s): course 110 or 111A. *The Staff*

120. Coding Theory. *

An introduction to mathematical theory of coding. Construction and properties of various codes, such as cyclic, quadratic residue, linear, Hamming, and Golay codes; weight enumerators; connections with modern algebra and combinatorics. Prerequisite(s): course 21. *The Staff*

121A. Differential Geometry. S

Topics include Euclidean space, tangent vectors, directional derivatives, curves and differential forms in space, mappings. Curves, the Frenet formulas, covariant derivatives, frame fields, the structural equations. The classification of space curves up to rigid motions. Vector fields and differentiable forms on surfaces; the shape operator. Gaussian and mean curvature. The theorem Egregium;

global classification of surfaces in three space by curvature. Prerequisite(s): courses 21 and 23B and either course 100 or Computer Science 101. Course 105A strongly recommended. *The Staff*

121B. Differential Geometry and Topology. *

Examples of surfaces of constant curvature, surfaces of revolutions, minimal surfaces. Abstract manifolds; integration theory; Riemannian manifolds. Total curvature and geodesics; the Euler characteristic, the Gauss-Bonnet theorem. Length-minimizing properties of geodesics, complete surfaces, curvature and conjugate points covering surfaces. Surfaces of constant curvature; the theorems of Bonnet and Hadamard. Prerequisite(s): course 121A. *The Staff*

124. Introduction to Topology. F

Topics include introduction to point set topology (topological spaces, continuous maps, connectedness, compactness), homotopy relation, definition and calculation of fundamental groups and homology groups, Euler characteristic, classification of orientable and nonorientable surfaces, degree of maps, and Lefschetz fixed-point theorem. Prerequisite(s): course 100; course 111A recommended. *The Staff*

128A. Classical Geometry: Euclidean and Non-Euclidean. F

Rigorous foundations for Euclidean and non-Euclidean geometries. History of attempts to prove the parallel postulate and of the simultaneous discovery by Gauss, J. Bolyai, and Lobachevsky of hyperbolic geometry. Consistency proved by Euclidean models. Classification of rigid motions in both geometries. Prerequisite(s): either course 100 or Computer Science 101. *The Staff*

128B. Classical Geometry: Projective. *

Theorems of Desargue, Pascal, and Pappus; projectivities; homogeneous and affine coordinates; conics; relation to perspective drawing and some history. Prerequisite(s): course 21. *The Staff*

130. Celestial Mechanics. *

Solves the two-body (or Kepler) problem, then moves onto the N-body problem where there are many open problems. Includes central force laws; orbital elements; conservation of linear momentum, energy, and angular momentum; the Lagrange-Jacobi formula; Sundman's theorem for total collision; virial theorem; the three-body problem; Jacobi coordinates; solutions of Euler and of Lagrange; and restricted three-body problem. Prerequisite(s): courses 19A-B and course 23A or Physics 5A or 6A; courses 21 and 24 strongly recommended. Enrollment limited to 35. *The Staff*

134. Cryptography. S

Introduces different methods in cryptography (shift cipher, affine cipher, Vigenere cipher, Hill cipher, RSA cipher, ElGamal cipher, knapsack cipher). The necessary material from number theory and probability theory is developed in the course. Common methods to attack ciphers discussed. Prerequisite(s): course 100; course 110 recommended as preparation. *The Staff*

140. Industrial Mathematics. *

Introduction to mathematical modeling of industrial problems. Problems in air quality remediation, image capture and reproduction, and crystallization are modeled as ordinary and partial differential equations then analyzed using a combination of qualitative and quantitative methods. Prerequisite(s): course 24 and either course 100 or Computer Science 101, and course 105A. *The Staff*

145. Introductory Chaos Theory. *

The Lorenz and Rossler attractors, measures of chaos, attractor reconstruction, applications from the sciences.

Students cannot receive credit for this course and Applied Mathematics and Statistics 146. Prerequisite(s): course 22 or 23A; course 21; course 100 or Computer Science 101. Concurrent enrollment in course 145L is required. *The Staff*

145L. Introductory Chaos Laboratory (1 credit). *

Laboratory sequence illustrating topics covered in course 145. One three-hour session per week in microcomputer laboratory. Concurrent enrollment in course 145 is required. *The Staff*

148. Numerical Analysis. *

The theory of constructive methods in mathematical analysis and its application with scientific computation. Some typical topics are difference equations, linear algebra, iteration, Bernoulli's method, quotient difference algorithm, the interpolating polynomial, numerical differentiation and integration, numerical solution of differential equations, finite Fourier series. Prerequisite(s): course 22 or 23A; course 21 and 24 or Applied Mathematics and Statistics 10 and 20; course 100 or Computer Science 101. Concurrent enrollment in course 148L is required. *The Staff*

148L. Numerical Analysis Laboratory (1 credit). *

Laboratory sequence illustrating topics covered in course 148. One three-hour session per week in microcomputer laboratory. Concurrent enrollment in course 148 is required. *The Staff*

160. Mathematical Logic I. S

Propositional and predicate calculus. Resolution, completeness, compactness, and Lowenheim-Skolem theorem. Recursive functions, Godel incompleteness theorem. Undecidable theories. Hilbert's 10th problem. Prerequisite(s): course 100 or Computer Science 101. *The Staff*

161. Mathematical Logic II. *

Naive set theory and its limitations (Russell's paradox); construction of numbers as sets; cardinal and ordinal numbers; cardinal and ordinal arithmetic; transfinite induction; axiom systems for set theory, with particular emphasis on the axiom of choice and the regularity axiom and their consequences (such as, the Banach-Tarski paradox); continuum hypothesis. Prerequisite(s): course 100 or equivalent, or by permission of instructor. Enrollment limited to 45. *The Staff*

181. History of Mathematics. W

A survey from a historical point of view of various developments in mathematics. Specific topics and periods to vary yearly. (General Education Code(s): TA.) *The Staff*

188. Supervised Teaching. F,W,S

Supervised tutoring in self-paced courses. May not be repeated for credit. Students submit petition to sponsoring agency. *The Staff*

189. ACE Program Service Learning (2 credits). F

Students participate in training and development to co-facilitate collaborative learning in ACE chemistry discussion sections and midterm/exam review sessions. Students are role models for students pursuing science- and math-intensive majors. Prerequisite(s): Prior participation in ACE; good academic standing; no non-passing grades in prior quarter. Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 10. (General Education Code(s): PR-S.) *N. Bhattacharya*

194. Senior Seminar. W,S

Designed to expose the student to topics not normally covered in the standard courses. The format varies from year to year. In recent years each student has written a paper and presented a lecture on it to the class. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 103 or 105A or 111A. Enrollment priority given to seniors. *The Staff*

195. Senior Thesis. F,W,S

Students research a mathematical topic under the guidance of a faculty sponsor and write a senior thesis demonstrating knowledge of the material. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Graduate Courses***200. Algebra I. F**

Group theory: subgroups, cosets, normal subgroups, homomorphisms, isomorphisms, quotient groups, free groups, generators and relations, group actions on a set. Sylow theorems, semidirect products, simple groups, nilpotent groups, and solvable groups. Ring theory: Chinese remainder theorem, prime ideals, localization. Euclidean domains, PIDs, UFDs, polynomial rings. Prerequisite(s): courses 111A and 117 are recommended as preparation. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

201. Algebra II. W

Vector spaces, linear transformations, eigenvalues and eigenvectors, the Jordan canonical form, bilinear forms, quadratic forms, real symmetric forms and real symmetric matrices, orthogonal transformations and orthogonal matrices, Euclidean space, Hermitian forms and Hermitian matrices, Hermitian spaces, unitary transformations and unitary matrices, skewsymmetric forms, tensor products of vector spaces, tensor algebras, symmetric algebras, exterior algebras, Clifford algebras and spin groups. Prerequisite(s): Course 200 is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

202. Algebra III. S

Module theory: Submodules, quotient modules, module homomorphisms, generators of modules, direct sums, free modules, torsion modules, modules over PIDs, and applications to rational and Jordan canonical forms. Field theory: field extensions, algebraic and transcendental extensions, splitting fields, algebraic closures, separable and normal extensions, the Galois theory, finite fields, Galois theory of polynomials. Prerequisite(s): Course 201 is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

203. Algebra IV. F

Topics include tensor product of modules over rings, projective modules and injective modules, Jacobson radical, Wedderburn's theorem, category theory, Noetherian rings, Artinian rings, affine varieties, projective varieties, Hilbert's Nullstellensatz, prime spectrum, Zariski topology, discrete valuation rings, and Dedekind domains. Prerequisite(s): courses 200, 201, and 202. Enrollment restricted to graduate students. *The Staff*

204. Analysis I. F

Completeness and compactness for real line; sequences and infinite series of functions; Fourier series; calculus on Euclidean space and the implicit function theorem;

metric spaces and the contracting mapping theorem; the Arzela-Ascoli theorem; basics of general topological spaces; the Baire category theorem; Urysohn's lemma; and Tychonoff's theorem. Prerequisite(s): course 105A or equivalent; course 105B is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

205. Analysis II. W

Lebesgue measure theory, abstract measure theory, measurable functions, integration, space of absolutely integrable functions, dominated convergence theorem, convergence in measure, Riesz representation theorem, product measure and Fubini's theorem. LP spaces, derivative of a measure, the Radon-Nikodym theorem, and the fundamental theorem of calculus. Prerequisite(s): course 204. Enrollment restricted to graduate students. *The Staff*

206. Analysis III. S

Banach spaces, Hahn-Banach theorem, uniform boundedness theorem, the open mapping and closed graph theorems, weak and weak* topology, the Banach-Alaoglu theorem, Hilbert spaces, self-adjoint operators, compact operators, spectral theory, Fredholm operators, spaces of distributions and the Fourier transform, and Sobolev spaces. Prerequisite(s): Courses 204 and 205 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

207. Complex Analysis. W

Holomorphic and harmonic functions, Cauchy's integral theorem, the maximum principle and its consequences, conformal mapping, analytic continuation, the Riemann mapping theorem. Prerequisite(s): Course 103 is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

208. Manifolds I. F

Definition of manifolds; the tangent bundle; the inverse function theorem and the implicit function theorem; transversality; Sard's theorem and the Whitney embedding theorem; vector fields, flows, and the Lie bracket; Frobenius's theorem. Course 204 recommended for preparation. Enrollment restricted to graduate students. *The Staff*

209. Manifolds II. W

Tensor algebra. Differential forms and associated formalism of pullback, wedge product, exterior derivative, Stokes theorem, integration. Cartan's formula for Lie derivative. Cohomology via differential forms. The Poincaré lemma and the Mayer-Vietoris sequence. Theorems of deRham and Hodge. Prerequisite(s): course 208. Course 201 is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

210. Manifolds III. S

The fundamental group, covering space theory and van Kampen's theorem (with a discussion of free and amalgamated products of groups), CW complexes, higher homotopy groups, cellular and singular cohomology, the Eilenberg-Steenrod axioms, computational tools including Mayer-Vietoris, cup products, Poincaré duality, the Lefschetz fixed point theorem, the exact homotopy sequence of a fibration and the Hurewicz isomorphism theorem, and remarks on characteristic classes. Prerequisite(s): Courses 208 and 209 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

211. Algebraic Topology. *

Continuation of course 210. Topics include theory of characteristic classes of vector bundles, cobordism theory, and homotopy theory. Prerequisite(s): Courses 200, 201, and 202 recommended as preparation. Enrollment re-

stricted to graduate students. *The Staff*

212. Differential Geometry. S

Principal bundles, associated bundles and vector bundles, connections and curvature on principal and vector bundles. More advanced topics include: introduction to cohomology, the Chern-Weil construction and characteristic classes, the Gauss-Bonnet theorem or Hodge theory, eigenvalue estimates for Beltrami Laplacian, and comparison theorems in Riemannian geometry. Prerequisite(s): course 208. Enrollment restricted to graduate students. *The Staff*

213A. Partial Differential Equations I. *

First of the two PDE courses covering basically Part I in Evans' book; *Partial Differential Equations*; which includes transport equations; Laplace equations; heat equations; wave equations; characteristics of nonlinear first-order PDE; Hamilton-Jacobi equations; conservation laws; some methods for solving equations in closed form; and the Cauchy-Kovalevskaya theorem. Courses 106 and 107 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

213B. Partial Differential Equations II. W

Second course of the PDE series covering basically most of Part II in Evans' book and some topics in nonlinear PDE including Sobolev spaces, Sobolev inequalities, existence, regularity and a priori estimates of solutions to second order elliptic PDE, parabolic equations, hyperbolic equations and systems of conservation laws, and calculus of variations and its applications to PDE. Prerequisite(s): Courses 106, 107, and 213A are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

214. Theory of Finite Groups. *

Nilpotent groups, solvable groups, Hall subgroups, the Frattini subgroup, the Fitting subgroup, the Schur-Zassenhaus theorem, fusion in p-subgroups, the transfer map, Frobenius theorem on normal p-complements. Prerequisite(s): Courses 200 and 201 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

215. Operator Theory. *

Operators on Banach spaces and Hilbert spaces. The spectral theorem. Compact and Fredholm operators. Other special classes of operators. Prerequisite(s): Courses 204, 205, 206, and 207 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

216. Advanced Analysis. *

Topics include: the Lebesgue set, the Marcinkiewicz interpolation theorem, singular integrals, the Calderon-Zygmund theorem, Hardy Littlewood-Sobolev theorem, pseudodifferential operators, compensated compactness, concentration compactness, and applications to PDE. Prerequisite(s): Courses 204, 205, and 206 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

217. Advanced Elliptic Partial Differential Equations. *

Topics include elliptic equations, existence of weak solutions, the Lax-Milgram theorem, interior and boundary regularity, maximum principles, the Harnack inequality, eigenvalues for symmetric and non-symmetric elliptic operators, calculus of variations (first variation: Euler-Lagrange equations, second variation: existence of minimizers). Other topics covered as time permits. Prerequisite(s): Courses 204, 205, and 206 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

218. Advanced Parabolic and Hyperbolic Partial Differential Equations. *

Topics include: linear evolution equations, second order parabolic equations, maximum principles, second order hyperbolic equations, propagation of singularities, hyperbolic systems of first order, semigroup theory, systems of conservation laws, Riemann problem, simple waves, rarefaction waves, shock waves, Riemann invariants, and entropy criteria. Other topics covered as time permits. Prerequisite(s): courses 205 and 206. Enrollment restricted to graduate students. *The Staff*

219. Nonlinear Functional Analysis. *

Topological methods in nonlinear partial differential equations, including degree theory, bifurcation theory, and monotonicity. Topics also include variational methods in the solution of nonlinear partial differential equations. Enrollment restricted to graduate students. *The Staff*

220A. Representation Theory I. *

Lie groups and Lie algebras, and their finite dimensional representations. Prerequisite(s): courses 200, 201, and 202. Courses 225A and 227 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

220B. Representation Theory II. *

Lie groups and Lie algebras, and their finite dimensional representations. Prerequisite(s): course 220A. Enrollment restricted to graduate students. *The Staff*

222A. Algebraic Number Theory. *

Topics include algebraic integers, completions, different and discriminant, cyclotomic fields, paralleloptopes, the ideal function, ideles and adèles, elementary properties of zeta functions and L-series, local class field theory, global class field theory. Courses 200, 201, and 202 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

222B. Algebraic Number Theory. *

Topics include geometric methods in number theory, finiteness theorems, analogues of Riemann-Roch for algebraic fields (after A. Weil), inverse Galois problem (Belyi theorem) and consequences. Enrollment restricted to graduate students. *The Staff*

223A. Algebraic Geometry I. *

Topics include examples of algebraic varieties, elements of commutative algebra, local properties of algebraic varieties, line bundles and sheaf cohomology, theory of algebraic curves. Weekly problem solving. Courses 200, 201, 202, and 208 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

223B. Algebraic Geometry II. *

A continuation of course 223A. Topics include theory of schemes and sheaf cohomology, formulation of the Riemann-Roch theorem, birational maps, theory of surfaces. Weekly problem solving. Course 223A is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

225A. Lie Algebras. F

Basic concepts of Lie algebras. Engel's theorem, Lie's theorem, Weyl's theorem are proved. Root space decomposition for semi-simple algebras, root systems and the classification theorem for semi-simple algebras over the complex numbers. Isomorphism and conjugacy theorems. Prerequisite(s): Courses 201 and 202 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

225B. Infinite Dimensional Lie Algebras. W

Finite dimensional semi-simple Lie algebras: PBW theorem, generators and relations, highest weight representations, Weyl character formula. Infinite dimensional Lie

algebras: Heisenberg algebras, Virasoro algebras, loop algebras, affine Kac-Moody algebras, vertex operator representations. Prerequisite(s): course 225A. Enrollment restricted to graduate students. *The Staff*

226A. Infinite Dimensional Lie Algebras and Quantum Field Theory I. *

Introduction to the infinite-dimensional Lie algebras that arise in modern mathematics and mathematical physics: Heisenberg and Virasoro algebras, representations of the Heisenberg algebra, Verma modules over the Virasoro algebra, the Kac determinant formula, and unitary and discrete series representations. Enrollment restricted to graduate students. *The Staff*

226B. Infinite Dimensional Lie Algebras and Quantum Field Theory II. *

Continuation of course 226A: Kac-Moody and affine Lie algebras and their representations, integrable modules, representations via vertex operators, modular invariance of characters, and introduction to vertex operator algebras. Enrollment restricted to graduate students. *The Staff*

227. Lie Groups. F

Lie groups and algebras, the exponential map, the adjoint action, Lie's three theorems, Lie subgroups, the maximal torus theorem, the Weyl group, some topology of Lie groups, some representation theory: Schur's Lemma, the Peter-Weyl theorem, roots, weights, classification of Lie groups, the classical groups. Prerequisite(s): courses 200, 201, 204, and 208. Enrollment restricted to graduate students. *The Staff*

228. Lie Incidence Geometries. W

Linear incidence geometry is introduced. Linear and classical groups are reviewed, and geometries associated with projective and polar spaces are introduced. Characterizations are obtained. Enrollment restricted to graduate students. *The Staff*

229. Kac-Moody Algebras. *

Theory of Kac-Moody algebras and their representations. The Weil-Kac character formula. Emphasis on representations of affine superalgebras by vertex operators. Connections to combinatorics, PDE, the monster group. The Virasoro algebra. Enrollment restricted to graduate students. *The Staff*

232. Morse Theory. *

Classical Morse Theory. The fundamental theorems relating critical points to the topology of a manifold are treated in detail. The Bolt Periodicity Theorem. A specialized course offered once every few years. Prerequisite(s): Courses 208, 209, 210, 211, and 212 recommended as preparation. Enrollment restricted to graduate students. Offered in alternate academic years. *The Staff*

233. Random Matrix Theory. *

Classical matrix ensembles; Wigner semi-circle law; method of moments. Gaussian ensembles. Method of orthogonal polynomials; Gaudin lemma. Distribution functions for spacings and largest eigenvalue. Asymptotics and Riemann-Hilbert problem. Painlevé theory and the Tracy-Widom distribution. Selberg's Integral. Matrix ensembles related to classical groups; symmetric functions theory. Averages of characteristic polynomials. Fundamentals of free probability theory. Overview of connections with physics, combinatorics, and number theory. Prerequisite(s): courses 103, 204, and 205; course 117 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

234. Riemann Surfaces. W

Riemann surfaces, conformal maps, harmonic forms, holomorphic forms, the Reimann-Roch theorem, the theory of moduli. Enrollment restricted to graduate students. *The Staff*

235. Dynamical Systems Theory. *

An introduction to the qualitative theory of systems of ordinary differential equations. Structural stability, critical elements, stable manifolds, generic properties, bifurcations of generic arcs. Prerequisite(s): courses 106A, 203, and 208. Enrollment restricted to graduate students. *The Staff*

238. Elliptic Functions and Modular Forms. *

The course, aimed at second-year graduate students, will cover the basic facts about elliptic functions and modular forms. The goal is to provide the student with foundations suitable for further work in advanced number theory, in conformal field theory, and in the theory of Riemann surfaces. Successful completion of graduate algebra sequence (courses 200-202) and either 207 or 103 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

239. Homological Algebra. *

Homology and cohomology theories have proven to be powerful tools in many fields (topology, geometry, number theory, algebra). Independent of the field, these theories use the common language of homological algebra. The aim of this course is to acquaint the participants with basic concepts of category theory and homological algebra, as follows: chain complexes, homology, homotopy, several (co)homology theories (topological spaces, manifolds, groups, algebras, Lie groups), projective and injective resolutions, derived functors (Ext and Tor). Depending on time, spectral sequences or derived categories may also be treated. Courses 200 and 202 strongly recommended. Enrollment restricted to graduate students. *The Staff*

240A. Representations of Finite Groups I. S

Introduces ordinary representation theory of finite groups (over the complex numbers). Main topics are characters, orthogonality relations, character tables, induction and restriction, Frobenius reciprocity, Mackey's formula, Clifford theory, Schur indicator, Schur index, Artin's and Brauer's induction theorems. Recommended: successful completion of courses 200-202. Enrollment restricted to graduate students. *The Staff*

240B. Representations of Finite Groups II. *

Introduces modular representation theory of finite groups (over a field of positive characteristic). Main topics are Grothendieck groups, Brauer characters, Brauer character table, projective covers, Brauer-Cartan triangle, relative projectivity, vertices, sources, Green correspondence, Green's indecomposability theorem. Recommended completion of courses 200-203 and 240A. Prerequisite(s): Courses 200, 201, 202, 203, and 240A recommended. Enrollment restricted to graduate students. *The Staff*

246. Representations of Algebras. *

Material includes associative algebras and their modules; projective and injective modules; projective covers; injective hulls; Krull-Schmidt Theorem; Cartan matrix; semi-simple algebras and modules; radical, simple algebras; symmetric algebras; quivers and their representations; Morita Theory; and basic algebras. Prerequisite(s): courses 200, 201, and 202. Enrollment restricted to graduate students. *The Staff*

248. Symplectic Geometry. *

Basic definitions. Darboux theorem. Basic examples: cotangent bundles, Kähler manifolds and co-adjoint orbits. Normal form theorems. Hamiltonian group actions, moment maps. Reduction by symmetry groups. Atiyah-Guillemin-Sternberg convexity. Introduction to Floer homological methods. Relations with other geometries including contact, Poisson, and Kähler geometry. Prerequisite(s): course 204; courses 208 and 209 are

recommended as preparation. Enrollment restricted to graduate students. *The Staff*

249A. Mechanics I. *

Covers symplectic geometry and classical Hamiltonian dynamics. Some of the key subjects are the Darboux theorem, Poisson brackets, Hamiltonian and Lagrangian systems, Legendre transformations, variational principles, Hamilton-Jacobi theory, geodesic equations, and an introduction to Poisson geometry. Courses 208 and 209 are recommended as preparation. Courses 208 and 209 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

249B. Mechanics II. *

Hamiltonian dynamics with symmetry. Key topics center around the momentum map and the theory of reduction in both the symplectic and Poisson context. Applications are taken from geometry, rigid body dynamics, and continuum mechanics. Course 249A is recommended as preparation. Enrollment restricted to graduate students. *The Staff*

249C. Mechanics III. *

Introduces students to active research topics tailored according to the interests of the students. Possible subjects are complete integrability and Kac-Moody Lie algebras; Smale's topological program and bifurcation theory; KAM theory, stability and chaos; relativity; quantization. Course 249B is recommended as preparation. Enrollment restricted to graduate students. Offered in alternate academic years. *The Staff*

252. Fluid Mechanics. *

First covers a basic introduction to fluid dynamics equations and then focuses on different aspects of the solutions to the Navier-Stokes equations. Prerequisite(s): courses 106 and 107 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

254. Geometric Analysis. *

Introduction to some basics in geometric analysis through the discussions of two fundamental problems in geometry: the resolution of the Yamabe problem and the study of harmonic maps. The analytic aspects of these problems include Sobolev spaces, best constants in Sobolev inequalities, and regularity and a priori estimates of systems of elliptic PDE. Courses 204, 205, 209, 212, and 213 recommended as preparation. Enrollment restricted to graduate students. *The Staff*

256. Algebraic Curves. *

Introduction to compact Riemann surfaces and algebraic geometry via an in-depth study of complex algebraic curves. Courses 200, 201, 202, 203, 204, and 207 are recommended as preparation. Enrollment restricted to graduate mathematics and physics students. *The Staff*

260. Combinatorics. *

Combinatorial mathematics, including summation methods, binomial coefficients, combinatorial sequences (Fibonacci, Stirling, Eulerian, harmonic, Bernoulli numbers), generating functions and their uses, Bernoulli processes and other topics in discrete probability. Oriented toward problem solving applications. Applications to statistical physics and computer science. Enrollment restricted to graduate students. *The Staff*

280. Topics in Analysis. *

Enrollment restricted to graduate students. *The Staff*

281. Topics in Algebra. S

Enrollment restricted to graduate students. *The Staff*

282. Topics in Geometry. *

Enrollment restricted to graduate students. *The Staff*

283. Topics in Combinatorial Theory. W

Enrollment restricted to graduate students. *The Staff*

284. Topics in Dynamics. *

Enrollment restricted to graduate students. *The Staff*

285. Topics in Partial Differential Equations. F

Topics such as derivation of the Navier-Stokes equations. Examples of flows including water waves, vortex motion, and boundary layers. Introductory functional analysis of the Navier-Stokes equation. Enrollment restricted to graduate students. *The Staff*

286. Topics in Number Theory. *

Topics in number theory, selected by instructor. Possibilities include modular and automorphic forms, elliptic curves, algebraic number theory, local fields, the trace formula. May also cover related areas of arithmetic algebraic geometry, harmonic analysis, and representation theory. Courses 200, 201, 202, and 205 are recommended as preparation. Enrollment restricted to graduate students. *The Staff*

287. Topics in Topology. *

Topics in topology, selected by the instructor. Possibilities include generalized (co)homology theory including K-theory, group actions on manifolds, equivariant and orbifold cohomology theory. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

292. Seminar (no credit). F,W,S

A weekly seminar attended by faculty, graduate students, and upper-division undergraduate students. All graduate students are expected to attend. Enrollment restricted to graduate students. *The Staff*

296. Special Student Seminar. F,W,S

Students and staff studying in an area where there is no specific course offering at that time. Enrollment restricted to graduate students. *The Staff*

297. Independent Study. F,W,S

Either study related to a course being taken or a totally independent study. Enrollment restricted to graduate students. Enrollment restricted to graduate students. *The Staff*

298. Master's Thesis Research. F,W,S

Enrollment restricted to graduate students. *The Staff*

299. Thesis Research. F,W,S

Enrollment restricted to graduate students. Enrollment restricted to graduate students. *The Staff*

Medieval Studies

Students wishing to pursue a course of study in Latin literature should consult the concentration in national/transnational literatures under Literature, page 361.

Merrill College

College Office
(831) 459-2144
<http://www2.ucsc.edu/merrill>

For college description and list of faculty, see page 94.

Lower-Division Courses

10. Becoming a Successful Student (2 credits). *

An interactive course providing the opportunity to assess and revise methods of and purposes in studying. Critical, effective approaches to reading, writing, participating in lectures and sections, taking exams, balancing competing responsibilities, and utilizing campus resources are explored. Contact college office for interview-only criteria. Enrollment limited to 30. *The Staff*

20N. Re-Evaluation Counseling. S

Class introduces the fundamentals of re-evaluation counseling (co-counseling) and focuses on those aspects of the theory and practice which facilitate living in a diverse world. Interview with instructor before first class meeting. Will be offered spring, 2011. Enrollment limited to 20. Offered in alternate academic years. *P. Roby*

28. Peer Leadership in Co-Curricular Settings (2 credits). S

Introductory course for student leaders combining theoretical background and practical applications. Topics include: student-development theory; communication strategies; leadership-skills assessment; and intergroup relations. Includes readings, discussions, self-reflection, and lectures. Resident assistant (RA) pre-employment training course. Enrollment by interview only: approval of instructor required. Enrollment restricted to selection as resident assistant (RA), program assistant, or alternate for Merrill College. Enrollment limited to 30. May be repeated for credit. *The Staff*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

80A. Introduction to University Discourse: Cultural Identities and Global Consciousness. F

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Examines world poverty, imperialism, and nationalism; peoples' need to assert their cultural identities; and the benefits of individuals' absorption in worthy causes. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. (General Education Code(s): T3-Social Sciences, C1, E.) *L. Martinez-Echazabal*

80B. Rhetoric and Inquiry: Cultural Identities and Global Consciousness. F

Explores the intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Examines world poverty, imperialism, and nationalism; peoples' need to assert their cultural identities; and the benefits of individuals' absorption in worthy causes. Incorporates outside research. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. (General Education Code(s): T3-Social Sciences, C2, E.) *L. Martinez-Echazabal*

80C. Merrill Seminar. S

Research-based seminar on a topic of particular cultural, historical, or contemporary interest, open to all undergraduate students, taught by either a Merrill College Fellow or other member of the UCSC faculty. (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *The Staff*

80L. Merrill Core Visual Laboratory (2 credits). *

Visual laboratory designed to work in tandem with the

Merrill Core Course to enhance learning for students with diverse skills and learning styles. Open to first-year Merrill students currently enrolled in course 80A, 80B, or 80X. Required of students in the Merrill Frosh Scholars Program. Concurrent enrollment in course 80A, 80B, or 80X is required. *C. Gerster*

80X. Introduction to University Discourse: Cultural Identities and Global Consciousness (Frosh Scholar).*

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Examines world poverty, imperialism, and nationalism; people's need to assert their cultural identities; and the benefits of individuals' absorption in worthy causes. Permission of instructor required; selection for this year-long scholars program based on application submitted prior to fall quarter. Enrollment restricted to first-year college members. Enrollment limited to 22. (General Education Code(s): T3-Social Sciences, C1, E.) *L. Martinez-Echazabal*

80Z. Merrill Scholars Seminar.*

Research-based, writing-intensive seminar focusing on the construction of persuasive arguments. Explores topics of cultural, historical, and/or political interest, taught by a Merrill College Fellow. Topic will change yearly. Enrollment restricted to Merrill Frosh Scholars program participants. Enrollment limited to 22. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C2.) *The Staff*

85B. Merrill Classroom Connection Field Study (3 credits). F,W,S

Supervised hands-on experience assisting in local elementary classrooms. Students attend UCSC class meetings, complete relevant readings in educational theory, and present a final assignment. Priority enrollment restricted to Merrill College members. May be repeated for credit. *L. Martinez-Echazabal*

85C. Merrill Classroom Connection Field Study (2 credits). F,W,S

Supervised hands-on experience assisting in local elementary school classrooms. Students also attend UCSC course meetings, complete relevant readings in educational theory, and present a final assignment. Priority enrollment restricted to Merrill College members. May be repeated for credit. *L. Martinez-Echazabal*

93. Field Study. F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Up to three such courses may be taken for credit in any one quarter. Approval of student's adviser and provost required. *The Staff*

93F. Field Study (2 credits). F,W,S

Provides for individual program of study sponsored by the college and performed off campus. Approval of instructor required. May be repeated for credit. *The Staff*

93G. Field Study (3 credits). F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Approval of instructor required. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Various topics to be arranged between student and instructor. Students submit petition to sponsoring agency. *The Staff*

99F. Tutorial (2 credits). F,W,S

Various topics to be arranged between student and instructor. Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

120. Personal Empowerment. W

Intensive course on individual goal-oriented behavior, commonly called problem solving. Focus on purpose, goals, meaning, emotions, languages, model-building, reality, thinking, logic, creativity, the steps of problem solving, common blocks, and techniques of unblocking. Meet with instructor prior to advance enrollment; priority given to upper-level students. Enrollment limited to 20. *F. Andrews*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar by an upper-division student under faculty supervision. (See course 42.) Students submit petition to sponsoring agency, supported by faculty member willing to supervise. *The Staff*

193. Field Study. F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Up to three such courses may be taken for credit in one quarter. Approval of student's adviser and provost required. *The Staff*

193E. Field Study (2 credits). F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Up to three such courses may be taken for credit in one quarter. Approval of student's adviser and provost required. May be repeated for credit. *The Staff*

193G. Field Study (3 credits). F,W,S

Provides for individual programs of study sponsored by the college and performed off campus. Up to three such courses may be taken for credit in one quarter. Approval of student's adviser and provost required. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a faculty member. *The Staff*

195. Senior Research Project. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Provides for college-sponsored individual study programs off campus, for which faculty supervision is not in person (e.g., supervision is by correspondence). Up to three such courses may be taken for credit in any one quarter. This may be a multiple-term course extending over two or three quarters; in this case the grade and evaluation submitted for the final quarter apply to all previous quarters. Petitions may be obtained at the Merrill College Office. Approval of student's adviser, certification of adequate preparation, and approval by the Merrill Provost required. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Various topics to be arranged between student and instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Microbiology and Environmental Toxicology

430 Physical Sciences Building
Telephone (831) 459-4719
FAX (831) 459-3524
<http://www.etox.ucsc.edu>

Faculty and Professional Interests

VICTORIA AUERBUCH STONE, Assistant Professor
Interactions between the pathogen Yersinia pseudotuberculosis and the innate immune system

MANEL CAMPS, Assistant Professor
Molecular mechanisms of reactive DNA methylation toxicity

A. RUSSELL FLEGAL, Professor
Anthropogenic perturbations of biogeochemical cycles, applications of isotopic tracers in anthropology and archaeology

KAREN OTTEMANN, Professor
Environmental responses of pathogenic bacteria

CHAD SALTIKOV, Associate Professor
Microbial anaerobic respiratory processes that influence the biotransformation of pollutants in the environment

DONALD R. SMITH, Professor
Neurotoxicity, cellular and organismal responses to environmental toxins

FITNAT YILDIZ, Associate Professor
Microbiology, molecular genetics, genomics; the mechanism of persistence of survival of Vibrio cholerae



Environmental Toxicology

KENNETH W. BRULAND (Ocean Sciences)
Biogeochemistry of trace metals

DON CROLL (Ecology and Evolutionary Biology)
Foraging ecology of marine sea birds and mammals, island conservation/ecology

ANDREW FISHER (Earth Sciences)
Hydrology, crustal studies, heat flow modeling

RAPHAEL KUDELA (Ocean Sciences)
Ecological modeling and remote sensing, satellite oceanography, phytoplankton ecology and harmful algal blooms

MARK MANGEL (Applied Mathematics and Statistics)
Mathematical modeling of biological phenomena, especially the evolutionary ecology of growth, aging, and longevity; quantitative issues in fishery management; mathematical and computational aspects of disease

MATTHEW MCCARTHY (Ocean Sciences)
Organic geochemistry, marine organic geochemistry, global biogeochemical cycles

PETER T. RAIMONDI (Ecology and Evolutionary Biology)
Applied marine ecology

MARY SILVER (Ocean Sciences)
Biological oceanography, marine plankton, midwater ecology

Cellular Toxicology

LINDSAY HINCK (MCD Biology)
Neurobiology, cell biology, development

TED HOLMAN (Chemistry and Biochemistry)
Bioinorganics and biological chemistry

PRADIP K. MASCHARAK (Chemistry and Biochemistry)
Bioinorganic chemistry

GLENN MILLHAUSER (Chemistry and Biochemistry)
Peptide structure and dynamics, electron spin resonance spectroscopy, nuclear magnetic resonance, agouti proteins

MARTHA ZUNIGA (MCD Biology)
Molecular, cellular, and developmental biology of the immune system

Microbiology

GRANT HARTZOG (MCD Biology)
Biochemistry, genetics, chromatin and transcriptional regulation

DOUGLAS R. KELLOGG (MCD Biology)
Coordination of cell growth and cell division

ROGER LININGTON (Chemistry and Biochemistry)
Marine Natural Products, Drugs for Neglected Diseases, Chemical Biology, Chemical Probes

TODD LOWE (Biomolecular Engineering)
Experimental and computation genomics, ncRNA gene finders, DNA microarrays to study the biology of Archaea

NADER POURMAND (Biomolecular Engineering)
Development of new tools and technologies that integrate biology, electronics, and nanofabrication for the detection and study of genes and proteins

JOSHUA STUART (Biomolecular Engineering)
Computational genomics

JONATHAN P. ZEHR (Ocean Sciences)
Aquatic microbial ecology, biological oceanography

Program Description

The Microbiology and Environmental Toxicology Department (formerly the Environmental Toxicology Department) sponsors undergraduate and graduate courses in microbiology and environmental toxicology, both within the department and through affiliated departments. The curriculum offers a strong foundation in fundamental and applied toxicology and microbiology to provide the breadth and depth of perspective required for this interdisciplinary science. Research interests of students and faculty in microbiology and environmental toxicology span the fields of biology, microbiology, chemistry, Earth sciences, ocean sciences, environmental studies, and human health.

Undergraduate Programs

While the Microbiology and Environmental Toxicology Department only awards graduate degrees, it does offer a select number of undergraduate courses to prepare and attract promising undergraduates for advanced studies in microbiology and environmental toxicology or related disciplines. Students interested in microbiology and environmental toxicology should major in a field such as biology; marine biology; molecular, cell, and developmental biology; biochemistry; chemistry; Earth sciences; engineering; or environmental studies while taking microbiology and environmental toxicology electives.

In addition, the program provides unique opportunities for exceptional undergraduates to conduct research

in microbiology and environmental toxicology. These opportunities are limited to students who have demonstrated their potential in undergraduate courses in the basic sciences and environmental toxicology. With department approval, these undergraduates may also take graduate courses in microbiology and environmental toxicology. That coursework will be applied toward a graduate degree in microbiology and environmental toxicology if they are accepted into the program.

Graduate Programs

Graduate training in the Department of Microbiology and Environmental Toxicology (METX) prepares students to solve important problems in the field of environmental health by providing stimulating coursework, extensive scientific presentation training, and in-depth research that culminates in a thesis. Our department is housed on one floor of a new building, allowing extensive interactions between all members. There is no other program in the world that educates students to appreciate the interplay between microbes, chemical toxins, and health, providing the training students require to work effectively in a complex world. Graduate training in the METX department prepares students to become leaders in the field, following career paths in academia, teaching, industry, and government. Master of science (M.S.) students typically finish in two years and doctor of philosophy (Ph.D.) students in four to six years.

Key components of our graduate training include:

- Core courses utilizing a case study format: METX 200, *Interdisciplinary Approaches to Problems at the Interface of Microbiology and Environmental Toxicology*.
- Core course devoted to grant-writing skills: METX 205, *Scientific Skills, Ethics, and Writing*.
- Personalized class plan for the remaining three courses to fit the student's background and research goals. Possible courses include METX 201, *Sources and Fates of Pollutants*, METX 202, *Cellular and Organismal Toxicology*, METX 206A, *Advanced Microbiology*, METX 210, *Molecular and Cellular Basis of Bacterial Pathogenesis*, METX 238, *Pathogenesis: Molecular Mechanisms of Disease*, and METX 250, *Environmental Microbiology*, as well as courses in other departments such as Ocean Sciences 220, *Chemical Oceanography*, and Molecular Cell and Developmental Biology 200B, *Advanced Molecular Genetics*.
- Speaking presentation skills training through coursework and yearly departmental presentations.
- Scientific writing and literature mastery through the writing of a literature review in the first year.
- Weekly seminars that expose students to the breadth of our fields and provide students with opportunities to interact closely with speakers to form connections and collaborations.
- Qualifying examinations designed to perfect the student's ability to craft research plans.
- Extensive laboratory research training that starts immediately upon entering the program and culminates in the student's master's thesis or Ph.D. dissertation.

Sample Pathways

Pathways within the microbiology and environmental toxicology graduate program focus on interdisciplinary

approaches to addressing problems in environmental and public health. We offer several defined training pathways, and also encourage students to create their own.

Metals in the Environment

Research includes how organisms are exposed to metals, how these metals cause toxicity, and investigating the concentration, speciation, and isotopic composition of contaminant metals and metalloids.

Microbiology

Microbiology provides research training on molecular genetic analysis of both non-pathogenic and pathogenic microbes. Students study host-pathogen interactions, ecology and evolution of pathogenic microorganisms, adaptation of pathogenic and non-pathogenic microorganisms to environmental stresses, and mechanisms of microbial biotransformation of pollutants and toxic metals.

Cellular and Organismal Toxicology

This pathway provides training in the biochemical, molecular, cellular, and physiological processes that are impacted by exposures to such contaminants as toxic metals. Research includes exposure pathways and toxicity of contaminants and pathogens within humans, with emphasis on the molecular and cellular mechanisms underlying toxicity.

Program Requirements

The microbiology and environmental toxicology student's curriculum (courses METX) is tailored to the individual, creating a graduate experience that combines essential background material with coursework at the frontiers of science. The student, in conjunction with a faculty committee, chooses classes to complement the Ph.D. or master's thesis work that each student is performing. Students are encouraged to explore new areas and bring this expertise back to their thesis research.

Requirements for both Master's and Ph.D. Students in Microbiology and Environmental Toxicology

1. Core coursework: METX 200, *Interdisciplinary Approaches to Problems at the Interface of Microbiology and Environmental Toxicology*, and METX 205, *Scientific Skills, Ethics, and Writing*, must be taken and passed with at least a B.
2. Additional coursework: Two courses from the following: METX 201, 202, 206A, 210, 238, 250, and at least one additional approved graduate-level course within Microbiology and Environmental Toxicology or another department. Students must enroll in METX 281, 292, and 297 each quarter. Additional courses as recommended by your first-year advising committee.
3. Literature review: Under direction of the student's adviser, write a literature review of the current state of the field of the proposed dissertation research. The written review will be handed in to the student's adviser at the end of the summer of the first year.
4. Department seminar: Give a 25-minute departmental seminar each academic year, and one one-hour departmental seminar during the spring quarter of the second year presenting the student's research.

Requirements specific to the Ph.D. degree

1. Teaching assistant: Doctoral students are required to work as teaching assistants (TA) for at least one quarter. Priority for TA positions is given to first-year doctoral students, then to current doctoral students who have not yet worked as a teaching assistant.
2. Ph.D. qualifying examination (part I)—microbiology and environmental toxicology internal). Part I of the qualifying examination consists of two portions: preparation and defense of an independent research proposal, and knowledge of material presented in the microbiology and environmental toxicology core courses taken by the student. The student must complete part I no later than spring quarter of the second year.
3. Ph.D. qualifying examination (part II). Present and defend a dissertation research proposal to the student's Ph.D. qualifying examination (QE) committee. The student must complete part II no later than spring quarter of the third year.
4. Advancement to candidacy. The student advances to candidacy after completing all coursework, completing the literature review, giving a second-year seminar and passing the Ph. D. qualifying examination parts I and II.
5. Dissertation defense. The student must submit their doctoral dissertation to the dissertation committee for tentative approval at least one month before presenting a formal, public doctoral research seminar.

Requirements specific to the Master's degree

1. Master's comprehensive examination. The comprehensive examination tests knowledge of the material presented in the microbiology and environmental toxicology core courses taken by the student, as well as general knowledge related to the student's master's research. In general, this oral examination is taken in the fall quarter of the second year.
2. Thesis. Students are required to submit a thesis for fulfillment of the degree requirements. The thesis should be submitted to the student's master's reading committee by the second week of the final quarter of work, generally, spring of the second year.

Lower-Division Courses**80E. Aquatic Toxicology. ***

An introduction to the sources, cycling, and impacts of toxicants in aquatic systems, including acid rain, ground water, fresh water rivers and lakes, estuaries, and the ocean. Emphasis is on the properties of toxic chemicals that influence their biogeochemical cycles and factors that influence their toxicity to aquatic organisms and humans. (General Education Code(s): T2-Natural Sciences.) *A. Flegal*

Upper-Division Courses**101. Sources and Fates of Pollutants. S**

Presents in-depth important principles of environmental toxicology related to the introduction, transport, and fate of toxicants in aquatic and terrestrial environments,

including environmental chemistry and biogeochemical cycles as well as exposure to pathways and uptake by organisms. Additional emphasis placed on susceptibility and effects of toxicants across organ systems, toxicokinetic and biomarkers of exposure, and effects at the ecosystem level. Students cannot receive credit for this course and course 201. *A. Flegal*

102. Cellular and Organismal Toxicology. F

Emphases of biochemical, cellular, and organ system basis of intoxication, including dose-response relationships, biotransformation of toxicants, biochemical mechanisms underlying toxicity, factors influencing toxic action, and biomarkers of exposure. Emphasizes effects of various classes of toxins, including heavy metals and persistent synthetic organics, with a focus on susceptible biochemical/cellular processes of the central nervous, immune, hepatic, and renal target organ systems. Designed for advanced undergraduates. Students cannot receive credit for this course and course 202. Prerequisite(s): Biology 20A and 20B or equivalent; Biology 100, Biochemistry, and 110, Cell Biology, are recommended. Enrollment restricted to juniors and seniors. *D. Smith*

119. Microbiology. W

Cell and molecular biology of bacteria and their viruses, including applications in medicine, public health, agriculture, and biotechnology. (Also offered as Biology: Molecular, Cell, and Developmental 119. Students cannot receive credit for both courses.) Prerequisite(s): BIOL 100 or BIOC 100A. *V. Stone*

119L. Microbiology Laboratory. F,W,S

An introduction to the principles and practices of laboratory microbiology, with a substantial presentation of optical microscopy. Students are billed a materials fee. (Also offered as Biology: Molecular, Cell, and Developmental 119L. Students cannot receive credit for both courses.) Prerequisite(s): previous or concurrent enrollment in BIOL 119 is required; satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to biological sciences and affiliated majors; biology minors; other majors by permission. (General Education Code(s): W.) *M. Dalbey, C. Saltikov, K. Ottemann*

125. Practicing Safe Science (2 credits). W

Introduces research safety principles and practices. Instructors and guest experts discuss research hazards and control measures. Students explore the safe use of research methods and materials via hands-on and outside exercises. Issues include compliance with hazardous waste and other environmental safety regulations. *J. Schoonover*

138. Pathogenesis: Molecular Mechanisms of Disease. S

Overview of the pathogenic mechanisms underlying human disease at the physiological and molecular levels, with their implications for epidemiology, diagnosis, and treatment. Includes discussion of clinical cases and of emerging areas of research. Geared toward students interested in future research or clinical careers in the area of human or animal health. Students cannot receive credit for this course and Microbiology and Environmental Toxicology 238. (Also offered as Biology: Molecular, Cell, and Developmental 118. Students cannot receive credit for both courses.) Prerequisite(s): Biology 130. Enrollment restricted to students majoring in biology; health sciences; molecular, cell, and developmental biology; biochemistry and molecular biology; or neuroscience and behavior. Offered in alternate academic years. *M. Camps*

140. Molecular Biology of Prokaryotes. *

Focuses on several aspects of prokaryotic molecular biology. Covers transcriptional regulation, translational regulation, DNA replication and segregation, protein secretion,

transport of small molecules, control of metabolism, stress response, bacterial differentiation, signal transduction, biofilm formation, and motility. Strong focus on experimental techniques and approaches used in prokaryotic molecular biology. Focus on model bacteria such as *Escherichia coli* and *Bacillus subtilis*. Students cannot receive credit for this course and course 240. Prerequisite(s): Biology 119. *K. Ottemann*

144. Groundwater Contamination. S

Analyses of contemporary problems in groundwater contamination, based on current scientific understanding of contaminant transport in aquifers. Topics include both theoretical concepts and case studies. To be offered in alternate academic years. Prerequisite(s): Earth Science 110B. Offered in alternate academic years. *A. Flegal*

145. Medical Geology. *

An interdisciplinary analysis of natural geochemical processes that impact human health and of anthropogenic processes that exacerbate those impacts. Prerequisite(s): Chemistry 1A, 1B, 1C, 1M, and 1N. *A. Flegal*

150. Introduction to Research and Experimental Design. *

Lecture-based course for advanced undergraduates actively engaged in undergraduate research (e.g., independent study or senior thesis). Emphasizes basic lab skills, including laboratory safety and handling of laboratory equipment; experimental design; scientific record keeping; and literature searching, review, and management. *K. Ottemann, (FWS) The Staff*

151. Scientific Writing and Presentation. *

For advanced undergraduates who are actively engaged in undergraduate research (e.g., independent study or senior thesis). Emphasizes the collection, reduction, analysis, management, and interpretation of scientific data; the presentation of scientific data in written and oral formats; and further development of critical thinking. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): W.) *The Staff*

160. Coastal Environmental Toxicology and Policy (3 credits). *

Interdisciplinary analysis of the scientific basis and policy development to regulate and manage environmental pollutants in coastal waters. Focuses on case studies involving aspects of environmental toxicology and policy including environmental monitoring and regulatory programs; ecosystem restoration; and regulating the environmental impacts of coastal development. Enrollment restricted to sophomores, juniors, seniors, and graduate students. *M. Connor, G. Griggs, A. Flegal*

195. Senior Thesis. F,W,S

An individually supervised course, with emphasis on independent research culminating in a senior thesis. May be repeated for credit. *The Staff*

198. Independent Study. F,W,S

Provides for individual programs of study (a) by means other than the usual supervision in person or (b) when the student is doing all or most of the course work off campus. With permission of the department, two or three courses may be taken concurrently, or the course repeated for credit. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Reading, discussion, written reports, and laboratory research on selected topics. May be repeated for credit. *The Staff*

Graduate Courses

200. Interdisciplinary Approaches in Environmental Toxicology. F

Introduction to interdisciplinary, case-based approaches to problem-solving. Course demonstrates how important, current problems in environmental and human health have been addressed and solved. Assigned problems that integrate the different organization levels (environmental, molecular/cellular, organismal/public health) inherent to environmental and human health are presented. Students work in collaborative teams to analyze each problem and create a proposal for a research plan/solution. Enrollment restricted to graduate students. *D. Smith, M. Camps, K. Ottemann*

201. Sources and Fates of Pollutants. S

Presents in-depth important principles of environmental toxicology related to the introduction, transport, and fate of toxicants in aquatic and terrestrial environments including environmental chemistry and biogeochemical cycles as well as exposure pathways and uptake by organisms. Additional emphasis will be placed on the susceptibility and effects of toxicants across organ systems, toxicokinetics and biomarkers of exposure, and effects at the ecosystem level. Students cannot receive credit for this course and course 101. Enrollment restricted to graduate students; qualified undergraduate science majors may enroll with permission of instructor. *A. Flegal*

202. Cellular and Organismal Toxicology. F

Emphasizes biochemical, cellular, and organ system basis of intoxication, including dose-response relationships, biotransformation of toxicants, biochemical mechanisms underlying toxicity, factors influencing toxic action, and biomarkers of exposure. Emphasizes effects of various classes of toxins, including heavy metals and persistent synthetic organics, with a focus on susceptible biochemical/cellular processes of the central nervous, immune, hepatic, and renal target organ systems. Students cannot receive credit for this course and Microbiology and Environmental Toxicology 102 or BIOL 122. Enrollment restricted to graduate students. *D. Smith*

203. Cellular and Molecular Toxicology. *

Presents in-depth cellular and molecular principles of environmental toxicology. These include modes of action and cellular and molecular targets of toxicants, as well as mechanisms of cellular and molecular responses to toxicants and their detoxification. State-of-the-art biological methodologies and approaches to identify and study cellular targets of toxicants. Designed to provide students with a broad and deep understanding of the biological aspects of toxicology at both cellular and molecular levels, and the skills to approach emerging challenges in the field. Enrollment restricted to graduate students; qualified undergraduates may enroll with instructor's permission. *The Staff*

205. Scientific Skills, Ethics, and Writing. *

Course provides fundamental training of graduate students in the scientific method, experimental design, ethics in science, grant proposal and scientific writing, data presentation, and scientific speaking. Students are evaluated on class participation, performance, and a written NIH/NSF style research proposal. Enrollment restricted to graduate students. *The Staff*

206A. Advanced Microbiology. F

Focuses on aspects of bacterial molecular biology. Covers four main areas: (1) metabolism-catabolism, anabolism, building-block precursors; (2) transcription/signal transduction; (3) replication/plasmid biology/division; (4) translation/protein processing/secretion/cell structure.

Strong focus on experimental techniques and approaches used in molecular biology, and on model bacteria, such as *Escherichia coli* and *Bacillus subtilis*. Enrollment restricted to graduate students. Advanced undergraduates may enroll with permission of instructor. *K. Ottemann, V. Stone, C. Saltikov*

210. Molecular and Cellular Basis of Bacterial Pathogenesis. *

Focuses on the molecular basis of bacterial pathogenesis with specific emphasis on gene expression, regulation, and ecology and evolution. Advanced undergraduates with extensive background in microbiology and biology may enroll with permission of instructor. Enrollment restricted to graduate students. Advanced undergraduates with extensive background in microbiology and biology may enroll with permission of instructor. *F. Yildiz*

215. Seminar in Advanced Prokaryotic Molecular Biology (2 credits). *

Seminar focuses on aspects of prokaryotic molecular biology. Specific topics include transcriptional regulation, translational regulations, DNA replication, secretion of proteins, transport of small molecules, bacterial differentiation, signal transduction, biofilm formation, and motility. Discussions focus on model bacteria such as *Escherichia coli* and *Bacillus subtilis*. Enrollment restricted to graduate students. *F. Yildiz, C. Saltikov, K. Ottemann*

238. Pathogenesis: Molecular Mechanisms of Disease. S

Overview of the pathogenic mechanisms underlying human disease at the physiological and molecular levels, with their implications for epidemiology, diagnosis, and treatment. Includes discussion of clinical cases and of emerging areas of research. Geared toward students interested in research or clinical careers in the area of human or animal health. Students cannot receive credit for this course and course 138. Enrollment restricted to graduate students. *M. Camps*

240. Molecular Biology of Prokaryotes. *

Focuses on several aspects of prokaryotic molecular biology. Covers transcriptional regulation, translational regulation, DNA replication and segregation, protein secretion, transport of small molecules, control of metabolism, stress response, bacterial differentiation, signal transduction, biofilm formation, and motility. Strong focus on experimental techniques and approaches used in prokaryotic molecular biology. Focus on model bacteria such as *Escherichia coli* and *Bacillus subtilis*. Students cannot receive credit for this course and course 140. *K. Ottemann*

250. Environmental Microbiology (2 credits). S

How microbes interact with their environments. Topics include anaerobic metabolism; biotransformation of toxic metals and organic pollutants; geomicrobiology; life in extreme environments; water quality. Advanced undergraduates with extensive background in microbiology and biology may enroll with permission of instructor. Enrollment restricted to graduate students. *C. Saltikov*

281A. Topics in Environmental Toxicology. *

Selected topics in environmental toxicology. Topics vary from year to year. Enrollment restricted to graduate students; qualified upper-division science majors may enroll with instructor's permission. May be repeated for credit. *The Staff*

281C. Topics in Environmental Microbiology (2 credits). F,W,S

Seminar and discussion focusing on mechanism of microbial transformation of metals. Participants present results from their research projects in a seminar format. Relevant

journal articles presented and discussed. Enrollment restricted to graduate students; qualified undergraduates may enroll with instructor's permission. *C. Saltikov*

281F. Topics in Aquatic Toxicology. F,W,S

Analyses of the sources and fates of aquatic pollutants. Discussions on processes at the air-water interface, within the water column, and in aquatic sediments. Topics vary from year to year. Enrollment restricted to graduate students; qualified upper-division science majors may enroll with instructor's permission. May be repeated for credit. *A. Flegal*

281M. Topics in Molecular Toxicology (2 credits). F,W,S

Seminar and discussion on the mechanisms of toxicity in DNA alkylating agents. Participants present results from their research, and relevant journal articles are discussed. Enrollment restricted to graduate students. Undergraduates may enroll with instructor's permission. Enrollment limited to 5. May be repeated for credit. *M. Camps*

281O. Topics in Bacterial Pathogenesis (2 credits). F,W,S

Intensive seminar focusing on mechanisms of bacterial pathogenesis of the ulcer-causing bacterium *Helicobacter pylori*. Participants are required to present results from their own research and relevant journal articles. (Also offered as Biology: Molecular, Cell, and Developmental 280O. Students cannot receive credit for both courses.) Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. Enrollment limited to 20. May be repeated for credit. *K. Ottemann*

281Q. Cellular and Organismal Responses to Toxicants. F,W,S

Intensive research seminar on the concepts, theory, and techniques in deriving physiologically based pharmacokinetic models of toxin exposure, metabolism, and efficacy of therapeutic treatment in mammalian models of human metal toxicity. Enrollment restricted to graduate students; qualified undergraduates may enroll with permission of instructor. May be repeated for credit. *D. Smith*

281V. Topics in Bacterial Pathogenesis and Innate Immunity (2 credits). F,W,S

Focuses on the interplay between the human gut bacterial pathogen *Yersinia pseudotuberculosis* and the innate immune system of the host. Participants are required to present the goals, results, and conclusions from their own research. Participation in the general discussion during others' presentations is also required. Enrollment restricted to graduate students. Qualified undergraduates performing research under the supervision of the instructor may enroll with instructor's permission. May be repeated for credit. *V. Stone*

281Y. Biofilms: Processes and Regulation (2 credits). F,W,S

Intensive seminar series focusing on the most current work on genes and the processes that regulate biofilm development dynamics as well as on the recent developments on visualization of biofilms. Presentation and discussion based. Enrollment restricted to graduate students. Qualified undergraduate students may enroll with instructor's permission. May be repeated for credit. *F. Yildiz*

282. Current Approaches to Molecular Pathogenesis (2 credits). *

Graduate level seminar focusing on the mechanisms by which bacterial pathogens cause disease. Specific topics include basic concepts of virulence and virulence factors, virulence factor regulation, toxins, and interactions of pathogens with mammalian cells and organs. Discus-

sions focus on several key pathogens, including *Helicobacter pylori*, *Vibrio cholerae*, *Salmonella typhimurium*, and *Listeria monocytogenes*. May be repeated for credit. *The Staff*

290. Proseminar. *

Special topics offered from time to time by faculty, visiting professors, or staff members. Enrollment restricted to graduate students; qualified undergraduates may enroll with instructor's permission. May be repeated for credit. *The Staff*

290A. Epidemiology and Risk Assessment. *

Approaches different techniques of biological monitoring and the exposure and effect of biomarkers related to occupational and environmental exposure to chemicals. Available methods for risk assessment and identification of protective exposure limits also considered. (Formerly *Biological Impact of Chemical Exposures*.) *The Staff*

292. Introductory Graduate Seminar (no credit). F,W,S

Weekly seminars by academic and research faculty on their areas of special interest. Students write weekly abstracts on articles covered by the seminars. Enrollment restricted to graduate students; qualified undergraduates may enroll with instructor's permission. *The Staff*

297. Independent Study. F,W,S

Independent study for graduate students who have not yet settled on a research area for the thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Molecular, Cell, and Development Biology

See Biological Sciences, page 153.

MUSIC

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Faculty and Professional Interests

Professor

AMY C. BEAL

American music, 20th-century music, experimental and improvisatory performance practices, postwar and Cold War culture, German new music festivals and radio stations, piano performance, contemporary music ensemble

LINDA C. BURMAN-HALL

Baroque music and performance practices; historic and new keyboard repertoire (harpsichord, organ, and fortepiano); Indonesian music cultures; ethnomusicology

DAVID H. COPE, Emeritus

SHERWOOD DUDLEY, Emeritus

EDWARD F. HOUGHTON, Emeritus

DAVID EVAN JONES

Composition and analysis, chamber opera, Balkan music,

language and music, timbre and orchestration

HI KYUNG KIM

Composition, theory, contemporary music, analysis, orchestration, Korean music, world music composition, Founder and Artistic Director, Pacific Rim Music Festival

ANATOLE LEIKIN

Classical and romantic music history, theory, and performance practices, piano and fortepiano, Russian music

FREDRIC LIEBERMAN

Ethnomusicology; composition; the music industry and legal/ethical issues; American vernacular musics; musics of east, Southeast, and south Asia; organology

LETA E. MILLER

Twentieth-century American music, modern and baroque flute, 16th-century chanson and madrigal, music and science, 18th- and 20th-century flute literature and performance styles, music of C.P.E. Bach and Lou Harrison

GORDON MUMMA, Emeritus

PAUL NAUERT

Theory, composition; rhythm and meter; music cognition; mathematical and computer models of the compositional process

NICOLE A. PAIEMENT

Conducting; world premiere performance and recordings; contemporary chamber opera; interdisciplinary art; Founder and Artistic Director, Ensemble Parallèle

JOHN M. SCHECHTER, Emeritus

Associate Professor

KARLTON E. HESTER

Premeditated, electroacoustic, and spontaneous composition; flutes, saxophones, and interdisciplinary performance; improvisational and Afrocentric music theory, analysis and history. Artistic Director, Global African Music and Arts Festival/Symposium; UCSC/ISIM International Improvisation Festival/Conference.

NINA TREADWELL

Renaissance through early baroque music history and performance practices, early plucked-string instruments (theorbo, renaissance, and baroque guitar; renaissance lute), 16th- and 17th-century Italian theatrical music, gender studies, women and music, literary and critical theory

Assistant Professor

BENJAMIN L. CARSON

Theory and composition, music perception, empiricism and subjectivity, Schoenberg, popular music, improvisation

TANYA H. MERCHANT

Ethnomusicology, musics of Central Asia and the former Soviet Union, music and gender, identity, nationalism, globalization, and the institutionalization of music

DARD NEUMAN, Kamil and Talat Hasan Endowed Chair in Classical Indian Music

Ethnomusicology; Hindustani music; colonialism, nationalism, technology and performance; sitar

Lecturer

ERIKA ARULANANTHAM

Group piano, musicianship

NATHANIEL A. BERMAN

Concert choir

MARK BRANDENBURG

Clarinet

PAUL D. CONTOS

Saxophone

MARY JANE COPE

Piano, fortepiano

WILLIAM D. COULTER

Classical guitar

GREER ELLISON

Flute

PETER Q. ELSEA

Electronic music and music technology

MARIA V. EZEROVA

Piano, musicianship

BARRY L. GREEN

String bass

ERIN IRVINE

Bassoon

ROBERT KLEVAN

Wind ensemble, large jazz ensemble

MURRAY LOW

Jazz theory and improvisation

PATRICE L. MAGINNIS

Voice

ROY T. MALAN

Violin, viola

GEORGE E. MARSH

Drumset, improvisation, rhythm theory, Inner Drumming, game theory, polyrhythms, Deep Listening

PATRICIA L. MITCHELL

Oboe

MESUT ÖZGEN

Classical guitar, classical guitar ensemble

STAN E. POPLIN

String bass, jazz ensembles

RICHARD ROPER

Trumpet

VANESSA RUOTOLO

Cello

JOHN T. SACKETT

Music theory

WAYNE J. SOLOMON

Trombone

BRIAN J. STAUFENBIEL

Voice, university opera theater

UNDANG SUMARNA

West Javanese gamelan

SUSAN C. VOLLMER

Horn

WILLIAM K. WINANT

Orchestral percussion, percussion ensemble

THE STAFF

Latin American ensembles



Distinguished Adjunct Professor

ALI AKBAR KHAN (deceased)

North Indian classical music

Visiting Professor

AASHISH KHAN

North Indian classical music

Program Description

The UCSC music curriculum is distinctive in developing musicians who integrate scholarship with performance. Although this rigorous program primarily

addresses Western art music, it also incorporates the study of world music cultures in both their art and vernacular traditions. A major in music establishes a substantial foundation for further academic or performance studies. Two undergraduate majors are offered: the bachelor of music (B.M.), which especially develops the student's attainment in performance, and the bachelor of arts (B.A.), which cultivates greater breadth in the student's academic achievement. Two minors in music are also offered: one in electronic music, and one in jazz. The electronic music and jazz minors are open to music majors, as well as to students pursuing other majors.

The music program provides courses for both general education and the music major/minor curriculum. Students from all disciplines are encouraged to enroll in music courses, including performance groups and private instruction.

The Music Center includes a 400-seat recital hall that has recording facilities, specially equipped classrooms, individual practice and teaching studios, a student computer laboratory, rehearsal space for ensembles, a gamelan studio, and studios for electronic and computer music. McHenry Library has a separate music section and listening rooms that have individual audio and video facilities. Recording and media equipment is available from the Learning Technologies center.

Letter Grade Requirement

All upper-division courses applied toward the music majors must be taken for a letter grade, except Music 120 and ensembles, which may be taken Pass/No Pass.

Requirements for the Bachelor of Arts

The course requirements for the bachelor of arts (B.A.) in music include courses 30A/L-B/M-C/N, 100A-B-C, 101A-B-C-D; either course 180A or 180B; another course selected from either 120, 124, 130, or the 180A or 180B course not already taken; and 197. Basic keyboard skills are required as a component of the music theory curriculum. Many students will need to take Music 60, *Group Instruction in Piano*, concurrently with the Music 30 sequence to achieve the appropriate level of skill. In addition, music majors are required to enroll in a minimum of six quarters of evaluated instrumental or choral ensembles, as well as a minimum of six quarters of evaluated individual instrumental or vocal lessons. Students who demonstrate insufficient potential when auditioning for individual instruction may have limited access to lessons, and they may be denied entry into the major. It is strongly recommended that these ensembles and lessons be taken every quarter from the beginning of the core curriculum (course 30 sequence). Music majors in the B.A. program must successfully complete the proficiency audition (see below).

Although a foreign language is not required for completion of the B.A. in music, students planning graduate work are strongly advised to study a language pertinent to their research area at least equivalent to level 3 at UCSC or be able to pass the level-4 entrance examination.

Students are encouraged to prepare a senior project, which may take one of three forms: a full senior recital, a full senior thesis, or a partial recital with a related shorter thesis. To be considered for highest honors in the major, B.A. students must complete, on an excellent level, a senior project.

Music B.A. Sample Planners

The following are two recommended academic plans for students to complete during their first two years

as preparation for the music major. Plan One is a guideline for students who are committed to the major early in their academic career; Plan Two is for students who are considering the major. Four-year plans may be found in the *Music Student Handbook*, available at the Music Department office or on the Music Department web site at http://music.ucsc.edu/undergrad/handbook_ug_current.pdf.

Students should check with the department office for the most up-to-date course schedules and program-planning advice since courses are not necessarily taught in the same quarters each academic year.

| Plan One | | | |
|---------------|---|----------------------|----------------------|
| Year | Fall | Winter | Spring |
| 1st (frsh) | MUSC 11A (recommended) | MUSC 30B/M | MUSC 30C/N |
| | MUSC 30A/L lessons | lessons | lessons |
| | ensemble (group piano, Mus 60, may be required; see courses 30A/L) | ensemble | ensemble |
| 2nd (soph) | MUSC 100A lessons | MUSC 100B lessons | MUSC 100C lessons |
| | ensemble | ensemble | ensemble |

| Plan Two | | | |
|---------------|--|--------------------------|--------------------------|
| Year | Fall | Winter | Spring |
| 1st (frsh) | MUSC 11A (recommended) | MUSC 13 (recommended) | MUSC 14 (recommended) |
| | lessons | lessons | lessons |
| | ensemble | ensemble | ensemble |
| 2nd (soph) | MUSC 30A/L (group piano, MUSC 60, may be required; see courses 30A/L) | MUSC 30B/M | MUSC 30C/N |

General Examinations

All students majoring in the B.A. program are required to take the following examinations, which are discussed in greater detail in the *Music Student Handbook*.

Core Curriculum Placement Examination (a sample of the examination can be viewed at <http://music.ucsc.edu/undergrad>). Students are tested in the areas of theory, music literature, and ear training. Success on this exam (or a score of approximately 85 percent or higher on the final examination of Music 14) is a prerequisite to course 30A/L. Students should also take the examination to place out of course 13 or to place into course 14. The examination is given during fall quarter on the same day as the music orientation meeting. Transfer students who demonstrate acceptable competency on the placement examination may be recommended for advanced placement based on a further examination (including testing in keyboard and sight-singing skills).

Advisory audition. Students are required to take an advisory audition on their major instrument or in voice at the conclusion of course 30A/L.

Proficiency audition. Students are required to demonstrate at least an upper-intermediate level of proficiency on their major instrument or in voice before enrolling in course 100B.

Senior exit seminar. Students in the B.A. program are required to take the exit seminar (course 197), which encompasses material from all segments of the required curriculum.

Requirements for the Bachelor of Music

The bachelor of music degree (B.M.) is designed for those who intend to pursue a career in performance. Acceptance to the program is by audition during fall

quarter. These auditions are open to registered UCSC students only, although prospective students may submit a tape to the Music Department and ask to receive an informal opinion about their chances for acceptance into the major.

B.M. students major in an instrument or in voice. For the audition, students should prepare three pieces or movements of a contrasting nature from at least two different stylistic periods. (Two contrasting movements from the same sonata or concerto may count as two of the three required pieces.) Prospective students' optional tapes should also meet these specifications to receive an unofficial evaluation from the Music Department.

The requirements for the B.M. include courses 30A/L-B/M-C/N, 100A-B-C, 101A-B-C-D, 180A or 180B, and 196B. In addition, students are required to enroll in a minimum of 12 quarters of evaluated instrumental or vocal ensembles, as well as a minimum of 11 quarters of evaluated instrumental or vocal lessons. Transfer students must enroll in lessons and ensembles every quarter in residence. A senior recital (course 196B) is required in the final quarter. The music core curriculum placement examination (see above), or passing course 14 with a final examination score of approximately 85 percent or higher, is a prerequisite to course 30A/L. Basic keyboard skills are required as a component of the music theory curriculum; some students will need to take course 60, *Group Instruction in Piano*, concurrently with the course 30A/L sequence to achieve the appropriate level of skill. B.M. students take a jury examination in their major instrument or in voice at least twice a year and perform one piece in the regular UCSC student recital series at least once a year. In addition to these requirements, voice majors are required to take French 1, German 1, and Italian 1. For students who wish to concentrate in jazz, the following changes for the B.M. requirements apply: students will take Music 111B instead of 180A or B; Music 174 (*Jazz Improvisation*) is required and may replace one quarter of ensembles; Music 175 (*Jazz Theory*) is required.

The B.M. program differs from the B.A. program in requiring more credits in performance and slightly fewer in theoretical disciplines. B.M. students are not required to take course 120, 124, or 130. The senior exit requirement for B.M. students is a senior recital. To receive highest honors, B.M. students must also complete, on an excellent level, the *Senior Exit Seminar* (Music 197).

B.M. Four-Year Sample Study Planner for Students Concentrating in an Instrument

Note: It is typical of B.M. programs at all institutions to spread general education requirements throughout a student's four years to allow for early specialization. Students should check with the department office for the most up-to-date course schedules and program planning advice, since courses are not necessarily taught in the same quarters each academic year. Numbers of quarter credits are in parentheses.

| Year | Fall | Winter | Spring |
|---------------|----------------------------|--------------|--------------|
| 1st (frsh) | lessons (3) | lessons (3) | lessons (3) |
| | ensemble (2) | ensemble (2) | ensemble (2) |
| | gen ed/college core (5) | gen ed (5) | MUSC 14 (5) |
| | gen ed (5) | gen ed (5) | gen ed (5) |
| 2nd (soph) | lessons (3) | lessons (3) | lessons (3) |
| | ensemble (2) | ensemble (2) | ensemble (2) |
| | MUSC 30A (5) | MUSC 30B (5) | MUSC 30C (5) |
| | MUSC 30L (2) | MUSC 30M (2) | MUSC 30N (2) |
| | MUSC 60 (2)* gen ed (5) | gen ed (5) | gen ed |

| Year | Fall | Winter | Spring |
|-------------|---|---|---|
| 3rd (jr) | lessons (3) ensemble (2) MUSC 100A (5) gen ed/elective (2-5) | lessons (3) ensemble (2) MUSC 100B (5) MUSC 101A (5) | lessons (3) ensemble (2) MUSC 100C (5) MUSC 101B (5) |
| 4th (sr) | lessons (3) ensemble (2) MUSC 101C (5) gen ed | lessons (3) ensemble (2) MUSC 101D (5) gen ed/elective (5) | MUSC 196B (5) ensemble (2) MUSC 180A or B (5) |

*Music 60 (*Group Instruction in Piano*) is not a course requirement for the major but should be taken if the student needs preparation for the keyboard proficiency examination. The course is geared to Music 30A/L. (Current music majors frequently take 17–20 credits in this configuration of courses.)

Voice majors need to work closely with an adviser to schedule general education courses because of the added language requirements; a Summer Session may be necessary. It is recommended that voice majors take a language course each fall quarter during the first three years and that vocal repertory in that language be stressed throughout the academic year. For example, instead of enrolling in a general education course during the fall quarter of the first, sophomore, and junior years, a student concentrating in voice might enroll in Italian 1, German 1, and French 1, respectively.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in music is satisfied by completing courses 101B, 101C, and 101D.

Minors

Electronic Music

The electronic music minor focuses on the study of creating music using the tools of modern technology. It is designed to complement the music major or programs in other media by providing instruction in advanced skills of audio production, sound synthesis, and computer-assisted composition. A student may obtain a minor in electronic music by completing the following:

- any course in the 11 series;
- course 13 (may be satisfied through the music core curriculum placement examination);
- course 14 (or course 30A/L placement);
- courses 80C, 123, 124, 125, and two quarters of 167;
- one of the following: course 80L or 80R (or a similar music course that has a technical focus as approved by the department), or Film 171A or Theater Arts 114;
- one of the following: Physics 80A or 160; or Computer Science 5C, 5J, 5P, or 12A; or Electrical Engineering 70, 153, or 171

Jazz

The jazz minor focuses on the study of the history, theory, and performance of jazz. In addition, students may be introduced to musical styles that have had profound influences on this uniquely American art form: folk and popular musics of Africa, Europe, and the United States and Western classical music. The jazz minor is limited

to students who have sufficient performance proficiency to pass auditions for entry into the jazz ensembles. The required courses for the minor in jazz are the following:

- course 11A;
- course 14 (students not qualified to take course 14 must also take course 13 as a prerequisite);
- course 75 and 175;
- course 111B (students not qualified to take course 111B must also take course 11B);
- course 11C, 11D, 80J, or 80Q;
- five quarters of ensembles, including at least three quarters of the jazz ensembles (courses 3 and/or 164). At least two quarters must be upper-division. Students who repeat course 174 for credit can use the second and subsequent quarters of 174 to fulfill a portion of the ensemble requirement; used in this way, course 174 counts as a jazz ensemble;
- course 174 (may be repeated for credit).

Detailed information about the music majors and minors may be obtained from the Music Department office.

Honors

Honors in the major are conferred by vote of the music faculty. B.A. or B.M. students can be awarded honors for excellent work in individual areas, including course work, senior project (thesis or recital), or *Senior Exit Seminar* (Music 197). Excellent work in any two of these areas normally results in honors in the major.

To be considered for highest honors in the major, B.A. students must complete a (non-required) senior project and B.M. students must complete the (non-required) *Senior Exit Seminar*. Honors in all three areas—coursework, senior project, and *Senior Exit Seminar*—normally results in highest honors in the major.

Transfer Students

The Music Department encourages transfer students to take the core curriculum placement examination and seek academic counseling before transfer (a sample of the exam can be viewed at <http://music.usc.edu/undergrad/>). Transfer students who have some background in music theory normally test either into course 14 or into 30A/L (which is only offered in the fall quarter). Students who test into course 13 or 14 take one or both of these courses in their first year to prepare for 30A/L the following fall. Transfer students who have completed all of their general education requirements and who test into course 30A/L upon transfer may be able to complete the music major in two years.

B.A. transfer students should note that upon completion of course 100A, they need to perform on a musical instrument or voice at an upper-intermediate level. Prospective students wishing to have their performance skill level assessed by faculty in preparation for entry to the program are encouraged to send a tape for faculty review.

B.M. transfer students should prepare to audition in the fall quarter after enrollment. (For audition requirements, see the Requirements for the Bachelor of Music section above.) In certain cases, some or all of the applied music requirement may be waived based on prior coursework.

B.M. Sample Study Planner for Transfer Students Concentrating in an Instrument

This plan assumes that all general education requirements have been met. The music core curriculum placement examination generally places junior transfer students in Music 30A/L (which is only offered during fall quarter).

Students should check with the department office for the most up-to-date course schedules and program planning advice, since courses are not necessarily taught in the same quarters each academic year. Numbers of quarter credits are in parentheses.

| Year | Fall | Winter | Spring |
|-------------|---|---|--|
| 3rd (jr) | lessons (3) ensemble (2) MUSC 30A (5) MUSC 30L (2) MUSC 60 (2)* | lessons (3) ensemble (2) MUSC 30B (5) MUSC 30M (2) MUSC 101A (5) | lessons (3) ensemble (2) MUSC 30C (5) MUSC 30N (2) MUSC 101B (5) |
| 4th (sr) | lessons (3) ensemble (2) MUSC 100A (5) MUSC 101C (5) | lessons (3) ensemble (2) MUSC 100B (5) MUSC 101D (5) elective (5) | MUSC 196B (5) ensemble (2) MUSC 100C (5) MUSC 180A or B (5) |

*Music 60 (*Group Instruction in Piano*) is not a course requirement for the major but should be taken if the student needs preparation for the keyboard proficiency examination. The course is geared to Music 30A/L. (Current music majors frequently take 17–20 credits in this configuration of courses.)

A transfer student concentrating in voice could enroll in Italian 1 and German 1 in the fall and winter quarters, respectively, of the junior year, and in French 1 in the spring quarter of the senior year. Such a transfer student would complete any desired electives prior to arrival at UCSC and/or in Summer Session. However, transfer students should try to satisfy as many of the language requirements as possible before entering the program.

Individual Instruction

Lessons in the instruments listed below are available on a fee basis and by audition with the instructor. Depending on whether a student is pursuing a particular music undergraduate degree program (B.A. or B.M.), or a music minor, concurrent enrollment in an appropriate ensemble is required for a stipulated number of quarters. Consult the Undergraduate *Music Student Handbook* for details.

Authorization from the performance instructor is a requirement for entry into the music majors. Students who demonstrate insufficient potential when auditioning for individual instruction may have limited access to lessons, and they may be denied entry into the major.

Courses 61, 62, and 161 carry partial course credit. Each quarter of enrollment in course 61 is equivalent to 2 credits; each quarter of enrollment in course 62 or 161 is equivalent to 3 credits. Course 162, open to advanced students only, carries 5 credits.

Class instruction for partial credit (courses 60 and 63) is available on some instruments but may not be used to fulfill the individual lesson requirements for the major.

Bass: B. Green, S. Poplin

Bassoon: E. Irvine

Cello: V. Ruotolo

Clarinet: M. Brandenburg

Class Piano: E. Arulanantham

Flute: G. Ellison Wolfson

Guitar, classical: W. Coulter, M. Özgen

Harpichord: L. Burman-Hall

Horn: S. Vollmer
Oboe: P. Mitchell
Percussion: G. Marsh, W. Winant
Piano, classical: M. J. Cope, M. Ezerova, A. Leikin
Saxophone: P. Contos
Trombone and tuba: W. Solomon
Trumpet: R. Roper
Violin and viola: R. Malan
Voice: P. Maginnis, B. Staufenbiel

Performance Groups

The participants in some groups are selected by auditions open to the entire university community. Students receive two course credits for each quarter of enrollment in any of the ensembles.

University Orchestra: N. Paiement
University Concert Choir: N. Berman
Women's Chorale: Staff
Chamber Singers: N. Paiement
University Opera Theater: B. Staufenbiel
Opera Workshop: P. Maginnis, B. Staufenbiel
Early Music Consort: L. Burman-Hall, L. Miller, N. Treadwell
Chamber Music: Staff
Large Jazz Ensemble: R. Klevan
Small Jazz Ensembles: S. Poplin
Latin American Ensembles: staff
Contemporary Music Ensemble: A. Beal
West Javanese Gamelan: U. Sumarna
Balinese Gamelan: L. Burman-Hall
Wind Ensemble: R. Klevan
Classical Guitar Ensemble: Mesut Özgen
North Indian Music Workshop: D. Neuman, A. Khan
Eurasian Ensemble: T. Merchant

Graduate Programs

Master of Arts

The master of arts (M.A.) degree program in music has emphases in composition, musicology/ethnomusicology, or performance practice, and integrates studies in performance, composition/analysis, and research. In consultation with a faculty adviser, the student pursues a two-year course of studies culminating in a final project that combines an original composition, written thesis, or essay with a related public performance or lecture recital.

Requirements

A minimum of 60 course credits completed at UCSC is required for the degree. All M.A. students are required to complete Music 200, 201, and 202, as well as 252 during each quarter in residence (for students entering the program fall 2007 and thereafter).

Students with an emphasis in composition also complete Music 219, 220, and one 203 course.

Students with an emphasis in musicology/ethnomusicology or performance practice also select three courses from Music 203A-H (course 206D meets the requirement for one 203 course).

The final project for the degree includes both performing and scholarly components, which vary according to the degree emphasis.

Students with a composition emphasis submit a thesis composition together with an essay that addresses historical, technical, and/or interpretive issues of the music (course 299); and they complete a full-length recital (course 298) of their compositional work.

Students with a musicology/ethnomusicology emphasis complete a thesis (course 299) and a short performance or lecture-recital related to the thesis (course 298).

Students with a performance practice emphasis complete a full-length recital (course 298) and an accompanying short essay that addresses historical, technical, and/or interpretive aspects of the music performed in the recital. Students in this emphasis whose main area is conducting complete a full-length recital (course 298) and one of the following: a shorter lecture-recital, a short analytical or contextual essay on a different topic, or collaboration with a graduate student composer or faculty composer on a premiere public performance. Students are encouraged to create a program involving corollary studies such as computer studies, area cultural studies, linguistics, anthropology, theater arts, and visual arts.

Current skill in reading and comprehension of a relevant foreign language must be demonstrated upon enrollment by attainment of level 3 on the UCSC language placement examination or, during the first year of enrollment, by satisfactory completion of level 3 of the language at UCSC, or by submission of an official transcript documenting successful completion of one year of university-level foreign language. With the approval of the primary adviser, students whose emphasis is algorithmic composition may complete three quarters/one year of university-level instruction in computer programming in lieu of fulfillment of the foreign-language requirement. Knowledge of languages not offered at UCSC must be demonstrated as determined by the Music Graduate Committee.

Prior to the start of classes each fall quarter, each incoming M.A. student is required to complete a three-hour diagnostic examination which is intended to identify areas in which supplementary coursework may be needed, in addition to the courses listed above.

Doctor of Musical Arts

The doctor of musical arts (D.M.A.) degree program in music composition has tracks in computer-assisted composition and world music composition. The track in computer-assisted composition includes algorithmic techniques for the generation of musical materials and structures to be realized in the creation of instrumental, vocal, and digitally synthesized music. The track in world music composition addresses a variety of compositional approaches influenced by indigenous world musics, with a focus upon those musics taught by faculty composers, ethnomusicologists, and applied instructors. The D.M.A. program seeks to develop accomplished, active, and articulate composers who have a broad awareness of the diverse styles, cultural influences, media, venues, and technical means available to them in the 21st century.

Requirements

For students entering with the bachelor's degree, a minimum of 102 credits in coursework at UCSC will be required. All students must be in residence for a minimum of nine quarters. Students must enroll in a minimum of 12 credits each quarter until they advance to candidacy. After advancing to candidacy, students remaining in residence must take a minimum of one five-credit course each quarter.

For students entering with a master's degree from another institution, a minimum of 72 credits in coursework at UCSC will be required. All students must be in residence for a minimum of six quarters. Students must enroll in a minimum of twelve credits each quarter until they advance to candidacy. After advancing to candidacy, students remaining in residence must take a minimum of one five-credit course each quarter.

Required courses include Music 200, 201, and 202 (students entering with a master's degree from another

institution may petition to waive one or more of these courses by submitting documentation for equivalent courses completed elsewhere). Students in the computer-assisted composition track complete Music 206B, one 203 course, and two quarters of 267 or another 206 course. Students in the world music composition track complete Music 206A, 203H, and 203G or another 206 course. All students are required to complete Music 219, 220, 252 each quarter in residence, and five quarters of enrollment in independent study, including Music 297, 298, and 299.

Current skill in reading and comprehension of a relevant foreign language must be demonstrated upon enrollment by attainment of level 3 on the UCSC language placement examination or, during the first year of enrollment, by satisfactory completion of level 3 of the language at UCSC, or by submission of an official transcript documenting successful completion of one year of university-level foreign language. With the approval of the primary adviser, students whose emphasis is algorithmic composition may complete three quarters/one year of university-level instruction in computer programming in lieu of fulfillment of the foreign-language requirement. Knowledge of languages not offered at UCSC must be demonstrated as determined by the Music Graduate Committee.

Prior to the start of classes in fall quarter, each incoming D.M.A. student is required to complete a three-hour diagnostic examination which is intended to identify areas in which supplementary coursework may be needed, in addition to the courses listed above.

A D.M.A. student who entered the D.M.A. program with a bachelor's degree may apply for a M.A. degree, whether he/she is leaving the D.M.A. program or continuing toward completion of the D.M.A. degree, by fulfilling the following requirements:

- Completion of a minimum of five quarters at UCSC.
- Completion of a minimum of 35 graduate or upper-division course credits (including all courses required for the M.A. degree with an emphasis in composition).
- Successful completion of the qualifying recital (course 298).

Pre-qualifying Reviews

Before the end of the first year of study, all D.M.A. students must present a half recital of their compositions from that year, and submit the scores and recital recording as a portfolio, which faculty will use to assess the student's progress in the program. In unusual cases, when progress has been minimal, faculty reserve the right to terminate a student's enrollment in the program. Typically, the half recital is satisfied by a combination of 1) participation in a concert of graduate-student compositions sponsored each April by Porter College and the Music Department, and 2) participation in a public reading of graduate-student final projects from course 220 at the end of spring quarter.

The Qualifying Recital

At the end of their second year of study, all students admitted to the D.M.A. program must present a half-recital (perhaps 35-40 minutes of music) representing their best work since entering the program. The D.M.A. qualifying recital will be evaluated by the student's primary adviser and by a second faculty member (generally a second composer) selected by the student in consultation with the primary adviser.

Dissertation Prospectus

The dissertation prospectus must be submitted by the beginning of spring quarter one year before the scheduled qualifying examination. The prospectus must include a proposal describing the scope and nature of the dissertation composition and the accompanying essay. In addition to defining the parameters of the dissertation itself, the dissertation prospectus will suggest to the student's qualifying examination committee those areas of study that should be emphasized in the student's qualifying examination.

Qualifying Examination

Advancement to candidacy is contingent upon the passing of a written examination and an oral examination normally administered at the end of year three for students entering with a bachelor's degree, and year two for students entering with a master's degree from another institution. For the written portion of the examination, the qualifying examination committee provides questions on the three topics assigned as areas of emphasis. The oral examination is administered by the student's qualifying examination committee and may concern any aspect of the assigned topics with an emphasis on those issues addressed in the written portion of the examination. Advancement to candidacy will be granted after successful completion of the written and oral examinations, acceptance of the dissertation reading committee form, satisfactory completion of course work and the foreign language requirement, and the payment of the necessary fees.

Dissertation

D.M.A. students must complete a dissertation consisting of a substantial musical composition accompanied by an essay. One to two years of work beyond the qualifying examinations should be sufficient for the completion of the dissertation, except in cases where extended fieldwork is required.

Final Examination

The final examination will be a public oral defense of the dissertation. After an oral presentation by the candidate, the candidate will be questioned by the Dissertation Committee.

Doctor of Philosophy in Music

The doctor of philosophy (Ph.D.) degree in music has an emphasis in cross-cultural studies, and aims to provide doctoral students with an integrative framework for music scholarship, emphasizing how musicology and ethnomusicology interact and complement one another. In addition to cultural approaches to world musics, the new program also encourages the integration of scholarly research with musical performance, emphasizing how performance serves both rhetorical and symbolic ends within various cultural settings. To this end the concept of "performance practice" plays a significant role in this program, given that the concept of historically or culturally informed performance is applicable to music from the earliest times to the present day in all geographical and cultural regions, and can encompass research activities as diverse as fieldwork, historical editing, and recording, as well as publishing of books and articles on the traditions of composition and performance.

Requirements

Students entering the Ph.D. program with a bachelor's degree are required to complete the following courses: Music 200, 201, 202, three courses from Music 253, three courses from Music 254, three courses from Music 203 (Music 206D) or a 254 course may each

substitute for one 203 course), Music 252 during each quarter of residence, and Music 299.

Students entering the Ph.D. program with a master's degree are required to complete following courses: three courses from Music 253 series, three courses from the Music 254 series, Music 252 during each quarter of residence, and Music 299.

Students entering the Ph.D. program are expected to have reading knowledge of a foreign language equivalent to at least one year of course work. In addition, students must acquire reading knowledge, equivalent to one year of coursework, of a second foreign language relevant to their area of interest during their first year of enrollment, or to demonstrate equivalent knowledge as determined by the Music Graduate Committee.

Prior to the start of classes in fall quarter, each incoming Ph.D. student is required to complete a three-hour diagnostic examination which is intended to identify areas in which supplementary course work may be needed, in addition to the courses listed above.

Ph.D. students entering the program with a bachelor's degree are required to submit a research paper by the beginning of the fourth quarter in residence, which will be revised that quarter under the supervision of the student's faculty adviser, and will be evaluated at the end of the quarter by the adviser and an additional faculty member. Students whose paper is assessed as unsatisfactory will not be allowed to continue in the Ph.D. program.

Students may devise a program of study that includes additional music courses, and courses from other disciplines suited to their special areas of concentration, in addition to the required courses.

Students who entered the Ph.D. program with a bachelor's degree may apply for the M.A. degree after completion of a minimum of five quarters in residence, the fourth-quarter research paper, and the following courses: 200, 201, 202, one course from 203A-H, and one course each from the 253 and 254 seminar series, and course 297.

Pre-qualifying reviews

At the end of the first year of study, all students accepted into the Ph.D. program will submit a brief report on work completed during that year. This report will inform a consideration by the music faculty of the student's status in the graduate program. Faculty will offer comments and suggestions to be communicated to the student either directly or through the student's adviser. However, if progress is minimal, faculty reserve the right to terminate a student's enrollment in the program.

Qualifying Examinations

Advancement to candidacy is contingent upon passing both written and oral examinations. The written qualifying examination will test knowledge absorbed through the two years of coursework as well as material in the student's field of concentration. The oral examination will focus on the student's developed expertise in her/his chosen specialization. Students must be registered in the quarter they take their qualifying examination.

The examinations will normally be administered in year four for students entering with a bachelor's degree, and in year three for students entering with a master's degree.

Advancement to candidacy will be granted after successful completion of the written and oral examinations, acceptance of the dissertation reading committee form, satisfactory completion of coursework and the foreign-language requirement, and the payment of the necessary fees.

Dissertation

To satisfy requirements for the degree, a student must complete a dissertation and present a related formal lecture or lecture-recital. The dissertation must embody substantial and original scholarly work based on a clearly distinguishable contemporary or historical music-cultural tradition, in any music-culture(s) of the world in which the UCSC program offers expertise. The public lecture or performance must demonstrate the student's grasp of the pertinent music-cultural performance tradition or music-cultural and/or music-historical concepts.

Final Examination

The final examination will be an oral defense of the dissertation open to the university faculty. Successful completion of this examination will be determined by a majority vote of the dissertation reading committee. Additional information about the program, including application and admission, is available from the Division of Graduate Studies and on the department web site: <http://music.ucsc.edu/>.

Lower-Division Courses

1A. Women's Chorale (2 credits). *

Study of vocal and choral techniques in the context of ensemble rehearsals, often culminating in public performance. Repertoire to include varied works for treble choir, both a cappella and with instrumental accompaniment. Familiarity with basic music notation recommended. Some additional rehearsal time, both individually and with the group is required. Students are billed a materials fee. Admission by audition with conductor prior to first class meeting. See enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. (General Education Code(s): A.) *N. Paiement*

1C. University Concert Choir (2 credits). *

A study of selected works for mixed chorus, with emphasis on masterworks for chorus and orchestra, culminating in one or more public concerts. Familiarity with basic music notation recommended. Admission by audition with conductor prior to first class meeting. See enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): PR-E, A.) *The Staff*

2. University Orchestra (2 credits). F,W,S

A study of selected works for orchestra, culminating in one or more public concerts. Admission by audition with conductor prior to first class meeting. See enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): PR-E, A.) *N. Paiement*

3. Large Jazz Ensemble (2 credits). F,W,S

Instruction in performance in large jazz ensembles with written arrangements. Prepares a specific repertory for public performance. Admission by audition with instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *R. Klevan*

4A. Latin American Ensemble: "Voces" (2 credits). *

Instruction in diverse musical traditions, and their culturally-grounded performance contexts, of Native American, Ibero-American, and African American music cultures of Latin America, including texted music in Spanish and Quechua or other regional languages. The class forms an ensemble that prepares varying cultural and national repertoires for public performance. Some Spanish language

ability is recommended. Attend first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *The Staff*

4B. Latin American Ensemble: “Taki Ñan” (2 credits). *

Development of Latin American, Native American, Ibero-American, African American, and/or *Nueva Canción* (New Song) repertoire in a small ensemble setting. Three quarters of course 4A or previous enrollment in course 4B required prior to enrolling in this course. Admission by audition with instructor at first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment limited to 10. May be repeated for credit. (General Education Code(s): A.) *The Staff*

5A. West Javanese Gamelan Ensemble: Beginning (2 credits). F,W,S

Instruction in practice and performance of gamelan music from Java or Sunda. Preparation of several works for public presentation. Attend first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. (General Education Code(s): A.) *U. Sumarna*

5B. West Javanese Gamelan Ensemble: Intermediate (2 credits). F,W,S

Instruction in practice and performance of gamelan music from Java or Sunda. Preparation of several works for public presentation. Attend first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. (General Education Code(s): A.) *U. Sumarna*

5C. West Javanese Gamelan Ensemble: Advanced (2 credits). F,W,S

Instruction in practice and performance of gamelan music from Java or Sunda. Preparation of several works for public presentation. Attend first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. (General Education Code(s): A.) *U. Sumarna*

6. Classical Guitar Ensemble (2 credits). *

Study of selected repertoire and instruction in performance for classical guitar ensemble. Ensembles for guitar and other instruments will prepare works for public performances both on and off campus. All students enrolled in individual guitar lessons are expected to enroll. Students of other instruments or voice may also audition. Some additional rehearsal time, individually and with the group, is required. Admission by audition with instructor prior to first class meeting. May be repeated for credit. (General Education Code(s): A.) *M. Ozgen*

8. Balinese Gamelan Ensemble (2 credits). *

Instruction in practice and performance of gamelan music from Bali and Indonesia, including ritual and new music. Preparation of several works for public presentation. Attend first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Prerequisite(s): course 5A or 5B or 5C or 8 or 13 or 14, or by permission of instructor at first class meeting. May be repeated for credit. (General Education Code(s): A.) *L. Burman-Hall*

9. Wind Ensemble (2 credits). *

A study of selected advanced-level works for wind ensemble, culminating in one or more public concerts. Admission by audition with conductor prior to first class meeting. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): PR-C, A.) *R. Klevan*

10. Eurasian Ensemble (2 credits). *

Performing ensemble focusing on the vernacular and art musics of the Eurasian continent, with emphasis on Central Asia. Admission by instructor determination at first class meeting. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): PR-C, A.) *T. Merchant*

11A. Classical Music from the Middle Ages to the Present. F,S

A study of selected masterworks in relation to the periods which they represent. Emphasis upon the listening experience and awareness of musical style and structure. Illustrated lectures and directed listening. (Formerly *Introduction to Western Art Music*.) (General Education Code(s): IM, IH, A.) *A. Leikin, N. Treadwell, L. Miller*

11B. Introduction to Jazz. W

Designed to provide students with thorough and comprehensive background in history and roots of jazz as a musical style from its African roots to the present. Essential jazz styles and traditions are discussed through lectures, required listening, readings, lecture demonstrations, and film presentations. (General Education Code(s): IH, A, E.) *K. Hester*

11C. Introduction to American Popular Music. F

Survey of American popular music, from the beginnings of mass media to the late-twentieth century and beyond. Areas of focus will include early African-American styles (the blues, gospel and ragtime), vaudeville songs, a variety of immigrant traditions and folk movements, rock and roll, soul, R & B, hip-hop, and others. Musical experience helpful but not required. (General Education Code(s): IH, A.) *B. Carson*

11D. Introduction to World Music. S

Covers topics reflecting distinctive features of selected world music cultures. Introduces content, scope, and method of ethnomusicology. Focuses on understanding the musical styles, performance practices, and cultural functions of these musical traditions. Incorporates live class performance of selected music. (General Education Code(s): CC, IH, A, E.) *T. Merchant*

13. Beginning Theory and Musicianship I. W

Fundamentals of music and notation. Major, minor scales, intervals, triads, and inversions, root-position 7th chords, and the beginning harmonic analysis. Emphasis on the development of the ear and coordination. Exercises of pulse, rhythm, pitch, and coordination. Dictation and sight singing. Enrollment restricted to first-year students and sophomores; juniors and seniors admitted by permission of instructor. Enrollment limited to 60. *N. Treadwell*

14. Beginning Theory and Musicianship II. W,S

Continuation of course 13. Triads and 7th chords and their inversions. Introduces Church modes, melodic and harmonic analysis, four-part harmony, and keyboard harmony. Sight-singing, ear training, and dictation. Knowledge of musical notation and scales required. Students who wish to take this course and have not taken course 13 or the placement exam should consult the instructor. See the enrollment conditions section of the quarterly *Schedule of Classes*. Prerequisite(s): course 13 or music core curriculum placement exam. Enrollment priority given to students for whom course 14 or 30A is a requirement. Enrollment limited to 25. *L. Burman-Hall, B. Carson*

30A. Theory, Literature, and Musicianship I. F

Integrated musicianship, theory, and analysis. Species counterpoint and fundamentals of tonal harmony. Analy-

sis of literature from the Middle Ages and Renaissance. Ear-training, taught in smaller sections, emphasizes recognition of triad and dominant-seventh inversions, dictation of diatonic melodies, and aural analysis of simple diatonic interval and chord progressions. Most of the ear-training materials consist of homophonic and polyphonic examples from music literature performed live in class. Concurrent enrollment in course 30L required. Prerequisite: admission by core curriculum placement examination or by passing course 14 with a final examination score of approximately 85 percent or higher. Enrollment limited to 60. *H. Kim*

30B. Theory, Literature, and Musicianship I. W

Integrated musicianship, theory, and analysis. Diatonic harmony and fundamentals of chromatic harmony and musical form, with an emphasis on early 18th-century styles. Ear-training, taught in smaller sections, emphasizes recognition of triad and seventh-chord qualities and inversions, dictation of moderately complex melodies and multi-voice chorales, and aural analysis of chord progressions including secondary functions. Most of the ear-training materials consist of homophonic and polyphonic examples from music literature performed live in class. Concurrent enrollment in course 30M required. Prerequisite(s): course 30A; instructor determination at first class meeting. Enrollment limited to 60. *A. Leikin*

30C. Theory, Literature, and Musicianship I. S

Integrated musicianship, theory, and analysis. Chromatic harmony and large forms, with emphasis on late 18th- and early 19th-century styles. Ear-training, taught in smaller sections, emphasizes melodic and multi-voice dictation, as well as aural analysis of chord progressions, with materials including digressions, modulations, and advanced chromatic idioms. Most of the ear-training materials consist of homophonic and polyphonic examples from music literature performed live in class. Concurrent enrollment in course 30N required. Prerequisite(s): course 30B; instructor determination at first class meeting. Enrollment limited to 60. *A. Leikin*

30L. Theory, Literature, and Musicianship I Laboratory (2 credits). F

Keyboard (score-reading, figured-bass, progressions, chorales) and musicianship (sight-singing, intervals, chords, rhythm) laboratory sequence illustrating topics covered in course 30A. Two 1-hour laboratory sessions per week. Concurrent enrollment in course 30A required; concurrent enrollment in course 60 also required for students without adequate prior keyboard training. Enrollment limited to 6. *H. Kim*

30M. Theory, Literature, and Musicianship I Laboratory (2 credits). W

Keyboard (score-reading, figured-bass, progressions, chorales) and musicianship (sight-singing, single chords and progressions, rhythm) laboratory sequence illustrating topics covered in course 30B. Two 1-hour laboratory sessions per week. Prerequisite(s): course 30L; instructor determination at first meeting of course 30B. Concurrent enrollment in course 30B required. Enrollment limited to 6. *The Staff*

30N. Theory, Literature, and Musicianship I Laboratory (2 credits). S

Keyboard (score-reading, figured-bass, progressions, chorales) and musicianship (sight-singing, atonal melody, rhythm) laboratory sequence illustrating topics covered in course 30C. Two 1-hour laboratory sessions per week. Prerequisite(s): course 30M; instructor determination at first meeting of course 30C. Concurrent enrollment in

course 30C required. Enrollment limited to 6. *The Staff*

42. Student-Directed Seminar. *

Seminars taught by upper-division students under faculty supervision. (See course 192.) Students submit petition to sponsoring agency. *The Staff*

51. Vocal Repertoire Class (2 credits). F,W,S

The study and performance of vocal repertoire from 1400 to the present, including solo song, oratorio, opera, ensemble music. Emphasis is given to the development of effective performance skills, culminating in public performance. Attend first class meeting; concurrent enrollment in individual voice lessons with instructor of this course is required. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): A.) *P. Maginnis, B. Staufenbiel*

54. North Indian Music Workshop (2 credits). S

A course covering the music of North India taught using the oral traditions of Indian music. For beginners as well as more experienced students, this course is well suited for instrumentalists and vocalists. Interview; instructor determination at first class meeting. May be repeated for credit. (General Education Code(s): A.) *A. Khan*

60. Group Instruction in Piano (2 credits). *

Elementary instruction in piano technique, including group and individual performance experience. A minimum of six hours per week of individual practice is required. Curriculum is coordinated with keyboard requirements of course 30L. Concurrent enrollment in course 30L is required. Students are billed a course fee. Prerequisite(s): Instructor determination at first class meeting. Enrollment limited to 8. May be repeated for credit. *E. Arulanantham*

61. Individual Lessons: Half Hour (2 credits). F,W,S

One-half hour of individual instrumental or vocal instruction. Repertory, technique, and performance practice. A minimum of six hours per week of individual practice is required. Concurrent enrollment in an ensemble in the lesson instrument or voice is required. Students are billed a course fee. Admission by audition with the instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment priority given to music majors and minors. May be repeated for credit. *The Staff*

62. Individual Lessons: One Hour (3 credits). F,W,S

One hour of individual instrumental or vocal instruction. Repertory, technique, and performance practice. A minimum of nine hours per week of individual practice is required. Concurrent enrollment in an ensemble in the lesson instrument or voice is required. Students are billed a course fee. Admission by audition with the instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment priority given to music majors and minors. May be repeated for credit. *The Staff*

63. Group Instrumental and Vocal Lessons (2 credits). F,W,S

Elementary group instruction in instrumental (excluding piano) or vocal techniques, including group and individual performance experience. A minimum of six hours per week of individual practice is required. Students are billed a course fee. Admission by audition with the instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment limited to 6. May be repeated for credit. *The Staff*

75. Beginning Improvisational Theory. *

Studies in the modes, scales, chord alternations and extensions, chord voicings, chord progressions, and forms that underlie jazz improvisation, composition, and arranging in a variety of styles. (Formerly *Jazz Theory I*.) Prerequisite(s): course 14. Enrollment limited to 30. (General Education Code(s): A.) *The Staff*

80A. Music of the Silk Road. *

Exploration of the commonalities between music cultures found along ancient trade routes through Asia. (General Education Code(s): CC, T4-Humanities and Arts, A, E.) *T. Merchant*

80C. History, Literature, and Technology of Electronic Music. F

This survey of electronic music from previous centuries to the present studies the works and aesthetics of important composers, acoustics, musical perception, the effects of technological innovation on cultural evolution, and the development of synthesizers and computer music. (General Education Code(s): T6-Natural Sciences or Humanities and Arts, A.) *The Staff*

80F. Music in Latin American Culture: Regional Traditions. *

In-depth study of select music cultures of Mexico, Central America, and Caribbean, Brazil, Chile, Argentina, Colombia, and Peru. Characteristic regional genres, ensembles, instruments, and music rituals. Case studies by ethnomusicologists with expertise in specific regional musics. Also Latin American Nueva Canción, women's musics, and overarching themes in Latin American music, as a whole. Offered on a rotational basis with other non-Western courses in the 80 series. (General Education Code(s): T4-Humanities and Arts, A, E.) *The Staff*

80G. American Musical Theater. F

Surveys American musicals from operetta through rock musicals with a historical approach focusing on selected examples from the literature. Music reading or musical experience helpful but not required. Offered in alternate academic years. (General Education Code(s): T4-Humanities and Arts, A.) *F. Lieberman*

80H. The Hollywood Musical. W

Introductory study of the Hollywood music film, exploring the theory of film sound, the musical genre, and representative works from the 1920s to the present. Students expected to view about two films each week, read assigned section of texts, and contribute to class discussions. (General Education Code(s): T4-Humanities and Arts, A.) *F. Lieberman*

80I. Music of Modern Israel. W

Historical, musicological, and anthropological study of the many (and often conflicting) worlds brought together by Israeli popular and art music: Jewish and Arabic traditions, Western ideals, and modern beats. Enrollment limited to 40. (General Education Code(s): CC, T4-Humanities and Arts, A, E.) *A. Tchamni*

80J. American Folk Music. *

Surveys American folk music, both instrumental and vocal, by region and period. Approach is primarily through listening. Previous musical experience helpful, but not required. Offered in alternate academic years. (General Education Code(s): T4-Humanities and Arts, A.) *F. Lieberman*

80L. Artificial Intelligence and Music. *

An introduction to basic concepts in music and artificial intelligence, and to algorithmic composition (composition by a set of explicit instructions, often using the computer). Other topics include basic introductions to related concepts in linguistics, mathematics, neural nets,

pattern matching, genetic algorithms, fuzzy logic, and interactive systems. Previous experience in one or more of these topics is helpful but not required. Students produce a project based on one of the models presented in class. Offered in alternate academic years. (General Education Code(s): T6-Natural Sciences or Humanities and Arts, A.) *The Staff*

80M. Film Music. S

A survey of film music including a discussion of current trends and film composers. Techniques and styles of film music are explored through lectures, required listenings, readings, and viewing of relevant films. A musical background, including the ability to read music, is helpful but not necessary. Offered in alternate academic years. (General Education Code(s): T4-Humanities and Arts, A.) *N. Treadwell, D. Cope*

80N. Music of the Grateful Dead. *

In-depth exploration of the music of the Grateful Dead. Contextual study of the sociology and history of the late 1960s psychedelic movement supplies background for study of the music as the band evolved through time. Offered in alternate academic years. (General Education Code(s): IM, T4-Humanities and Arts, A.) *F. Lieberman*

80O. Music, Politics, and Protest. W

Examination of relationship between music, politics, and protest in the U.S. in the 20th century, with focus on how music commented upon and reflected different eras in American cultural and political life. (General Education Code(s): T4-Humanities and Arts, A.) *D. Neuman*

80P. History of Jewish Music. F

Survey of the diverse and rich musical traditions of Jewish music in the diaspora from biblical times to the present. Examines the historical, social, and anthropological aspects of the different communities from sacred music through art and popular songs. Enrollment limited to 40. (General Education Code(s): CC, T4-Humanities and Arts, A, E.) *A. Tchamni*

80Q. A Survey of African Music. *

Traces the various stylistic musical areas throughout the African continent and explores the development of traditional African music from antiquity into the 20th century. Offered in alternate academic years. (General Education Code(s): T4-Humanities and Arts, A, E.) *K. Hester*

80R. Music and the World Wide Web. *

A survey of musical applications of the World Wide Web and the technologies they employ: tools for musical research, playback, composition, performance, and publishing. Historical perspectives and artistic ethics also discussed. Students prepare a creative project using software tools, techniques, sound sources available on the web, and learn how to publish the results on the web. Enrollment limited to 44. Offered in alternate academic years. (General Education Code(s): T6-Natural Sciences or Humanities and Arts, A.) *The Staff*

80S. Women in Music. F

An exploration of the sociological position of women as composers and performers in Western and non-Western musics, with a focus on both ethnographic and historical sources. (Also offered as Feminist Studies 80S. Students cannot receive credit for both courses.) Offered in alternate academic years. (General Education Code(s): CC, T4-Humanities and Arts.) *T. Merchant*

80V. The Music of the Beatles. S

The most significant group in the history of popular music, the Beatles spanned the gamut of styles from

hard-edged R & B to sophisticated art-rock. This course explores their work in detail, in its own terms, and in the historical/cultural/technological contexts. Students cannot receive credit for both this course and course 180V in the same quarter. Course 11C is recommended but not required as preparation. (General Education Code(s): T4-Humanities and Arts, A.) *F. Lieberman*

80X. Music of India. W

A survey course in Hindustani (North Indian) and Karnatak (South Indian) music covering the Raga (modal system) and Tala (metric system) as they have developed in the two traditions. Consideration is given to the historical development of the music, from Vedic chanting to the modern Raga system; social functions of the music throughout history; and instrumental and vocal forms with an emphasis on listening. (General Education Code(s): T4-Humanities and Arts, A, E.) *D. Neuman*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Admission requires approval of department. *The Staff*

99. Tutorial. F,W,S

A program of directed study arranged with a department faculty member. Students submit petition to sponsoring agency. *The Staff*

99F. Tutorial (2 credits). F,W,S

A program of directed study arranged with a department faculty member. Class time is proportionally less than a five-credit course. Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

100A. Theory, Literature, and Musicianship II. F

Tonal counterpoint and advanced tonal analysis. Techniques of 18th-century counterpoint and compositional practice. Advanced concepts in harmony, form, and the structure of melody in tonal music. Prerequisite(s): courses 30C and 30N and Piano Proficiency Exam. Enrollment limited to 20. (General Education Code(s): MF) *J. Sackett, B. Carson*

100B. Theory, Literature, and Musicianship II. W

Harmony and form in 19th- and early 20th-century music. Further techniques for the analysis of advanced tonal, chromatic, and post-tonal harmony. Study of larger forms, chromaticism, principles of development, and style elements unique to late romanticism and early modernism. Prerequisite(s): course 100A. Enrollment limited to 20. (General Education Code(s): MF) *The Staff*

100C. Theory, Literature, and Musicianship II. S

Theories and practices of 20th-century music. Survey of compositional principles in 20th-century music, with an emphasis on departures from tradition. Techniques of post-tonal, dodecaphonic, and serial composition; survey of post-war movements in composition and improvisation. Prerequisite(s): course 100B. Enrollment limited to 20. (General Education Code(s): MF) *D. Neuman, P. Nauert*

101A. History of Western Art Music. W

First quarter of a four-quarter detailed chronological study of Western art music from antiquity to the present. Coordinated lectures, readings, listening assignments, and analysis of representative works: Antiquity, Middle Ages, Renaissance. Prerequisite(s): course 30A. *L. Miller*

101B. History of Western Art Music. S

Second quarter of a four-quarter detailed chronological study of Western art music from antiquity to the present. Coordinated lectures, readings, listening assignments, and analysis of representative works: Baroque. Prerequisite(s): course 30B and satisfaction of the Entry Level Writing and Composition requirements. *N. Treadwell*

101C. History of Western Art Music. F

Third quarter of a four-quarter detailed chronological study of Western art music from antiquity to the present. Coordinated lectures, readings, listening assignments, and analysis of representative works: Classical and Romantic. Prerequisite(s): course 30C and satisfaction of the Entry Level Writing and Composition requirements. *A. Beal*

101D. History of Western Art Music. W

Fourth quarter of a four-quarter detailed chronological study of Western art music from antiquity to the present. Coordinated lectures, readings, listening assignments, and analysis of representative works: twentieth century. Prerequisite(s): course 30C and satisfaction of the Entry Level Writing and Composition requirements. *A. Beal*

102. University Orchestra (2 credits). F,W,S

A study of selected works for orchestra, culminating in one or more public concerts. Admission by audition with conductor prior to first class meeting; see the enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. Enrollment restricted to juniors and seniors. May be repeated for credit. (General Education Code(s): A.) *Y. Samet, N. Paiement*

103. University Concert Choir (2 credits). *

A study of selected works for orchestra, culminating in one or more public concerts. Prerequisite(s): admission by audition with conductor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): A.) *N. Berman*

111B. Seminar in Jazz Analysis. W

Analytic exploration of the evolution of "jazz" in America. The process involves independent listening, analysis, transcription, weekly seminar discussions, and oral presentation to students in course 11B. Prerequisite(s): course 30B and course 11B. Enrollment limited to 20. *K. Hester*

120. Seminar in Music Composition. W

Instruction in individual composition offered in the context of a group; composition in traditional large and small forms. Prerequisite(s): course 30C. Enrollment limited to 20. *H. Kim*

123. Electronic Sound Synthesis. W

Introduction to electronic music studio techniques, relevant electroacoustical studies, and procedures of electronic music composition. Practical experience in the UCSC electronic music studio with an analog synthesizer; mixing, equalization, multitrack recording equipment, and other sound processing. Application form available at department office during last two weeks of the previous quarter. Preference given to music majors, students in the film/video major, and those with substantial musical experience. Prerequisite(s): instructor determination via application; course 80C; course 14 or course 30A placement. Enrollment limited to 25. *P. Elsea, D. Jones*

124. Intermediate Electronic Sound Synthesis. S

Composition with the use of small computers in the electronic music studio. Techniques covered include hybrid synthesis, digital synthesis, and MIDI-controlled systems.

No programming is involved, but basic computer literacy is helpful. Prerequisite(s): course 123. Enrollment limited to 25. *P. Elsea, P. Nauert*

125. Advanced Electronic Sound Synthesis. F

Continuing study in the electronic music studio, with concentration on compositional development. Includes advanced applications of skills developed in courses 123 and 124, expansion of background knowledge and relevant electroacoustical studies. Prerequisite(s): course 124. Enrollment limited to 25. *P. Elsea*

130. Orchestration. F

A study of the nature of each instrument of the orchestra. Scoring for various small instrumental combinations, culminating in a transcription for full orchestra. Prerequisite(s): course 30C. Enrollment limited to 20. *H. Kim*

159A. Opera Workshop (2 credits). F,W

A workshop for singers, accompanists, and directors, the course develops a wide variety of skills related to opera through scenework. Attention will be given to movement, acting, coaching, and operatic stage-directing technique. Instruction culminates in studio productions of scenes from operas and musicals. Admission by permission of vocal instructor, or by audition with instructor prior to first class meeting. Students are billed a materials fee. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): A.) *B. Staufenbiel*

159B. Opera Workshop (3 credits). F,W

A workshop for singers, accompanists, and directors, the course develops a wide variety of skills related to opera through scenework. Attention will be given to movement, acting, coaching, and operatic stage-directing technique. Instruction culminates in studio productions of scenes from operas and musicals. Admission by permission of vocal instructor, or by audition with instructor prior to first class meeting. Students are billed a materials fee. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): A.) *B. Staufenbiel*

160. University Opera Theater. S

A production workshop, culminating in one or more staged performances of an entire opera or selected scenes from the operatic repertory. Admission by audition with instructor prior to first class meeting; auditions usually take place in fall quarter. See the enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): A.) *B. Staufenbiel*

161. Individual Lessons: One Hour (3 credits). F,W,S

One hour of individual instrumental or vocal instruction. Repertory, technique, and performance practice. A minimum of nine hours per week of individual practice is required. Concurrent enrollment in an ensemble in the lesson instrument or voice is required. Students are billed a course fee. Admission by audition with the instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Enrollment priority given to music majors and minors. May be repeated for credit. *The Staff*

162. Advanced Individual Lessons: One Hour. F,W,S

One hour of individual instruction for advanced students. Study of repertory, technique, and performance practice. A minimum of 18 hours per week of individual practice and at least one 30-minute recital are required. May be taken three times for credit. Concurrent enrollment in an ensemble in the lesson instrument or voice is required. Students are billed a course fee. Admission

by juried audition. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. *The Staff*

163. Early Music Consort (2 credits). F,W

A study of selected works for varied early music instrumental and vocal resources, culminating in one or more public concerts. Individual lessons are recommended in conjunction with consort work. Recommended for students who have instrumental or vocal competence and music literacy. Admission by audition with instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. (General Education Code(s): PR-C.) *N. Treadwell*

164. Jazz Ensembles (2 credits). F,W,S

Instruction in combo performance and techniques of the jazz idiom. The class forms several ensembles that prepare a specific repertory for public performance. Admission by audition with instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. *S. Poplin*

165. Chamber Music Workshop (2 credits). F,W,S

A study of selected works for various small combinations of instruments, culminating in one or more public concerts. Admission by audition with instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. *The Staff*

166. Chamber Singers (2 credits). F,W

The study of selected works for small vocal ensemble from the 15th through 20th centuries, with performances on and off campus throughout the academic year. Students must have demonstrated vocal and music reading skills. Admission by audition with instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): PR-C, A.) *N. Paiement*

167. Workshop in Electronic Music (2 credits). F,W,S

Continuing studio work in electronic music. Students carry out individual projects, meeting in weekly seminar to share problems and discoveries. Relevant advanced topics are covered, including new developments in the art. Prerequisite(s): course 124. Enrollment limited to 20. May be repeated for credit. *P. Elsea*

168. Contemporary Music Ensemble (2 credits). *

A study of selected works for various small combinations of instruments and voice, culminating in one or more public concerts. Admission by audition with instructor prior to first class meeting. See the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. *L. Miller, H. Kim, A. Beal*

174. Intermediate Jazz Improvisation. S

Develops basic skills through a range of advanced bop, quasi-modal and post-bebop styles—including selected free jazz and “avant-garde” repertoire. Prerequisite(s): course 75; audition with instructor at first class meeting. Enrollment limited to 20. May be repeated for credit. *K. Hester*

175. Jazz Theory II. *

Through transcription, analysis, and performance of “jazz” standards, composition, arranging, improvisation, and spontaneous creation explored. Students write a series of improvisations, short compositions, and arrangements

throughout the course. Prerequisite(s): courses 75, 100A, and 100B. Enrollment limited to 30. *M. Low, K. Hester*

180A. Studies in World Musics: Asia and the Pacific. S

In-depth ethnomusicological studies of selected music cultures of East Asia, Southeast Asia, and the Pacific. Emphasizes comparison of historical, theoretical, contextual, and cultural features. Includes basic ethnomusicological points of reference, as regards organology, music ritual, notation and transcription, and aspects of field research. Prerequisite(s): course 30B. Concurrent enrollment in a non-Western performing ensemble is strongly recommended. Enrollment restricted to music majors and graduate students. Anthropology majors may enroll with permission of instructor. Enrollment limited to 30. (General Education Code(s): A, E.) *T. Merchant*

180B. Studies in World Musics: Africa and the Americas. *

In-depth ethnomusicological studies of selected music cultures of sub-Saharan Africa and South and North America, including Native America. Emphasizes comparison of historical, theoretical, contextual, and cultural features. Includes basic ethnomusicological points of reference, as regards organology, music ritual, notation and transcription, and aspects of field research. Prerequisite(s): course 30B; concurrent enrollment in a non-Western performing ensemble is strongly recommended. Enrollment restricted to music majors and graduate students. Anthropology majors may enroll with permission of instructor. Enrollment limited to 30. (General Education Code(s): A, E.) *The Staff*

180N. Seminar on Music of the Grateful Dead. *

Detailed study of the Grateful Dead’s music, history, and sociology. Course 80N introduces the Dead to general students, but this course is for music majors or minors; non-majors who can read music; and Deadheads who have extensive touring/concert experience. Prerequisite(s): Course 11C (formerly 80H), or 80N, or equivalent experience. Admission by consent of instructor: personal interview before first class recommended. Students cannot receive credit for both this course and 80N in the same quarter. Enrollment limited to 30. *F. Lieberman*

180V. Seminar in the Music of the Beatles. S

Detailed study of the Beatles’ music. While course 80V introduces the Beatles to general students, this course is designed for music majors, music minors, students able to read music, or non-majors with strong knowledge of the Beatles’ repertory. Interview only; instructor determination at or before first class meeting. Prerequisite(s): course 11C or equivalent experience; basic knowledge of Beatles repertory. Students cannot receive credit for both this course and course 80V in the same quarter. Enrollment limited to 30. *F. Lieberman*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Upper-division standing and a proposal supported by a music faculty member willing to supervise required. *The Staff*

195A. Senior Thesis. F,W,S

Preparation of senior thesis over one or two quarters. If taken as a multiple-term course, the grade and evaluation submitted for the final quarter applies to the previous quarter. Students submit petition to sponsoring agency. *The Staff*

195B. Senior Thesis. F,W,S

Preparation of senior thesis over one or two quarters. If taken as a multiple-term course, the grade and evaluation submitted for the final quarter applies to the previous quarter. Students submit petition to sponsoring agency. *The Staff*

196A. Senior Recital Preparation (without individual lessons). F,W,S

Prerequisite(s): juried audition or approved composition portfolio. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

196B. Senior Recital Preparation (with individual lessons). F,W,S

Students are billed a course fee. Prerequisite(s): juried audition. May be repeated for credit. *The Staff*

197. Senior Exit Seminar (2 credits). S

Designed for music majors in their final quarter. Focuses on music in social context while seeking to integrate knowledge from previous music courses in preparation of a series of analytical projects. *L. Miller*

199. Tutorial. F,W,S

A program of directed study arranged with a department faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199E. Tutorial (2 credits). F,W,S

A program of directed study arranged with a department faculty member. Class time is proportionally less than a five-credit course. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200. Introduction to Research Methods. F

Practical introduction to graduate study in music focusing on research methods, music sources and bibliography, techniques of scholarly writing, and critical readings in the discipline. Culminates in a public oral presentation on the model of a professional conference paper. *N. Treadwell*

201. History of Music Theory from the Greeks Through Rameau. *

Study and analysis of pre-tonal and tonal music from the Greeks through the 18th century. Course combines a history of theory with analyses that utilize contemporaneous theoretical concepts. (Formerly *Pretonal and Tonal Analysis*.) Enrollment restricted to graduate students. Offered in alternate academic years. *L. Miller*

202. Tonal and Posttonal Analysis. *

Encompasses various forms of linear analysis, set theory, and selected topics in current analytical practice. Offered in alternate academic years. *L. Miller*

203. Special Topics in Performance Practice. *

Investigation of primary and secondary sources of information about the culturally and historically accurate performance of music in various times and places. Undergraduates who have completed the appropriate course 101 courses may enroll in 203 courses by interview with the instructor. *The Staff*

203A. Performance Practice in the Middle Ages. *

A study of performance practices in medieval music from Gregorian chant to the 14th century. History of instruments and notation. Rhythmic interpretations of chant and a study of improvised practices in organum. Editing and performance of representative works. Offered on a rotational basis with other courses in the 203 series. *L. Miller*

203B. Performance Practice in the Renaissance. *

A study of performance practices in Renaissance music, including concepts of mode, *musica ficta*, ornamentation, text underlay, tempo, and articulation. Basic principles of white notation and a brief history of instruments. Transcription, editing, and performance of a Renaissance work. Offered on a rotational basis with other courses in the 203 series. *N. Treadwell, L. Miller*

203C. Performance Practice in the Baroque. F

An examination of historically informed performance practice techniques in Baroque music, with attention to aspects of ornamentation, articulation, figured bass realization, dance choreography, rhythm and tempo, and organology. In-class performances and editing of source materials are included. Offered on a rotational basis with other courses in the 203 series. *L. Burman-Hall*

203D. Performance Practice in the Classic Period. *

Issues in performance practice focusing on selected topics and styles from the time of C.P.E. Bach through Haydn. Development of selected genres and ensembles, sources and editing, and interpretation and improvisation. Offered on a rotational basis with other courses in the 203 series. *L. Burman-Hall*

203E. Performance Practice in the Romantic Period. W

Interpretation of music from Beethoven to Scriabin through examinations of both the musical texts (form, genre, harmony, texture, orchestration, etc.) and the period performance practices. Topics range from interpretative analyses of selected compositions to critical assessments of modern as well as documented 19th- and early 20th-century performances. Offered on a rotational basis with other courses in the 203 series. *A. Leikin*

203F. Performance Practice in the 20th Century. *

Projects in analysis, notational studies, extended instrumental techniques, and the aesthetics and performance practices associated with composers from Debussy to the present. Reading and listening focuses on the writings and performances of the composers themselves and upon interpretive writings by informed performers of 20th-century music. Offered on a rotational basis with other courses in the 203 series. May be repeated for credit. *B. Carson, A. Beal, D. Jones*

203G. Concepts, Issues, and the Practice of Ethnomusicology. *

Ethnomusicological field methodology; vocal and instrumental performance practices as related to the ethnomusicological endeavor. Specific topics: philosophical paradigms, historical overview, and definitional issues of ethnomusicology; field research concepts and procedures; studies in instrumental and vocal performance practices of diverse cultures; selected writings of Charles Seeger; transcription and analysis issues; studies in micromusics. Offered on a rotational basis with other courses in the 203 series. *The Staff*

203H. Area Studies in Performance Practice. *

Intensive examination of the vocal and instrumental performance practices of living musical traditions of Indonesia, Latin America, or other regions. Topics may incorporate soloistic and ensemble traditions, secular and sacred traditions. Research rubrics include tuning, tone quality, performance posture and rhetoric, and improvisational and fixed patterns, as dictated by regional norms. May be repeated for credit in a different

area. Offered on a rotational basis with other courses in the 203 series. May be repeated for credit. *J. Schechter, D. Neuman, H. Kim, L. Burman-Hall*

206A. World Music Composition. S

Studies in the history, structure, and cultural function of music from cultures as diverse as Global African, central European, Korean, Latin American, Indonesian, and Indian traditions. Examines ways in which composers such as Bartok, Anthony Braxton, Chou Wen-Chung, Lou Harrison, and Takemitsu sought and integrated such influences. Students choose to write critical and analytic essays on musics exhibiting diverse cultural influences, or to compose music that takes a vernacular or non-European music as a model for a compositional/improvisational approach. Enrollment restricted to graduate students. Enrollment limited to 12. May be repeated for credit. *K. Hester*

206B. Computer-Assisted Composition. *

Study of techniques of algorithmic and computer-assisted composition in a variety of contemporary idioms. Topics may include stochastic methods, generative grammars, search strategies, and the construction of abstract compositional designs and spaces. Final project for course involves students formulating and algorithmically implementing their own theoretical assumptions and compositional strategies. *D. Cope*

206D. Music Perception and Cognition. *

Investigations in the psychology of musical listening and awareness. Topics include time and rhythm perception, auditory scene analysis, pattern recognition, and theories of linguistics applied to harmony, melody, and form in the music of diverse cultures. Explores applications of the cognitive sciences to music transcription, analysis, composition, interpretation, and performance practice. Students apply existing knowledge in the cognitive sciences to a developing creative or analytical project, or develop and conduct new experiments. Enrollment restricted to graduate students. Enrollment limited to 16. May be repeated for credit. *B. Carson*

219. Techniques in Composition. F

Short compositional exercises incorporating diverse contemporary techniques with emphasis on problem-solving and development of compositional skills. Exercises focus on particular strategies for organizing and coordinating aspects of pitch, rhythm, timbre, and other musical dimensions, depending on interests of instructor and students. (Formerly course 219A.) Enrollment restricted to graduate students. May be repeated for credit. *D. Jones*

220. Graduate Seminar in Music Composition. W

Instruction in individual composition offered in the context of a group; composition in large forms of the 20th century with emphasis on techniques since 1950. May be taken by upper-division undergraduates for credit. Interview with instructor at first class meeting. Prerequisite(s): course 219. Enrollment limited to 16. May be repeated for credit. *H. Kim*

228. Techniques of Modernity and Aesthetic Formations. *

Explores the transformations and aesthetic possibilities of the digital age through a study of perceptual shifts of the past, from orality to literacy, gift to commodity, pre-colonial to colonial, "pre-modern" to "modern," and the technological revolutions that accompanied these shifts. (Also offered as Digital Arts and New Media 228. Students cannot receive credit for both courses.) Enrollment restricted to graduate students; upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 18. *D. Neuman*

252. Current Issues Colloquium (2 credits). E,W,S

An interactive colloquium featuring presentations by faculty, graduate students, and visiting scholars on research projects in composition, musicology / ethnomusicology, and performance practice, followed by focused discussion. Enrollment restricted to graduate students. Undergraduate students may enroll with permission of instructor. May be repeated for credit. *L. Burman-Hall*

253A. Pitch, Melody, and Tuning Systems. *

Focuses on pitch systems from Western and non-Western cultures, and on scholarly perspectives about them throughout the 20th and 21st centuries. Enrollment restricted to graduate students. Enrollment limited to 20. *T. Merchant*

253B. Rhythm, Time, and Form. W

Traditional and experimental rhythmic and temporal systems representing diverse cultures, with emphasis on unmeasured, divisive, additive, and multilayer practices in cultural context. Students examine rhythmic composition, improvisation, and rubato performance in selected cultures, including rhythmic notation and transcription systems. Prerequisite(s): course 200 or the equivalent, or consent of instructor. Enrollment restricted to graduate students. Enrollment limited to 10. *L. Burman-Hall*

253C. Music and Discourse. *

Addresses both song and musical performance as modes of discourse. For song: musical and textual phrase and verse structures and their interrelationships. For musical performances: musical performance as rhetoric and emblem. Enrollment restricted to graduate students. Enrollment limited to 5. *F. Lieberman*

253D. Issues in the Ethnography of Music. S

Explores ethnography—the description of culture—as it relates to musicology and ethnomusicology, particularly where "culture" and cultural production are historically dynamic and geographically porous. Examines music with sensitivity to such complexities of context, and the disciplinary points of reference from which cultural difference is calculated. Considers the ideological imprint of methodology on cultural analysis: how to study an unfamiliar music in a way that transcends the measure of "difference from the familiar," and, conversely, how to conduct an "objective" study of a familiar music. Enrollment restricted to graduate students. Enrollment limited to 10. *D. Neuman*

254C. Performance Theory and Practice. *

"Performance" can describe activities in the arts, humanities, and social sciences. Recognizing the mappings of this concept, this course examines selected performances and performative behavior through theoretical and critical lenses. Emphasis is on investigating the act and practice of musical performance in multicultural context, and on analyzing scholarly writing as performative discourse. Enrollment restricted to graduate students. Enrollment limited to 10. *N. Treadwell*

254D. Organology and Acoustics. *

Comprehensive study of musical instruments including, but not limited to, physical and engineering concepts; theory and methods of description, analysis, systematic, and cultural classifications; physiology and performance techniques; cultural significance; anthropomorphic and zoomorphic symbolism; ritual usage; and more. Previous enrollment in introductory ethnomusicology course (e.g., course 11D) helpful, but not required. Enrollment by interview only, except music M.A. and Ph.D. students. Enrollment restricted to junior and senior music majors, electronic music minors, anthropology majors, or physics

majors, and graduate students. Enrollment limited to 15. *F. Lieberman*

254E. Asian Resonances in 20th-Century American and European Music. *

Explores the influence of Asian musics on Western composers from Debussy to Britten to American experimentalists such as Harrison, Cage, Riley, and Rudyard. Questions of cultural appropriation and originality are addressed through specific examples and critical readings. Enrollment restricted to graduate students. Enrollment limited to 10. *L. Miller*

254I. Empirical Approaches to Art Information. *

Reading and practice in empirical methods, as applied to the study of music, visual art, multimedia production, and performance arts. Topics include semiotics, critiques of empiricism, cultural determinants and contingents of perception, the psychophysics of information, sensory perception (visual and auditory), memory, pattern recognition, and awareness. Students apply existing knowledge in the cognitive sciences to a developing creative project, or develop and conduct new experiments. (Also offered as Digital Arts and New Media 254I. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 17. May be repeated for credit. *B. Carson*

254J. Jazz Historiography. *

Introduces the ways jazz history has been conceptualized, evaluated, and transmitted. Examines the social, intellectual, and cultural formations that have influenced this historiography. Considers the interdisciplinary project of "new jazz studies" in relation to established and alternative historical narratives. Enrollment restricted to graduate students. Enrollment limited to 10. *The Staff*

254K. Music, Gender, and Sexuality. F

Seminar focuses on musicological and ethnomusicological work incorporating feminist and queer theories published since the late 1980s. Cross-cultural approach to the examination of music, gender, and sexuality, drawing examples from both Western and non-Western traditions. Enrollment restricted to graduate students. Enrollment limited to 10. *T. Merchant*

254L. John Cage: Innovation, Collaboration, and Performance Technologies. S

In-depth examination of John Cage's interdisciplinary work, his pioneering activity in live electronic technology, and his influence in current multimedia creativity. Approximately one-half of the seminary is devoted to student research and creative projects and reflect Cage's legacy. (Also offered as Digital Arts and New Media 254L. Students cannot receive credit for both courses.) Enrollment restricted to juniors, seniors, and graduate students. Upper-division undergraduates may enroll with permission of instructor. Enrollment limited to 12. *A. Beal*

254M. Music in San Francisco, 1850-1950. *

Explores San Francisco's musical life during the city's first century, including opera, symphony, Chinese music, musical theater, and other genres. Considerable emphasis on music and society, including issues of race. Enrollment restricted to graduate students. Enrollment limited to 15. *L. Miller*

261. Graduate Applied Instruction (3 credits). F,W,S

One hour of individual instrumental or vocal instruction for graduate students. Repertory, technique, and performance practice. A minimum of nine hours per week of individual practice is required. Students are billed a course

fee. Admission by audition with the instructor prior to first class meeting; see the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. *The Staff*

265. Graduate Ensemble Participation (2 credits). F,W,S

Participation by graduate students in ensembles. Enrollment limit appropriate to the size of each ensemble. Admission by audition with the instructor prior to first class meeting; see the enrollment conditions section of the quarterly *Schedule of Classes*. May be repeated for credit. *The Staff*

267. Workshop in Computer Music and Visualization (2 credits). F,W,S

Graduate-level techniques and procedures of computer music composition and visualization. Practical experience in the UCSC electronic music studio with computer composition systems and software, including visualization and interactive performance systems. Extensive exploration of music and interactive graphic programs such as Max/MSP/Jitter. Enrollment by permission of instructor; appropriate graduate experience required. Enrollment restricted to graduate students. (Also offered as Digital Arts and New Media 267. Students cannot receive credit for both courses.) Enrollment limited to 12. May be repeated for credit. *P. Elsea*

295. Directed Reading. F,W,S

Directed reading which does not involve a term paper. May be repeated once for credit. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Independent study, creative work, or research for graduate students who have not yet begun work on their thesis. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

298. Graduate Recital. F,W,S

A public performance in the student's primary area of interest, related to the thesis or dissertation project, under the supervision of a faculty member. Students submit petition to sponsoring agency. Enrollment restricted to graduate students. *The Staff*

299. Thesis Research. F,W,S

A thesis consisting of a substantive and original creative or scholarly work, related to the graduate recital, under the supervision of a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Natural History

See Environmental Studies, page 277.

Natural Sciences

See Physical and Biological Sciences, page 407.

Neuroscience and Behavior

See Biological Sciences, page 153.

Oakes College

College Office
(831) 459-2558
<http://oakes.ucsc.edu>

For college description and list of faculty, see page 99.

Lower-Division Courses

10. Academic Success (2 credits). F

Provides opportunity to assess and revise methods of and purposes in studying. Critical, effective approaches to reading, writing, participating in lectures and sections, taking exams, balancing competing responsibilities, and utilizing campus resources explored. Enrollment by permission of college adviser. *The Staff*

30. Thesis Writing and Editing (2 credits). S

Substantial writing and revision for a piece of writing relevant to a student's field. Focuses on academic research, documentation, editing, and revision. Enrollment restricted to junior and senior college members. Enrollment by permission of instructor. Enrollment limited to 20. May be repeated for credit. *R. King, M. Baker*

42. Student-Directed Seminar.

Seminars taught by upper-division Oakes students under faculty supervision. (See course 192.) *The Staff*

60. Oakes Literary Journal: Further Reflections on a Diverse Society (2 credits). W

For publication in an Oakes College literary journal, students significantly refine an essay from the fall quarter Oakes College core course. Course work includes consideration of a substantive text that engages core course themes and promotes the focus of the essay. Prerequisite(s): course 80A or 80B. Enrollment restricted to first-year students. Enrollment limited to 20. May be repeated for credit. *R. King, M. Baker*

63. Oakes Food, Community, and Culture (2 credits). F

Collaborative design of the Oakes Garden while participating in dinners and cafe-style discussions on the culture, community, and food system of Oakes College. Enrollment restricted to Oakes College members. Enrollment limited to 16. May be repeated for credit. *D. Shaw*

67. The Politics of Food: Labor and Social Justice (2 credits). S

Engages the themes of Oakes College (respect for diversity and social justice) and the interests of UCSC's Center for Agroecology and Sustainable Food Systems. Topics include the racial politics of food, farm labor, organic farming, and activism. Prerequisite(s): successful completion of college core course 80A, 80B, 80C, 80D, or 80H. Enrollment restricted to college members. Enrollment limited to 25. May be repeated for credit. *R. King, M. Baker*

70. Diverse Voices in Contemporary American Women's Poetry. S

Examines the work of contemporary American women poets representing a range of socioeconomic, sexual, cultural, and ideological identities. Discussion focuses on analysis and interpretation of poems. Students produce a portfolio of creative response work and analytical essays. Enrollment restricted to first-year students and sophomores. Enrollment limited to 20. *L. Knisely*

73. Poetry and Activism (2 credits). S

Examines poetry as a form of political activism. Students write, participate in workshops, and perform poems that address social-justice issues. Students also analyze

and interpret activist poems as models for the students' own writing projects. Enrollment restricted to college members. Enrollment limited to 25. May be repeated for credit. *L. Knisely*

75. Oakes Student Development and Leadership Theory (2 credits). S

Overview of theories, methods, applications, skills, and special topics focusing on college student development and leadership. Uses a variety of learning modes including lecture, discussion, case studies, small group interaction, and presentations. Interview only: see Oakes coordinator for residential education during spring enrollment period. Enrollment restricted to Oakes College members. Enrollment limited to 30. May be repeated for credit. *The Staff*

77. Exploring Opportunities for Social Justice Fieldwork (3 credits). W,S

Designed to promote social justice and diversity through community service experiences. Students are required to complete a 25-hour service project to be determined by individual course plans. Students will engage in/reflect upon social justice through community service, readings, and discussions. Prerequisite: Oakes 80 College Core Course. Enrollment limited to 20. *The Staff*

80A. Introduction to University Discourse: Communicating Diversity for a Just Society. F

Explores rhetorical principles and conventions of university discourse providing intensive practice in analytical writing, critical reading, and speaking. Examines historical and contemporary aspects of multiculturalism in the U.S. Explores how social inequality based on ethnicity, race, class, and gender occurs among all levels of society. Students cannot receive credit for this course and course 80B. (Formerly *Introduction to University Discourse: Values and Change in a Diverse Society*.) Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C1, E.) *K. Lau*

80B. Rhetoric and Inquiry: Communicating Diversity for a Just Society. F

Explores intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Examines historical and contemporary aspects of multiculturalism in the U.S. Explores how social inequality based on ethnicity, race, class, and gender occurs among all levels of society. Students cannot receive credit for this course and course 80A. (Formerly *Rhetoric and Inquiry: Values and Change in a Diverse Society*.) Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. Enrollment limited to 22. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C2, E.) *K. Lau*

80C. Introduction to University Discourse: Communicating Diversity for a Just Society Writing Intensive 1. F

Explores rhetorical principles and conventions of university discourse and provides intensive practice in analytical writing, critical reading, and speaking. Examines historical and contemporary aspects of multiculturalism in the U.S. Explores how social inequality based on ethnicity, race, class, and gender occurs among all levels of society. More writing-intensive than course 80A; prerequisite to course 80D. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. *The Staff*

80D. Introduction to University Discourse: Communicating Diversity for a Just Society Writing

Intensive 2. W

Continues to provide practice in analytical writing, critical reading, and speaking, and to examine issues relating to multiculturalism, diversity, and power. Prerequisite(s): course 80C. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 22. (General Education Code(s): C1.) *The Staff*

80H. Rainbow Theater Cultural Studies. S

Introduction to multicultural theater and multicultural plays that aims to bring cultural awareness to all students interested in theater discipline. Students are required to read and critically analyze contemporary plays of color with emphasis on race and culture in contemporary American society. Enrollment limited to 40. May be repeated for credit. (General Education Code(s): T4-Humanities and Arts, E.) *D. Williams*

93. Field Study. F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a faculty supervisor. To be used primarily by lower-division students doing part-time off-campus study. Prerequisite(s): approval of student's adviser, certification of adequate preparation, approval of provost. May be repeated for credit. *The Staff*

94E. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty instructor. Students submit petition to sponsoring agency. *The Staff*

95. Directed Reading. F,W,S

Directed reading on selected topics in literature. Students submit petition to sponsoring agency. *The Staff*

99. Tutorial. F,W,S

Individual study for lower-division students directed by a fellow of Oakes. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Independent Study (2 credits). F,W,S

Independent study on various topics to be arranged between student and instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

112. Re/Presenting Identity. W

Examines culturally relevant texts that describe identity formation and representation in contemporary America. Investigates the work of authors who represent a wide range of cultural, racial, sexual, socioeconomic, and gender identities. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior college members. Enrollment limited to 20. (General Education Code(s): W.) *L. Knisely*

150. Gays and Lesbians in the United States. W

Examines the diverse social and cultural contexts in which gay and lesbian identities are constructed and expressed. Provides an overview of current themes in gay and lesbian history: the sex-gender system, sexuality and sexual identity, the coming-out experience, gay and lesbian subcultures, sexual roles, politics, legal recognition of relationships, religion, mental and physical health in the gay/lesbian community, and gay activism. Enrollment restricted to junior and senior Oakes College members. Enrollment limited to 30. *K. Simonton*

175. Imagining the Filipino Diaspora. S

Examines the relationship between gender, sexuality, and the nation in Filipino American and Philippine cultural production, including performance, film, and the Internet. Contextualizes Filipino American/Philippine cultural

production within a broader framework of the Filipino diaspora. Enrollment restricted to juniors and seniors. Enrollment limited to 20. (General Education Code(s): E.) *The Staff*

192. Directed Student Teaching. F,W,S

Teaching a lower-division seminar under faculty supervision. (See course 42.) Prerequisite(s): upper-division standing in Oakes; a proposal supported by a faculty member willing to supervise. *The Staff*

193. Field Study. F,W,S

Supervised off-campus study conducted under the immediate and direct guidance of a faculty supervisor. To be used primarily by upper-division students doing part-time off-campus study. Prerequisite(s): approval of student's adviser, certification of adequate preparation, approval of provost. If taking two or more such courses in any one quarter, must obtain approval of academic adviser. *The Staff*

195. Senior Thesis. F,W,S

Senior thesis related to college-sponsored individual majors. Students submit petition to sponsoring agency. Sponsoring faculty must be member of individual major committee. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

College-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Up to three such courses may be taken for credit in any one quarter. Prerequisite(s): approval of the student's adviser, certification of adequate preparation, and approval by provost. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual study for junior and senior members of Oakes College directed by a fellow of Oakes. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Independent Study (2 credits). F,W,S

Independent study on various topics to be arranged between student and instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Ocean Sciences

4312 Earth and Marine Sciences Building
(831) 459-4730
<http://oceansci.ucsc.edu/>

Faculty and Professional Interests

Professor

KENNETH W. BRULAND
Chemical oceanography, biogeochemistry of trace metals and radionuclides, aquatic chemistry, geochemistry

MARGARET L. (PEGGY) DELANEY
Paleoceanography, marine geochemistry

ROBERT E. GARRISON (Emeritus)

RAPHAEL M. KUDELA
Ecological modeling and remote sensing, satellite oceanography, phytoplankton ecology and harmful algal blooms

ANDREW M. MOORE
Physical oceanography; numerical ocean modeling; air-interaction; ocean prediction

A. CHRISTINA RAVELO

Stable isotope geochemistry and chemical oceanography, paleoclimatology

MARY W. SILVER (Emeritus)

JONATHAN P. ZEHR

Aquatic microbial ecology, biological oceanography

Associate Professor

CHRISTOPHER A. EDWARDS

Physical oceanography, numerical modeling of coastal- and basin-scale dynamics

MATTHEW D. MCCARTHY

Organic geochemistry, marine organic geochemistry, global biogeochemical cycles

Assistant Professor

SHARON E. STAMMERJOHN

Polar oceanography and climate; interdisciplinary approaches to understanding environmental and ecosystem response to climate variability

Adjunct Professor

KENNETH L. SMITH

Pelagic-benthic coupling in the abyssal Eastern North Pacific

RANDALL S. WELLS

Behavioral ecology and conservation biology of small cetaceans

Associate Adjunct Professor

JEFFREY D. PADUAN

Coastal ocean dynamics: surface currents, wave heights, wind and tidal forcing from high-frequency radar data

Assistant Adjunct Professor

MICHAEL BECK

Marine conservation, regional biodiversity planning, habitat restoration, marine proprietary rights

JOHN CARLOS GARZA

Population and ecological genetics of marine organisms

STEVEN H. HADDOCK

Ecology of bioluminescence and gelatinous zooplankton from blue-water and deep-sea environments

SEAN A. HAYES

Behavior, ecology, genetics, and population dynamics with a particular interest in salmon and pinnipeds

ROGER LININGTON

Marine natural products; drugs for neglected diseases; chemical biology; chemical probes

ALEXANDRA WORDEN

Mechanisms and controls of microbial population dynamics with an emphasis on carbon cycling in marine ecosystems

Lecturer

JOEL GOLDMAN

Phytoplankton ecology, microbial food chain dynamics

THOMAS GUILDERSON

Paleoceanography, tracer chemistry, carbon cycle, climate change

BALDO MARINOVIC

Plankton biology, Euphausiid (krill) population biology, zooplankton ecology, pelagic food web dynamics, climate change potential impacts on zooplankton and fisheries

ADINA PAYTAN

Biogeochemistry, paleoceanography, environmental and aquatic chemistry

COLLEEN REICHMUTH

Pinniped cognition and perception, including cross-modal

(auditory-visual) emergent learning in sea lions and behavioral and electrophysical assessment of hearing in several marine mammal species

SCOTT SHAFFER

Links between ecology, morphology, and physiological adaptations of marine vertebrates, particularly how animals use and allocate energy



Professor

GIACOMO BERNARDI (BIOLOGICAL Sciences)

Fish biology, phylogenetics, evolution

MARK CARR (BIOLOGICAL Sciences)

Marine ecology, applied marine ecology

DANIEL P. COSTA (Biological Sciences)

Physiological ecology of marine mammals and birds

PHILLIP CREWS (Chemistry)

Marine natural products chemistry, bioorganic chemistry, organic structural analysis by NMR, natural products of marine macro- and microorganisms

DONALD CROLL

Foraging ecology of marine birds and mammals, island conservation/ecology

ANDREW T. FISHER (Earth Sciences)

Hydrogeology, crustal studies, coupled flows, modeling

STANLEY M. FLATTÉ (Emeritus, Physics)

A. RUSSELL FLEGAL (Environmental Toxicology)

Anthropogenic perturbations of biogeochemical cycles, applications of isotopic tracers in anthropology and archaeology

LAUREL R. FOX (Biological Sciences)

Terrestrial population and community ecology, plant-animal interactions

JAMES B. GILL (Earth Sciences)

Igneous petrology, geochemistry of island arcs

LYNDA J. GOFF (Emeritus, Biological Sciences)

GARY B. GRIGGS (Earth Sciences)

Coastal processes, hazards and engineering

BURNEY J. LEBOEUF (Emeritus, Biological Sciences)

MARC S. MANGEL (Applied Mathematics and Statistics)

Mathematical modeling of biological phenomena, especially the evolutionary ecology of growth, aging, and longevity; quantitative issues in fishery management; mathematical and computational aspects of disease

A. TODD NEWBERRY (Emeritus, Biological Sciences)

CHARLES L. (LEO) ORTIZ (Emeritus, Biological Sciences)

DONALD C. POTTS (Biological Sciences)

Coral reef ecology, genetics, evolution, and geological history; marine biodiversity; tropical biology, global change, and remote sensing

GRANT H. POGSON

Molecular population genetics, ecological genetics, marine invertebrates and fishes

PETER RAIMONDI (BIOLOGICAL Sciences)

Marine ecology, evolutionary ecology, experimental design, applied ecology

ELI A. SILVER (Earth Sciences)

Marine geology and geophysics, active tectonics, remote sensing

LISA SLOAN (EARTH Sciences)

Paleoclimatology, climate change, Earth system science, surficial processes

DONALD R. SMITH (Environmental Toxicology)

Neurotoxicity, cellular and organismal responses to environmental toxins

LINCOLN TAIZ (BIOLOGICAL Sciences)

Plant development, light regulation of stomatal opening

TERRIE M. WILLIAMS (Biological Sciences)

Vertebrate locomotor and thermoregulatory physiology; marine biodiversity; comparative vertebrate energetics, exercise physiology

JAMES C. ZACHOS (Earth Sciences)

Paleoceanography, Ocean Sciences

Program Description

The Ocean Sciences Department includes faculty and students involved in oceanography and other marine sciences and sponsors undergraduate and graduate courses in these disciplines. Through faculty sponsors, students have access to a wide variety of research facilities and equipment, including on-campus analytical chemistry, geology, and molecular biology laboratories for marine research; computing and imaging facilities; an onshore marine laboratory two miles from campus (Long Marine Laboratory), with aquariums and holding tanks that are supplied with running sea water; and a unique field station on Año Nuevo Island (19 miles north of Santa Cruz), especially suited for studies on pinnipeds and marine birds. The department supports collaborative studies utilizing the innovative technologies of the nearby Monterey Bay Aquarium Research Institute, the Naval Postgraduate School, Stanford University's Hopkins Marine Station, California State University (CSU) Moss Landing Laboratory, and others. Students may also work at other University of California facilities, including the Bodega Marine Laboratories and Scripps Institute of Oceanography.

In addition to research and instructional activities along the California coast, interests of the core faculty and their students include biological, chemical, and physical oceanography; plus sediment, marine, organic, and trace metal biogeochemistry; marine plankton, phytoplankton ecology, paleoceanography, aquatic microbial ecology, ecological modeling, and remote sensing (satellite oceanography); numeric modeling of coastal and basin-scale dynamics; and midwater ecology, climatology, and many more.

Ocean sciences affiliated faculty in other departments represent a deep resource of research interests and methodologies including those pertaining to coral reef and kelp forest ecology, plate tectonics and continental margins, marine mammal behavior and physiology, and natural products from marine organisms. Student research projects have included participation in major scientific expeditions to various marine environments ranging from polar regions to the tropics.

Undergraduate Programs

Although offering a range of undergraduate courses, the Ocean Sciences Department presently offers only graduate degrees. The undergraduate major in marine biology, sponsored by the Biological Sciences Departments, includes required and elective courses in ocean sciences; and there is an ocean sciences concentration in Earth

sciences for undergraduates. Students interested in ocean sciences should major in a discipline such as biology, marine biology, chemistry, Earth sciences, physics, or mathematics and take ocean sciences-related electives. Students with a bachelor's degree in one of these disciplines or equivalent coursework may apply directly for admission to the graduate program through the Division of Graduate Studies.

Graduate Programs

The graduate programs in ocean sciences are designed to prepare students for careers in research, teaching, and other environmentally related endeavors. The fundamental requirement for admission to the program is substantial evidence of superior scholarship and aptitude for original research. Preparation for admission to the graduate program in Ocean Sciences (master of science (M.S.) or doctor of philosophy (Ph.D.)) should comprise an undergraduate degree in the discipline of one of the program specialty areas (e.g., biology or marine biology, geology or earth sciences, chemistry, or physical science), or an equivalent background. If a student does not have a degree in one of these areas, the student must show their sponsor that they have taken the classes necessary to do their research. This preparation should normally include courses (prerequisites) in calculus, statistics, physics, chemistry, general biology or ecology, and geology for all majors (see below for the number of courses).

1 year of a calculus series

1 year of chemistry with laboratories

1 year of physics with laboratories

1 course in Earth sciences or geologic principles

1 course in biology

1 course in statistics or biostatistics for all majors

Ocean Sciences Ph.D. Degree Program

The program leading to a doctorate in ocean sciences is designed with a core training in oceanography for all students, supplemented and focused by advanced training in oceanography and in the traditional disciplines (biology, chemistry, Earth sciences, and physics) as chosen by the student and her or his advisers. The core training is provided through core courses in ocean sciences; a subset of which is taken by all students in the first two years and reinforced by the student's seminars throughout the program. In addition to core courses in ocean sciences, preparation includes upper-division/graduate courses in ocean sciences and in the specialty discipline, graduate seminars, independent research credits, participation in departmental student seminar series, and a minimum requirement of two quarters as a teaching assistant. There is no formal language requirement.

The results of a scheduling meeting in the first quarter of enrollment are used to map out the course program in the first year. The course program is determined by a faculty advisory committee in consultation with the student; and courses are drawn from ocean sciences and other science departments (e.g., biology, chemistry, Earth sciences, physics). No later than fall quarter of their second year, students must take a departmental oral examination that tests knowledge of ocean sciences and general expertise in their parent discipline. An oral and a written qualifying examination are required, generally in the second or third year of

graduate study. A dissertation based on original research is required, and the final examination is a public oral defense of the dissertation. Students are encouraged to prepare their dissertation, or certain chapters of it, in a form suitable for publication.

Sample Pathways

The pathways within the ocean sciences Ph.D. program are differentiated from related degrees in the traditional disciplines by their focus on global-scale problems and interactions, a focus on the ocean, and their inherently interdisciplinary approach. Interdisciplinary projects across and between pathways are encouraged, as are interactions with faculty in related departments.

- *Biological oceanography*

This area involves the interactions of organisms with their chemical and physical environments. It includes research on the physiology and ecology of organisms, but differs from marine biology in the focus on the oceanographic setting of the organism in relationship to, for example, biogeochemical cycling and the effects of ocean currents on distributions of organisms. The focus is mainly on small oceanic life-forms (plankton and bacteria, molecular ecology) and their roles in the biogeochemical cycles of marine systems.

- *Chemical oceanography*

Chemical interactions of trace metals and radionuclides in the sea are the focus of this group. Research includes development of analytical techniques and measurement of trace species in seawater and investigation of the effects and interactions of trace elements on biological processes using analytical and isotopic approaches.

- *Geological oceanography*

Paleoceanography, paleoclimatology, and sediment geochemistry are the focus in this pathway. Research areas include the history of global geochemical cycles and composition of the ocean on various timescales, the fate and diagenesis of materials in sediments and their contribution to the paleoceanographic record, understanding ocean and climate history by the use of records of stable isotopes and trace elements, and paleoclimate modeling.

- *Physical oceanography*

The physics and dynamics of the ocean and atmosphere are the main aspects of this program. Research includes observational, computational, theoretical, and experimental physical oceanography, geophysical fluid dynamics, ocean acoustics, dynamical meteorology, climate, and global change.

Requirements for Ph.D. Students in the Ocean Sciences Department

To introduce students to the breadth and depth of the field of ocean sciences, students will be required to complete the following:

1. Four core courses. These courses are expected to be completed in the first year of the program (and prior to taking the departmental examination) in the sequence listed below:

fall OCEA 200, *Physical Oceanography*
OCEA 280, *Marine Geology*

winter OCEA 220, *Chemical Oceanography*
spring OCEA 230, *Biological Oceanography*

2. A minimum of three graduate-level or upper-division elective courses to provide depth in the chosen area of emphasis or supporting disciplines. These courses are chosen in consultation with the student's adviser and department graduate advising committee (a maximum of one course can be a graduate-level seminar (OCEA 290); at least two courses must be graduate or upper-division undergraduate lecture courses).
3. OCEA 296, *Teaching in Ocean Sciences*, to be taken prior to or concurrent with being a teaching assistant.
4. Teaching experience satisfied by two quarters of teaching assistant experience in Ocean Sciences or supporting departments.
5. OCEA 293, a 2-credit *Graduate Research Seminar*, required to be taken each spring quarter by all Ph.D. students.
6. OCEA 292, attendance at the *Ocean Sciences Seminar* series each quarter of enrollment.
7. A minimum of three courses in *Thesis Research* (course 299) under direction of a sponsor. Each quarter in residence a student should take 15 credits of classes; students beyond their first year will usually take 10 or 15 credits of *Thesis Research* each quarter.
8. Comprehensive departmental examination. This oral examination, covering material from the core courses, is usually taken at the beginning of a student's second year in the program. This examination must be completed successfully within two years of entering the program.
9. Pass the qualifying examination to advance to candidacy. This examination requires a written research proposal to be defended orally in front of the student's dissertation committee and is normally taken at the beginning of the third year of the program. This examination is expected to be completed successfully within three years of entering the program.
10. Ph.D. dissertation. The Ph.D. dissertation, demonstrating original thought and research, must be written, presented in an open seminar, and defended to the student's thesis committee. Chapters of the dissertation may be written in publication format, but must conform to university publication guidelines for submission.

Ocean Sciences Master's Degree Program

The Ocean Sciences Department offers a master of science (M.S.) degree in ocean sciences. The degree combines core courses and electives to provide depth and breadth in ocean sciences, with a focused thesis to provide experience in original research. Graduates from the program are excellently prepared to take research or management positions in organizations concerned with the marine environment, become educators, or enter doctoral programs in ocean sciences or related fields.

Whereas the doctoral program has an oceanographic orientation, the marine sciences master's program is even broader and has traditionally attracted many students in marine biology and ecology. As with the

doctoral program, students are encouraged to select a course of study and a research program that draws on the expertise of the core ocean sciences faculty and any of the affiliated faculty in other departments. Customized programs of study that combine related disciplines are supported in the master's program.

Course Requirements for the Ocean Sciences Master's Degree

To introduce students to the breadth and depth of the field of ocean sciences, students will be required to complete the following:

1. Complete three of the four core courses (one of which must be course 200, *Physical Oceanography*). Students are expected to complete all three of these courses in the first year of the program, and they should be taken in the order listed below. All four core courses are recommended. If taken, the fourth course counts as an elective.

| | |
|--------|--|
| fall | OCEA 200, <i>Physical Oceanography</i> |
| | OCEA 280, <i>Marine Geology</i> |
| winter | OCEA 220, <i>Chemical Oceanography</i> |
| spring | OCEA 230, <i>Biological Oceanography</i> |
2. A minimum of three graduate-level or upper-division elective courses to provide depth in the chosen area of emphasis. These courses are chosen in consultation with an adviser and department graduate advising committee (only one of these can be a graduate seminar (OCEA 290); at least two must be lecture courses).
3. A minimum of three courses in *Thesis Research* (OCEA 299) under direction of a sponsor. Each quarter a student should take 15 credits of classes. Students beyond their first year will usually take 10 or 15 credits of *Thesis Research* each quarter.
4. OCEA 296, *Teaching in Ocean Sciences*, to be taken prior to or concurrent with being a teaching assistant
5. Teaching experience satisfied by one quarter of teaching assistant experience
6. Attendance at the *Ocean Sciences Seminar* series (OCEA 292) each quarter of enrollment
7. Complete a master's thesis, and present it at an open seminar.

Details regarding admission to graduate standing, financial aid, examinations, and the requirements for the master of science and doctor of philosophy degrees are available from the Division of Graduate Studies (http://graddiv.ucsc.edu/student_affairs/).

Lower-Division Courses

1. The Oceans. F,W,S

An interdisciplinary introduction to oceanography focusing on biological, chemical, geological, and physical processes. Covers topics such as origins and structure of planet Earth and its oceans, co-evolution of Earth and life, plate tectonics, liquid water and the hydrologic and hydrothermal cycles, salinity and elemental cycles, ocean circulation, primary production and nutrient cycles, plankton and nekton, life on the sea floor, near shore and estuarine communities, future environmental problems our oceans face. Students may also enroll in and receive credit for Earth Sciences 1. (Note: General Education credit will not be granted for this course and Biology 80D.) (General Education Code(s): SI, IN, Q.) *C. Edwards, R. Kudela, M. McCarthy*

wards, R. Kudela, M. McCarthy

80A. Life in the Sea. F,W,S

The ecology of plants and animals in oceans and coastal areas. Consideration of life in various marine habitats, including the open ocean, rocky shores, estuaries, and the sea. Includes field trips. High school biology and chemistry courses are recommended prior to taking this course. (General Education Code(s): SI, T-2 Natural Sciences.) *The Staff*

80B. Our Changing Planet. F,W,S

Interdisciplinary scientific perspective on Earth system, focusing on human impacts on global environment. Introduces concepts of Earth system science and explores topics such as global warming, ozone depletion, pollution, deforestation, and future climate change. Prerequisite(s): high school chemistry course recommended. (General Education Code(s): PE-E, T2-Natural Sciences.) *S. Stammerjohn, M. McCarthy*

Upper-Division Courses

101. The Marine Environment. W

An introduction to the marine environment stressing the interaction of physical, chemical, and geological factors in the ocean. Provides the oceanographic background needed for studies in marine biology. Students taking the prerequisite math courses concurrently may enroll in the course with permission from instructor. Prerequisite(s): Chemistry 1C and Mathematics 11B or 19B. Students taking the prerequisite math courses concurrently may enroll in the course with permission from instructor. *R. Kudela, S. Stammerjohn, A. Moore*

102. Oceans and Climate: Past, Present, and Future. S

An introduction to Earth's environment, particularly its oceanic and climatic components. Emphasizes interactions between chemical, physical, biological, and geological processes, and fundamentals of past, present, and future global environmental change. Provides backgrounds for specialized courses in oceanic or climatic change. Prerequisite(s): Chemistry 1C. *A. Ravelo*

118. Marine Microbial Ecology. S

The study of marine bacteria and their role in the marine ecosystem. Emphasis on biochemistry and physiology in relation to metabolic activity and elemental cycles, trophic interactions, and flows of material and energy in marine food webs. Exams and term paper required. Students cannot receive credit for this course and Ocean Sciences 218. Prerequisite(s): Biology 20C or 21C, and Chemistry 1C. *J. Zehr*

120. Aquatic Chemistry: Principles and Applications. F

An integrated study of the chemical behavior of natural waters with an emphasis on both principles and applications. Topics include chemical equilibrium, kinetics, acids/bases, oxidation/reduction, complexation, solid dissolution and precipitation, and reactions on solid surfaces. Prerequisite(s): Chemistry 108B or 112C. *K. Bruland*

124. Aquatic Organic Geochemistry. W

Introduction to organic geochemistry with emphasis on aquatic environments. Explores how non-living organic matter shapes biogeochemical cycles by carrying and sequestering reduced carbon and major nutrients and examines influence of chemical structure and environmental factors on transport and fate of organic molecules. Provides an introduction to organic biomarkers. Students cannot receive credit for this course and course 224. Prerequisite(s): basic college chemistry (Chemistry 1B, 1C); at least one quarter of college level organic chem-

istry required (e.g., Chemistry 7). *M. McCarthy*

130. Biological Oceanography. S

Biological description of sea, with emphasis on processes and patterns. Topics include microbial dynamics, phytoplankton and zooplankton production, and ecology of marine food webs. Emphasis placed on understanding how physical, chemical, and geological environment shapes biology and ecology of oceans, including such topics as harmful algal blooms, global estimates of productivity, and effects of humans on environment. Students may not receive credit for this course and Ocean Sciences 230. Prerequisite(s): previous course in ocean sciences recommended. Enrollment restricted to juniors (with instructor approval), seniors, graduate students. *R. Kudela*

172. Geophysical Fluid Dynamics. S

Introduces fluid motion influenced by rotation. Topics include the Coriolis force, geostrophic flow, potential vorticity, the shallow water model, quasigeostrophic approximation, planetary waves, Ekman theory, thermal wind, models of the large-scale oceanic and atmospheric circulation, and equatorial dynamics. Taught in conjunction with course 272. Students cannot receive credit for this course and course 272. (Also offered as Earth Sciences 172. Students cannot receive credit for both courses.) Prerequisite(s): Physics 107; Mathematics 22 or 23B recommended. Offered in alternate academic years. *C. Edwards*

199. Independent Study. F,W,S

Students submit petition to sponsoring agency. *The Staff*

Graduate Courses

200. Physical Oceanography. F

Introduction to the physics of the ocean-atmosphere system. Structure of the ocean and atmosphere. Energy balance and radiative transfer. Atmospheric circulation; weather and climate. Physical properties of seawater, air-sea interaction, mixing, water masses, ocean circulation, waves; CO₂ and global change. Designed for beginning graduate students in ocean sciences and upper-division science majors. Calculus and physics recommended as preparation. *A. Moore*

211. Climate Dynamics. W

Introduction to the dynamics of the Earth climate system. Topics: climate system components; the global energy balance; radiative transfer; the hydrological cycle; general circulations of the atmosphere and ocean; El Niño; the North Atlantic Oscillation; the Pacific Decadal Oscillation. Enrollment restricted to graduate students. Undergraduates may enroll by permission of instructor. Previous courses in calculus and ocean sciences or earth sciences are recommended. *A. Moore*

213. Biogeochemical Cycles. F

Overview of biogeochemical cycles, present and past, and geochemical models. Topics include: marine, terrestrial, and global views of the carbon, nitrogen, phosphorus, silicon, sulfur, and oxygen cycles, and the evolution of these cycles and Earth's redox balance through geologic time. (Also offered as Earth Sciences 213. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Upper-division undergraduates may enroll with instructor approval. College-level chemistry and an upper-division course in at least one relevant discipline are recommended. *M. Delaney*

215. Predicting the Atmosphere, Ocean, and Climate. *

Introduction to the theory and practice of operational prediction in meteorology, oceanography, and climate. Topics: observations and estimation theory; dynamic

adjustment and initialization; estimation theory; data assimilation; forecast verification; predictability; ocean state estimation; seasonal forecasting. Enrollment restricted to graduate students. Undergraduates may enroll with instructor approval. Courses 200, 264, Earth Sciences 272, or equivalents are recommended. *A. Moore*

218. Marine Microbial Ecology. S

Recent developments in the study of marine bacteria and their role in the marine ecosystem. Emphasis on biochemistry and physiology in relation to metabolic activity and elemental cycles, trophic interactions and flows of material and energy in marine food webs. Exams and research paper required. Students cannot receive credit for this course, course 118, and Biology 171. Biology 20C and Chemistry 1C recommended. *J. Zehr*

220. Chemical Oceanography. W

A chemical description of the sea; emphasis on the chemical interactions of the oceans with the biosphere, atmosphere, and lithosphere. Topics include biogeochemical cycles and the use of chemical tracers to study oceanic and coastal processes. Course designed for graduate students; available to upper-division science majors. *M. McCarthy*

224. Aquatic Organic Geochemistry. W

Introduction to organic geochemistry with emphasis on aquatic environments. Explores how non-living organic matter shapes biogeochemical cycles by carrying and sequestering reduced carbon and major nutrients and examines influence of chemical structure and environmental factors on transport and fate of organic molecules. Provides an introduction to organic biomarkers. Students cannot receive credit for this course and course 124. *M. McCarthy*

230. Biological Oceanography. S

Biological description of sea, with emphasis on processes and patterns. Topics include microbial dynamics, phytoplankton and zooplankton production, and ecology of marine food webs. Emphasis placed on understanding how physical, chemical, and geological environment shapes biology and ecology of oceans, including such topics as harmful algal blooms, global estimates of productivity, and effects of humans on environment. Students may not receive credit for this course and course 130. Prerequisite(s): previous course in ocean sciences recommended. Enrollment restricted to graduate students. *R. Kudela*

260. Introductory Data Analysis in the Ocean and Earth Sciences. *

Introduces data analysis methods regularly encountered within the ocean and earth sciences. Topics include: error propagation; least squares analysis; data interpolation methods; empirical orthogonal functions; and Monte Carlo methods applied to problems drawn from oceanographic and earth sciences datasets. Introduces and uses a high-level computing and visualization package, MATLAB. Student project consists of analysis of the student's own dataset. (Formerly course 264, *Ocean Data Analysis*) (Also offered as Earth Sciences 260. Students cannot receive credit for both courses.) Prerequisite(s): previous course in ocean or earth sciences is recommended. Enrollment restricted to graduate students; undergraduates with permission of instructor. *C. Edwards*

272. Geophysical Fluid Dynamics. S

Introduces fluid motion influenced by rotation. Topics include the Coriolis force, geostrophic flow, potential vorticity, the shallow water model, quasigeostrophic approximation, planetary waves, Ekman theory, thermal wind, models of the large-scale oceanic and atmospheric circulation, and equatorial dynamics. Students cannot re-

ceive credit for this course and course 172. (Also offered as Earth Sciences 272. Students cannot receive credit for both courses.) Physics 227 is recommended as preparation. Enrollment restricted to graduate students. Offered in alternate academic years. *C. Edwards*

280. Marine Geology. F

Geology of the marine environment. Topics include controls on the types, origin, and distribution of marine sediments; geology of oceanic crust; evolution of continental margins and plate boundaries; introduction to paleoceanography. Students cannot receive credit for this course and Earth Sciences 102. Enrollment restricted to graduate students. *M. Delaney*

285. Past Climate Change. *

Reviews the fundamentals of climate dynamics and explores how Earth's environment is a product of the interaction of its components. Uses examples of climate change from historical and geologic records, and from predictions of the future. Recommended for junior, senior, and graduate students in the sciences. *A. Ravelo*

286. Introduction to Ocean Modeling. *

Fundamental concepts and ideas that underpin numerical modeling of the ocean. Topics include numerical methods and solutions of partial differential equations (PDEs), ocean circulation, wave dynamics, ocean ecosystem model, and MATLAB programming. Enrollment restricted to graduate students, or to seniors by permission of instructor. *A. Moore*

290. Proseminar.

Special topics in marine sciences to be offered from time to time by professors and staff members. *The Staff*

290A. Topics in Chemical Oceanography. S

A weekly seminar series covering recent developments in chemical oceanography. Different topics and approaches will be stressed from year to year. May be repeated for credit. *K. Bruland*

290B. Topics in Biological Oceanography. *

Explores different problems of special interest in biological oceanography. Different topics and approaches will be stressed from year to year. May be repeated for credit. *M. Silver*

290C. Topics in Marine Geochemistry. W,S

Selected topics in geochemistry. Discussion of theoretical models, different approaches, and recent research. Topics vary from year to year. May be repeated for credit. *M. Delaney*

290D. Topics in Marine Microbiology. *

A weekly seminar series covering topics in environmental microbiology. Topics vary from year to year, and will include research in ecology, methodology, biochemistry and physiology of bacteria. Emphasis on the role of bacteria in biogeochemical cycling from microzone to global scales, with particular focus in marine systems. May be repeated for credit. *J. Zehr*

290E. Topics in Climatic and Oceanic Change. F

Weekly seminar series covering recent developments in climatic and oceanic change. Different topics and approaches stressed from year to year. Prerequisite(s): interview with instructor prior to first class meeting. May be repeated for credit. *A. Ravelo*

290G. Topics in Physical Oceanography. S

Weekly seminar series covering topics in physical oceanography as well as biological-physical interactions in the oceans. Different topics and approaches stressed from year to year. Enrollment restricted to graduate students; under-

graduates may enroll with permission of instructor. May be repeated for credit. *S. Stammerjohn*

290H. Topics in Ocean Optics. *

Examines recent developments and application of bio-optics to the marine environment, including theory, instrumentation, and remote sensing. Different topics and approaches emphasized from year to year. Prerequisite(s): previous course in ocean sciences recommended. Enrollment restricted to graduate students; senior undergraduates with permission of instructor. May be repeated for credit. *R. Kudela*

290J. Topics in Marine Organic Geochemistry. *

Examines recent developments in uses of organic geochemistry to trace oceanographic and biogeochemical processes. Focuses on introduction to organic biomarkers, current literature, and evolving applications. Different topics and approaches emphasized from year to year. Prerequisite(s): previous course in ocean sciences and organic chemistry are recommended. Enrollment restricted to graduate students; seniors with instructor's permission. May be repeated for credit. *M. McCarthy*

292. Seminar (no credit). F,W,S

Weekly seminar on various topics attended by faculty, graduate, and upper-division undergraduate students. *The Staff*

293. Graduate Research Seminar (2 credits). W

Weekly seminar series covering a spectrum of topics in oceanography. Designed for Ph.D. program graduate students in ocean sciences and those in biology, Earth sciences, chemistry, and physics with research interests in oceanography. Enrollment restricted to graduate students. May be repeated for credit. *M. McCarthy*

296. Teaching in Ocean Sciences (2 credits). F

For new and/or relatively inexperienced graduate students in pedagogy of ocean sciences. Role and responsibilities of teaching in ocean sciences described and developed. Includes discussions about effective teaching methods; hands-on issues for work in the laboratory; university expectations; and regulations regarding teaching, organizational strategies, time management, and working with instructors and staff. Prerequisite(s): graduate standing or permission of instructor. Enrollment restricted to graduate students. *C. Edwards*

297. Independent Study.

Independent reading, research, and written reports not related to thesis research. Students submit petition to sponsoring agency. *The Staff*

299. Thesis Research.

Students submit petition to sponsoring agency. *The Staff*

Philosophy

Cowell College
(831) 459-2070
<http://philosophy.ucsc.edu>

Faculty and Professional Interests

Professor

W. EMMANUEL ABRAHAM, Emeritus

DAVID C. HOY, Distinguished Professor, Emeritus

S. PAUL KASHAP, Emeritus

CARLOS G. NOREÑA, Emeritus

RICHARD E. OTTE

Philosophy of religion, formal epistemology, philosophy of science, philosophical logic

PAUL A. ROTH

Philosophy of social science, philosophy and sociology of science, epistemology, history of analytic philosophy, philosophy of history

ELLEN KAPPY SUCKIEL, Emerita

RICHARD A. WASSERSTROM, Emeritus

Associate Professor

JONATHAN ELLIS

Philosophy of mind, epistemology, philosophy of language, Wittgenstein

ROBERT A. GOFF, Emeritus

DANIEL GUEVARA

Kant, moral philosophy, moral psychology, environmental ethics, history of modern philosophy

Assistant Professor

JOHN F. BOWEN

Ancient philosophy, especially ancient science and metaphysics, and contemporary analytic metaphysics

ABRAHAM D. STONE

History of 20th-century philosophy (continental and analytic), 19th-century continental philosophy, philosophy of science, metaphysics, and medieval philosophy

RASMUS G. WINTHER

Philosophy of science, epistemology, metaphysics, philosophy of biology, American pragmatism, Latin American philosophy, evolutionary theory

Lecturer

JOCELYN HOY

Feminist philosophy, 19th- and 20th-century continental philosophy



Professor

KAREN M. BARAD (Feminist Studies)

Physics, feminist philosophy, philosophy of science, cultural studies of science, and feminist theory

SANDRA CHUNG (Linguistics)

Syntax, semantics, Austronesian languages

JEROME NEU (Humanities)

Philosophy of mind; emotions, culture, and insults; philosophy of law; Freud and psychoanalytic theory

Program Description

Philosophy inquires into assumptions about and theories of the most basic facets of rational thought, e.g., what to believe (epistemology), what is (metaphysics), what to value (morality). Such questions can be studied by looking at answers that contemporary philosophers propose, by investigating the principles that other disciplines use to legitimate claims, or by learning how, historically, philosophers approached these issues. In this respect, "philosophy" names not only an historically defined subject matter, but also inquiry into any of the fundamental determinants of all forms of rational thought. Thus, students of philosophy can pursue a broad range of topics of the greatest historical, intellectual, and personal interest.

The department offers courses that relate these traditional philosophical questions to contemporary work in literature and the social and natural sciences. In addition, the department offers several courses that make a careful study of the classic texts in philosophy, ancient and modern. Moreover, the curriculum covers all the dominant contemporary schools of philosophy in the Anglo-American and European traditions.

The study of philosophy enables students to expand their abilities in critical thinking and reasoning as well as to improve their skills in verbal and written communication. Students may major or minor in philosophy. The department also offers a major in philosophy with a concentration in religious thought.

Philosophy prepares students for many careers as well as for most professional schools, including law. Students who wish to go to graduate school in philosophy are encouraged to study logic at both the introductory and intermediate levels and any languages that are necessary for advanced scholarship in the different historical eras of philosophy.

Major Requirements

Courses

Eleven courses are required: two at the introductory level, two in the history of philosophy sequence (100A, 100B, 100C), and seven additional upper-division courses (including one advanced seminar). For some of the lower-division required courses, students may petition to substitute courses taken at other institutions. These 11 courses must meet the following distribution requirements:

Introductory. Course 9 and at least one of courses 11, 22, 24, 28, or any Philosophy 80 course;

History of philosophy. Two of 100A, 100B, or 100C (all three strongly recommended for students who anticipate graduate work in philosophy). Taking any two from the sequence Philosophy 100A, 100B, and 100C will satisfy the Disciplinary Communication (DC) requirement.

At least seven additional courses numbered 100A and above, one of which must be an advanced seminar numbered 190. Note that the two courses counted toward fulfilling the history of philosophy requirement cannot be counted among these seven additional courses. Courses 195A, 195B, and 199 also cannot be counted among these seven additional courses. All upper-division courses must be completed at UCSC unless a petition for an exception is approved by the undergraduate program adviser.

In order to be a philosophy major, courses must be satisfied in the following sequence. Before being eligible to enroll in any course in the history sequence (Philosophy 100A-100C), a student must have completed all required introductory courses, e.g., Philosophy 9 and at least one from Philosophy 11, 22, 24, 28, or any 80-sequence course. Before being eligible to enroll in any philosophy course above Philosophy 100C, prospective majors must have taken at least one of the required history of philosophy courses (e.g., either Philosophy 100A, 100B, or 100C). Transfer students wishing to major in philosophy should consult with the Philosophy Department undergraduate adviser as soon as possible.

Disciplinary Communication Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC Requirement in philosophy is met by completing any two from the sequence Philosophy 100A, 100B, and 100C.

Comprehensive Requirement

In the fourth year, students satisfy the comprehensive (exit) requirement by taking one course numbered 190. This advanced seminar meets the standards of the senior-year level of achievement in philosophy. Students who do superior work in an advanced seminar can be awarded a notation of Honors in the evaluation for that course. In addition to Honors in an advanced seminar, graduating seniors with a distinguished record of achievement in their philosophy courses may be awarded Honors or Highest Honors in the philosophy major. Graduation with Honors in Philosophy requires at least a 3.7 average in all philosophy courses taken at

UCSC. Graduation with Highest Honors in Philosophy requires at least a 3.9 average in all philosophy courses taken at UCSC. Students with an average between 3.8 and 3.9 may be awarded Highest Honors by vote of the Philosophy Department.

Minor Requirements

A minor in philosophy consists of any nine of the 11 courses required for the major. At least five of these must be upper-division. There is no senior exit requirement for the minor.

Program Planning Notes

When a faculty member thinks that a student has done exceptional work that could be carried to a more advanced level, the student may be given the option of writing a senior essay (course 195A). Normally, the senior essay is completed in one quarter; in unusual circumstances, it can be continued for a second quarter (course 195B), but only if the writing requirements for course 195A are completed successfully and on time. The senior essay, like individual studies more generally, does not count toward the 11 courses required for the major.

After undergraduates have taken the requisite introductory courses, they have a wide range of upper-division courses from which to choose. Those who are considering advanced study are encouraged to consult regularly with any member of the philosophy faculty about the courses that would best prepare them for graduate work. Preparation for graduate work ought to begin before senior year. The Philosophy Department sponsors workshops in the fall quarter for students contemplating graduate school in philosophy.

Philosophy Major with Concentration in Religious Thought

This program is for students who wish to use the discipline of philosophy as a basis for pursuing an interest in religious thought. It consists of an individually planned sequence of at least four courses dealing with religious thought, supplementing a core of courses in philosophy. Admittance into the program requires consultation with the faculty director of the concentration and approval by the department undergraduate adviser. A sequence of upper-division courses is needed to fulfill the religious thought concentration. Students should plan to meet with the director and the undergraduate adviser at least once a year to discuss their progress.

To major in this concentration, the student petitions the department through the normal major declaration process by the established campus quarterly deadlines.

Course Requirements

Fourteen courses are required: two introductory philosophy courses; two in the history of philosophy sequence; six upper-division philosophy courses; and four courses in the area of religious thought.

These 14 courses must meet the following distribution requirements:

Introductory. Course 9 and at least one of 11, 22, 24, 28, or any Philosophy 80 course.

History of Philosophy. Philosophy 100A (*Ancient Greek Philosophy*) and either Philosophy 100B (*The Rationalists*) or Philosophy 100C (*The Empiricists*).

Upper-Division and/or Graduate Courses. Six five-credit philosophy courses at UCSC, including one advanced seminar (190 series), and excluding Philosophy 199. These courses must include three advanced courses in philosophy of religion: either Philosophy 170 (*Interpretation of Religion*) or Philosophy 171 (*Faith*

and Reason), and two other upper-division or graduate courses that involve philosophy of religion. The director of the concentration in religious thought will determine which philosophy courses count as involving philosophy of religion.

Concentration in Religious Thought. Four courses in the area of religious thought from programs on campus such as anthropology, literature, history, history of art and visual culture, philosophy, psychology, and sociology. The director of the concentration in religious thought must approve these courses.

Transfer Students. Students can petition the department for credit in the major for coursework done elsewhere. In general, equivalent introductory courses in philosophy may be substituted for UCSC philosophy introductory courses. One upper-division course taken at another four-year university may also be substituted by petition—submit a syllabus and supporting material from the class to the Philosophy Department office (Cowell 220). Only courses for which the student has received a B or better grade will be accepted for the major. The requirement of three upper-division or graduate philosophy of religion courses cannot be substituted with courses taken elsewhere; they must be taken at UCSC.

Graduate Program

The Department of Philosophy conceives of philosophy as a broad and inherently cross-disciplinary enterprise. The department has a particular emphasis in philosophy of science, broadly conceived. This embraces a wide range of topics, including those questions of value and normativity that naturally arise in connection with policies and applications of science and technology. Graduate students are able as well to take advantage of a wide range of courses in the history of philosophy, including ancient, early modern, Kantian, 19th-century, continental, American, and the history of 20th-century philosophy (analytic, continental, and combined). In addition to philosophical questions concerning science and in the history of philosophy, faculty research has also focused recently on metaphysics, epistemology, the philosophy of mind, the philosophy of language, moral philosophy, moral psychology, environmental ethics, the philosophy of religion, philosophical logic, and the philosophy of history.

Both the master of arts (M.A.) and the doctor of philosophy (Ph.D.) programs encourage interaction with other fields.

Graduate Program Requirements

Breadth Requirements in the First Year

During their first year, all graduate students are expected to fulfill a set of breadth requirements. These requirements are designed to provide both a common experience on which students can build their individual projects and a shared framework within which they can exchange ideas. In addition to Philosophy 201, *First Year Seminar*, students must take at least one course in the area of metaphysics and epistemology and one course in the area of value theory according to a list determined annually by the graduate committee. During their first year of study all students must pass a logic competency examination with a grade of B or better. This examination will cover material typically taught in a first course in formal logic. For further details, see the graduate program statement on the department's web page or consult with the department's graduate adviser.

Ph.D. Program

The Ph.D. program provides students with closely monitored training in philosophy. The program is

designed to be completed in six years or less. Graduate work in philosophy can lead to careers both inside and outside academia. Because most doctoral students will be preparing for a career that involves teaching philosophy, they are encouraged to be teaching assistants for at least three quarters.

Courses. A minimum of 12 graduate courses. Up to two courses may be taken from the offerings of other departments, and up to two courses may be independent studies.

Language requirement. The foreign language will be individually determined based on the relevance of such linguistic skills to the research interests of the student. Proficiency can be demonstrated either by passing a written examination administered by the department or by successfully completing a language course approved by the graduate committee.

Qualifying examination. Near the end of the required coursework, doctoral students will develop a research project. The qualifying examination, normally taken during the third year of enrollment, is centered on a qualifying essay that demonstrates the candidate's ability to do extended, dissertation-level research and analysis relevant to the proposed thesis topic and dissertation plan. The examination focuses on the student's research project and on the fields of scholarship it presupposes.

Dissertation. The final requirement for the Ph.D. degree is a dissertation representing a contribution to philosophical research.

M.A. Program

Applications to the M.A. program are welcomed from talented students with diverse academic backgrounds. The program is open not only to applicants who majored in philosophy as undergraduates, but also to applicants from other disciplines, who have a significant background in philosophy and who now want to study philosophy more intensively. The program is designed to be completed in one or two years.

Courses. A minimum of nine graduate courses. Up to two courses may be taken from the offerings of other departments, and up to two courses may be independent studies.

Languages. There is no foreign language requirement for M.A. students.

Master's paper. By the end of the second year of study and the completion of 45 credits, M.A. students will submit a master's paper, which will normally be defended orally before a committee of two faculty members.

Relationship of the M.A. and Ph.D. Programs

Students in the M.A. and Ph.D. programs will be in the same classes and work on the same course distribution requirements. Enrollment in the M.A. program confers no advantage for admission to the Ph.D. program.

Applications and Admissions

Application materials are available online at <http://grad-div.ucsc.edu>. Further information regarding the program may be requested from the Department of Philosophy at (831) 459-4578, fax: (831) 459-2650. Visit the web site at <http://philosophy.ucsc.edu>.

Lower-Division Courses

9. Introduction to Logic. E3

A study of correct reasoning, concentrating on developing the skills necessary to distinguish logically correct from logically incorrect arguments. The emphasis is on modern symbolic logic, although the traditional theory of the syllogism is also covered. (General Education Code(s): MF, IH, Q.) (F) *J. Bowin*, (S) *The Staff*

11. Introduction to Philosophy. F

An introduction to the main areas of philosophy through critical reflection on and analysis of both classical and contemporary texts. Focuses on central and enduring problems in philosophy such as skepticism about the external world, the mind-body problem, and the nature of morality. (General Education Code(s): TA, IH.) (F) *J. Neu*

22. Introduction to Ethical Theory. W

A consideration of ethical issues and theories focusing on the foundation of moral value and the principles governing character and behavior. Designed to extend and develop the student's abilities in philosophical reasoning about ethics. (General Education Code(s): IH.) *The Staff*

24. Introduction to Ethics: Contemporary Moral Issues. *

An examination of the conceptual and moral issues that arise in connection with such topics as abortion, racism and war and violence, world hunger, humans and their interactions with the nonhuman environment. The readings are drawn from recent philosophical articles on these topics. (General Education Code(s): IH.) *The Staff*

26. Existentialism and After. *

A survey of recent movements in European thought, such as phenomenology, existentialism, hermeneutics, critical theory, continental feminism, and poststructuralism, with some attention to their 19th-century precursors. Selections from major philosophical treatises are supplemented with literary works. (General Education Code(s): IH.) *The Staff*

28. Environmental Ethics. *

This course is an introduction to the moral issues raised by our interactions with nonhuman animals and with the rest of the natural environment. The course will relate traditional moral theories to contemporary literature on the ethics of nature conservation and environmental protection. The course is intended as a first course in philosophy as well as a first course in ethics; therefore, questions concerning the nature of philosophical inquiry and the ways in which philosophical inquiry is different from inquiries conducted within other disciplines will also be addressed. (General Education Code(s): IH.) (FWS) *The Staff*

80E. Latin American Philosophy. W

Is there a general school of philosophy endemic to Latin America? Would it have to appeal to quintessential Western philosophical questions regarding knowledge, values, and reality? If not, why not, and would it then still count as philosophy? What difference do ethnic and national diversity, as well as strong political and social inequality, make to the development of philosophical questions and frameworks? Course explores a variety of historically situated Latin American thinkers who investigate ethnic identity, gender, and socio-political inequality and liberation, and historical memory, and who have also made important contributions to mainstream analytical and continental philosophy. (Also offered as Latin American and Latino Studies 80E. Students cannot receive credit for both courses.) (General Education Code(s): T4-Humanities and Arts, E.) *R. Winther*

80F. Philosophical Puzzles, Paradoxes, and Conundrums. *

Many philosophical problems have origins in puzzles and paradoxes. One of the most famous is Zeno's paradox of motion. Among others are paradox of the heap (Sortes paradox), Newcomb's puzzle (puzzle about rational decision making), Problem of the Many (problem about material objects), and Liar paradox (paradox for semantics). Over long history of philosophy, many such puzzles and paradoxes have been discovered; some have been solved,

and others have yet to be solved. (General Education Code(s): T4-Humanities and Arts.) *The Staff*

80G. Bioethics in the 21st Century: Science, Business, and Society. *

Serves science and non-science majors interested in bioethics. Guest speakers and instructors lead discussions of major ethical questions having arisen from research in genetics, medicine, and industries supported by this knowledge. (Also offered as Biomolecular Engineering 80G. Students cannot receive credit for both courses.) (General Education Code(s): PE-T, T6-Natural Sciences or Humanities and Arts.) *The Staff*

80L. Life, Logic, and Learning. *

Develops students' thinking and intellectual know-how in three ways of practical value to them: 1) the basic principles of logical thinking—standard rhetorical maneuvers, common fallacies of probability, features of persuasive argument, etc.; 2) stronger skills for approaching learning activities through hands-on practice with strategies from learning sciences; 3) exploration, in a personal yet academically rigorous way, of the difficult "life" questions that preoccupy many students: What should I do after college? What makes for a happy and fulfilling life? (General Education Code(s): T4-Humanities and Arts.) *J. Ellis*

80M. Philosophical Foundations of Science Studies. *

Provides a philosophical perspective concerning the revolution in the understanding of science that generated the so-called "science wars." Introduces the changed philosophical understanding of science shared and presupposed in the fields of science, technology, and society. (Formerly Science and Society.) (General Education Code(s): T5-Humanities and Arts or Social Sciences.) *P. Roth*

80S. The Nature of Science. *

A survey of what philosophers have said about the nature of science and scientific change. Emphasis is placed on whether science is best characterized as the gradual accumulation of truth or whether truth is irrelevant to scientific change. (General Education Code(s): T6-Natural Sciences or Humanities and Arts.) *R. Ortt*

99. Tutorial. F,W,S

The Staff

Upper-Division Courses**100. Vienna Circle and American Philosophy. ***

Study of philosophical movement called the Vienna Circle, named so chiefly for intellectual excellence of its members, but also for external historical reasons. Course pays careful attention to intercultural aspects of ideas of the Vienna Circle: intellectual climate under which these ideas were formed, how thoughts of its members found an echo outside of Austria, and how they made a lasting influence on philosophical thinking in England and in U.S. *The Staff*

100A. Ancient Greek Philosophy. F

Survey of ancient Greek philosophy of the Classical and Hellenistic periods. Begins with Socrates and the pre-Socratics, then undertakes an intensive study of Plato and Aristotle. Course then surveys the main developments that follow: Epicureanism, Stoicism, and Scepticism. (Formerly course 91.) (General Education Code(s): W satisfied by taking this course and either course 100B or 100C.) Prerequisite(s): course 9; courses 11 or 22 or 24 or 28 or any 80 course; and satisfaction of the Entry Level Writing and Composition requirements. *J. Bowin*

100B. The Rationalists. W

A study of the historical background and the present relevance of Descartes, Spinoza, and Leibniz. (Formerly

course 93.) (General Education Code(s): W satisfied by taking this course and either course 100A or 100C.) Prerequisite(s): course 9; courses 11 or 22 or 24 or 28 or any 80 course; and satisfaction of the Entry Level Writing and Composition requirements. *A. Stone*

100C. The Empiricists. S

A critical study (based on original texts) of Locke, Berkeley, and especially Hume on the nature of knowledge, perception, causation, morality, religion, and political society. (Formerly course 94.) (General Education Code(s): W satisfied by taking this course and either course 100A or 100B.) Prerequisite(s): course 9; courses 11 or 22 or 24 or 28 or any 80 course; and satisfaction of the Entry Level Writing and Composition requirements. *D. Guevara*

106. Kant. S

Intensive study of Kant's philosophy, particularly his epistemology and metaphysics developed in his Critique of Pure Reason. Prerequisite(s): course 100A or 100B or 100C. Enrollment limited to 70. *A. Stone*

107. Nineteenth-Century Philosophy. W

A study of some European philosophers of the 19th century, with particular attention to Hegel, Schopenhauer, and Nietzsche. (Formerly course 108.) Prerequisite(s): course 100A or 100B or 100C. *J. Hoy*

108. Phenomenology. *

French phenomenology includes primarily the work of Jean-Paul Sartre, Simone de Beauvoir, and Maurice Merleau-Ponty. Additional topics include the nature of consciousness and agency. Course includes discussion of French feminists' reactions to Simone de Beauvoir and Emmanuel Levinas. Prerequisite(s): course 100A or 100B or 100C. *J. Hoy*

109. Poststructuralism and After. *

The three major poststructuralist philosophers are Michel Foucault, Jacques Derrida, and Gilles Deleuze. After studying their rejection of phenomenological accounts of consciousness and agency—as well as their program for studying power, bio-power, multiplicity, difference, and repetition,—current critics, such as Slavoj Žižek and Judith Butler, are also read for contrast between the methods of phenomenology, genealogy, and critical theory. Prerequisite(s): course 100A or 100B or 100C. *D. Hoy*

110. Heidegger. *

A close study of early and late texts by Martin Heidegger, especially Being and Time. Prerequisite(s): course 106 or 107 or 108 or 109 or 111. Enrollment limited to 45. *D. Hoy*

111. Continental Philosophy. *

Study of recent work in continental philosophy. Topics vary. Prerequisite(s): course 100A or 100B or 100C. Enrollment restricted to junior and senior philosophy majors. *W. Godzich*

112. American Philosophy. *

Study of classical American philosophers, specifically Emerson, Peirce, James, and Dewey, with emphasis on their views of metaphysics, epistemology, ethics, and philosophy of religion. Some attention is also paid to recent pragmatic tendencies in American philosophy. Prerequisite(s): course 100A or 100B or 100C. *R. Winther*

113. The Origins of Analytic Philosophy. *

An examination of the beginnings of analytic philosophy, with primary interest in the reformulation of traditional philosophical problems by Frege, Russell, and the early Wittgenstein. Some attention is also paid to the development of Vienna Circle logical positivism (Schlick, Carnap, Waismann). Prerequisite(s): course 100A or 100B or 100C. Enrollment limited to 39. May be repeated for credit. *P. Roth*

114. Probability and Confirmation. *

Studies the philosophical foundations of probability, induction, and confirmation. Different interpretations of probability studied, and solutions to various problems and paradoxes investigated. Students cannot receive credit for this course and course 214. Prerequisite(s): course 9, and course 100A or 100B or 100C. *R. Otte*

115. Formal Methods in Philosophy. *

Study of formal methods commonly used in analytic philosophy. Emphasis is on developing the technical tools to enable one to read and do modern analytic philosophy. Applications of various formal tools to philosophical problems will also be discussed. Prerequisite(s): course 9, and course 100A or 100B or 100C. *R. Otte*

116. Logic, Sets, and Functions. *

Introduction to basic set theory, recursive definitions, and mathematical induction. Provides a bridge between course 9 and courses 117 and 119. Strong emphasis on proving theorems and constructing proofs, both formal proofs and proofs in the customary, informal style used by mathematicians. Prerequisite(s): course 9; and two from courses 100A, 100B, and 100C. *J. Bowin*

117. Non-Classical Logic. *

Investigation of non-classical logic. Several propositional non-classical logics, such as various modal logics, multi-valued logics, and relevance logics studied. Meta-theoretic results, including soundness and completeness, investigated for each logic studied. Prerequisite(s): course 9, and course 100A or 100B or 100C. Enrollment limited to 40. (S) *The Staff*

119. Intermediate Logic. F

Detailed treatment of the semantics of first order logic and formal computability. Completeness, undecidability of first order logic and Lowenheim-Skolem results also proven. Nature and formal limits of computability and introduction to incompleteness also investigated. Students cannot receive credit for this course and course 219. Prerequisite(s): course 9, and course 100A or 100B or 100C. *R. Otte*

120. Philosophical Writing. *

Training in philosophical thinking and its expression in written form. Prerequisite(s): course 91 or 93 or 94; and satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to philosophy majors. Enrollment limited to 54. (General Education Code(s): W.) *The Staff*

121. Knowledge and Rationality. S

An investigation of modern theories of knowledge, justification, and rationality. One course in philosophy is strongly recommended prior to taking this course. Prerequisite(s): course 100A or 100B or 100C. *The Staff*

122. Topics in Metaphysics. W

Topics vary each quarter, and may focus on one or more sub-fields of metaphysics, e.g., philosophy of time, philosophy of persistence, etc.; or the course may be taught as a general survey of metaphysics. Prerequisite(s): course 9, and course 100A or 100B or 100C. *J. Bowin*

123. Philosophy of Language. *

Current theories of the nature and preconditions of language, the nature of meaning, and the nature of truth. Prerequisite(s): course 100A or 100B or 100C; or consent of instructor. Enrollment limited to 82. *J. Ellis*

125. Philosophy of Science. S

An examination of various topics that arise in thinking about science. Different philosophical problems, such as realism, instrumentalism, confirmation, explanation, space and time, and rational decision making are exten-

sively discussed and criticized. Prerequisite(s): course 100A or 100B or 100C. *R. Winter*

126. Philosophy of Social Sciences. *

Examines philosophical concerns regarding the methods and assumptions of the social sciences. For example, must the methods of the social sciences differ in some important ways from those used by the natural sciences? Another issue concerns problems arising from studying groups where the very notion of rationality appears to vary from culture to culture or over historical periods. Prerequisite(s): course 91 or 93 or 94. *P. Roth*

127. Philosophy of Biology. *

Can developmental processes be reduced to gene expression? Does the history of life exhibit trends (e.g. increasing complexity)? How are we to understand key concepts such as "fitness," "species," "adaptation," and "gene?" Is there such a thing as human nature? Course surveys these and other core philosophical topics in the biological sciences. Prerequisite(s): course 100A or 100B or 100C; satisfaction of Entry Level Writing and Composition requirements. Enrollment limited to 39. (General Education Code(s): W.) *The Staff*

133. Philosophy of Mind. *

Focuses on philosophical questions, both historical and contemporary, concerning the relation between body and mind. Particular attention is given to whether consciousness can be totally explained in physical terms. Prerequisite(s): course 100A or 100B or 100C. *J. Ellis*

135. Philosophy of Psychology. *

Looks at philosophical issues raised by current research on the nature of perception, cognition, and consciousness in psychology and cognitive science. Can there be a science of the mind? Could machines be conscious? Do animals have minds? How did the mind evolve? These and a host of related questions form the subject matter of this course. Students cannot receive credit for this course and course 235. Prerequisite(s): course 100A or 100B or 100C, or by consent of instructor. Enrollment restricted to sophomores, juniors, and seniors. *The Staff*

137. Practical Rationality. *

Examines challenges to what has been a dominant understanding of practical rationality: the claim that reason can never guide action in itself; that acting against one's better judgment is necessarily irrational; that emotions disrupt rather than facilitate practical reasoning. Prerequisite(s): course 100A or 100B or 100C. *The Staff*

138. Wittgenstein. *

Focuses on the writings of the Austrian philosopher Ludwig Wittgenstein. Wittgenstein's work is typically divided into three time periods: early, middle, and late. Prerequisite(s): course 100A or 100B or 100C. Enrollment restricted to junior and senior philosophy majors. *J. Ellis*

139. Freud. *

The development of Freud's concept of mind. Extensive reading tracing the origins and development of Freud's theories and concepts (e.g., abreaction, psychic energy, defense, wish-fulfillment, unconscious fantasy, dreams, symptoms, transference, cure, sexuality) and emphasizing the underlying model of the mind and mental functioning. (Also offered as Psychology 163. Students cannot receive credit for both courses.) Prerequisite(s): course 100A or 100B or 100C. Offered in alternate academic years. *J. Neu*

140. History of Ethics.

A careful study of any one or a number of select primary texts in the history of moral philosophy, with some emphasis on the relation to contemporary issues. Prerequisite(s): course 100A or 100B or 100C. *D. Guevara*

141. Epistemology and Cognition. *

Epistemology is preoccupied with skepticism, the view that knowledge is unobtainable. Recently, there has been skepticism voiced about the status of epistemology itself; philosophers conversant in cognitive science suggest that epistemology is beset with dubious presuppositions. We survey epistemology, cognitive science, and their interface. Students cannot receive credit for this course and course 241. Prerequisite(s): course 91 or 93 or 94. Enrollment restricted to junior and senior philosophy majors. *The Staff*

142. Advanced Ethics. W

An examination of central issues in ethical theory including the nature of and justification for the moral point of view, the place of reason in ethics, the status of moral principles, and the nature of moral experience. Prerequisite(s): course 22, 24, or 28, and course 100A or 100B or 100C. *D. Guevara*

144. Social and Political Philosophy. *

A study of selected classical and contemporary writings dealing with topics such as the nature and legitimacy of the liberal state, the limits of political obligation, and theories of distributive justice and rights. (Also offered as Legal Studies 144. Students cannot receive credit for both courses.) Prerequisite(s): course 100A or 100B or 100C. Offered in alternate academic years. *The Staff*

145. Brave New World: Ethical Issues in Genetics. *

Study of ethical issues involved in recent and upcoming advances in genetic research and technology such as genetic engineering, cloning, human embryo research, genetic experimentation, use of an individual's genetic information, and the manipulation of human evolution. Also discusses fundamental issues such as the moral responsibility of scientists, our obligations to future generations, and the notion of human perfectibility. Prerequisite(s): course 100A or 100B or 100C. *E. Suckiel*

146. Philosophy of Law. W

Exploration of selected problems in jurisprudence: "legal reasoning" and social policy, rules and individual cases, the mental element in the law, punishment and responsibility, causation and fault, liberty and paternalism, etc. (Also offered as Legal Studies 146. Students cannot receive credit for both courses.) Prerequisite(s): course 100A or 100B or 100C. *J. Neu*

147. Topics in Feminist Philosophy. *

Topics in feminist philosophy, which may include: the nature of feminist philosophy, feminist approaches to philosophical issues, social and political philosophy, theories of knowledge, ethics, aesthetics, and science, technology, and medicine studies. Presupposes some familiarity with philosophy or feminist scholarship. (Also offered as Feminist Studies 168. Students cannot receive credit for both courses.) Prerequisite(s): course 100A or 100B or 100C. *J. Hoy*

148. The Holocaust and Philosophy. *

By using the historiography of the Holocaust as a case study, examines the epistemology and ontology of historical knowledge, i.e., how the past is known, and what about it there is to know. Prerequisite(s): course 100A or 100B or 100C. Enrollment restricted to juniors and seniors. *P. Roth*

150. Moral Aspects of Decision Making. *

How should you act when any course of action would contradict the rules of morality? This situation is "the question of dirty hands." It is connected to the doctrine of double effect: the claim that although willing evil as a means to some good result is always wrong, it is permissible to cause evil as a side effect while aiming at a

good result. Discussions include practical issues, such as democracy's combat against terrorism; and theoretical issues, such as the difference between action and omission, and the connection between goodwill and good (or bad) results. Prerequisite(s): course 100A or 100B or 100C; or consent of instructor. *The Staff*

151. Modern Theories of Justice. *

Questions of social and distributive justice are as ancient as Aristotle; yet, modern philosophy, with its developing notions of democracy and quality, has added much sophistication and subtlety to these questions, especially since the publication of John Rawls' *A Theory of Justice* (1971). Issues discussed include: personal relations, concept of community, the notion of the State, and global justice. Prerequisite(s): course 91 or 93 or 94; or consent of instructor. *The Staff*

152. Aesthetics. *

Problems about form, meaning, and interpretation in art, as found in major aesthetic theories from the philosophical tradition, and also in a variety of encounters between recent philosophy and the arts. One course in philosophy is strongly recommended prior to taking this course. Prerequisite(s): course 100A or 100B or 100C. (General Education Code(s): A.) *The Staff*

153. Philosophy of Race. *

Topics include conceptual-analytical and political-social issues. Selected topics may include: the ontology of race; race as real or constructed; scientific understandings of race; race and identity; and color-blind versus color-sensitive theories of justice and political policy. Prerequisite(s): course 100A or 100B or 100C; or consent of instructor. *The Staff*

154. Philosophy in Literature. *

Story, drama, and poetry considered as sources of philosophical perspective or as particular challenges to philosophical interpretation. Also, discussion of literary and imaginative elements in philosophical writing. One course in philosophy is strongly recommended prior to taking this course. Prerequisite(s): course 100A or 100B or 100C. *The Staff*

170. The Interpretation of Religion. *

A study of different philosophical responses to religious belief and practice, from the classical "proofs" of religion, to skeptical critiques of religious experience, to conceptual issues in the interpretation of religious texts. Prerequisite(s): course 100A or 100B or 100C. *The Staff*

171. Faith and Reason. F

Recent work in analytic philosophy of religion, concentrating on traditional theism. Topics include arguments for and against the existence of God, religious experience, miracles, the relation of faith and reason, and problems such as freedom and divine foreknowledge. Prerequisite(s): course 9, and course 100A or 100B or 100C. *R. Otte*

180R. Readings in Philosophy (2 credits). F

Discussion-based course centered on readings in contemporary philosophy. Readings change each term and are a mixture of books, chapters from books, and articles. Readings are primarily in analytic philosophy, and student input is strongly encouraged. Prerequisite(s): One philosophy course. Enrollment by permission of instructor. Enrollment limited to 20. May be repeated for credit. *R. Otte*

190. Advanced Seminar.

190A. Topics in Ancient Greek Philosophy. W

Topics will vary each quarter and will focus on a major ancient Greek philosophical figure or work. Prerequisite(s): two from courses 100A, 100B, and 100C; or consent of instructor. Enrollment restricted to junior and senior

philosophy majors. Enrollment limited to 12. May be repeated for credit. *J. Bowin*

190C. Advanced Topics in Contemporary Ethics. *

Examines one or more leading ethical theories, such as Kantianism, Virtue Theory, Consequentialism, and Humean ethical theory. Examines different foundational ethical principles and arguments for those principles, contrasting accounts of moral action and moral motivation, as well as epistemological and motivational role of emotions in ethical theory. Students cannot receive credit for this course and course 290C. Prerequisite(s): course 140 or 142; and two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 22. May be repeated for credit. *D. Guevara*

190D. Kant's Moral Theory. F

A careful study of Kant's moral theory, with an emphasis on the Groundwork for the Metaphysics of Morals, the Critique of Practical Reason, and the Metaphysics of Morals. Recent secondary sources are considered as well. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. *D. Guevara*

190E. Major Figures in 19th-Century Philosophy. W,S

Focuses on philosophical writings and the significance of a single figure in 19th-century philosophy. May include, but not be limited to, Emerson, Hegel, Kierkegaard, Marx, Schopenhauer, Nietzsche, and Thoreau. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. May be repeated for credit. *A. Stone, J. Hoy*

190F. Topics in Philosophy of Biology. S

Philosophy of biology is one of the fastest-growing areas of philosophy of science. Course gives advanced seniors an overview of many diverse topics currently under discussion in modern philosophy and biology and provides a foundation for further research, regardless of previous experience with the biological sciences. Students cannot receive credit for this course and course 290F. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to juniors and seniors. Enrollment limited to 15. May be repeated for credit. *R. Winther*

190G. Wittgenstein. *

Focuses on the writings of the Austrian philosopher Ludwig Wittgenstein. Wittgenstein's work is typically divided into three periods: early, middle, and late. Topics covered include writings from one or more periods. Students cannot receive credit for this course and course 290G. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 22. *J. Ellis*

190J. Advanced Topics in the History of Ethics. *

A careful study of any one of the main moral theories in the history of philosophy, with some emphasis on the relation to contemporary moral philosophy. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. *D. Guevara*

190L. The Emotions. W

Analysis of particular emotions (e.g., jealousy, boredom, regret) and exploration of general theoretical issues (e.g., expression, control) with emphasis on moral psychology. Satisfies seminar requirement. Admission by interview with instructor. Prerequisite(s): two from courses 100A, 100B, and 100C; satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. Enrollment limited to 23. (General Education Code(s): W.) *J. Neu*

190M. William James. *

Intensive study of James's philosophy, including his philosophical psychology and pragmatic method. Covers James's epistemology, metaphysics, ethics, and philosophy of religion. Prerequisite(s): two from courses 100A, 100B, and 100C; and satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. (General Education Code(s): W.) *E. Suckiel*

190N. Philosophy of Religion. *

An examination of recent work in philosophy of religion. The approach may vary between an analytic and continental approach in different years. Topics might include the rationality of belief in God, religious epistemology, hermeneutics, and religious experience. Prerequisite(s): course 171 and two from courses 100A, 100B, and 100C. Enrollment limited to 20. May be repeated for credit. *R. Otte*

190O. Topics in Epistemology. *

An examination of recent work in epistemology. May focus on topics such as perception, naturalized epistemology, probabilistic epistemology, theories of justification, a priori knowledge, and memory. (Formerly *Epistemology*.) Prerequisite(s): course 9; and two from courses 91, 93, and 94. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. *R. Otte*

190P. Major Figures in Contemporary Philosophy.

Focuses on philosophical writings and significance of a single figure in contemporary (20th- and 21st-century) philosophy. May include, but not be limited to, Russell, Whitehead, Wittgenstein, Husserl, Carnap, Murdoch, Quine, Irigaray, Derrida, and Davidson. Students cannot receive credit for this course and course 290P. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to senior philosophy majors. Enrollment limited to 22. May be repeated for credit. *A. Stone*

190Q. Philosophy of Mathematics. *

Introduction to problems of contemporary analytic philosophy of mathematics. Do mathematical objects exist? Are mathematical statements true? How can we know? Examines the historical background to contemporary debates and the positions which have been taken within them. Students cannot receive credit for this course and course 290Q. Prerequisite(s): course 9; and two from courses 91, 93, and 94; and Mathematics 19A or 20A, or AP score of 4 on the BC exam, or Mathematics Placement Exam score of 40. Enrollment limited to 15. *A. Stone*

190S. Philosophy of Science. F

An examination of a topic in current philosophy of science. The material for the course is chosen from topics such as realism and instrumentalism, scientific explanation, space and time, the confirmation of theories, laws of nature, and scientific abstraction. Students cannot receive credit for this course and course 190S. Prerequisite(s): course 9, and course 100A or 100B or 100C; satisfaction of Entry Level Writing and Composition requirements; enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): W.) *R. Otte*

190T. Advanced Feminist Philosophy. *

Focuses on issues in epistemology and ontology: the construction of knowledge and objectivity, rationality and emotions, subjectivity and personal identity, and the body and sexuality. (Also offered as Feminist Studies 194J. Students cannot receive credit for both courses.) Prerequisite(s): course 147 or Feminist Studies 100; and two from courses 100A, 100B, and 100C. Enrollment limited to 20. *J. Hoy*

190U. Conceptual Schemes. S

Reference to "conceptual schemes" has become commonplace in and out of the philosophical literature. Course examines the philosophical foundations for talk about conceptual schemes and the philosophical and historical arguments that frame and make plausible such discussions. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. *P. Roth*

190V. Hermeneutics. *

Intensive study of the tradition of philosophical hermeneutics, which is concerned with the theory of understanding and interpretation. Readings drawn from Martin Heidegger, Hans-Georg Gadamer, and possibly Paul Ricoeur. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment limited to 12. *D. Hoy*

190W. History of Consciousness. *

Historical study of philosophical theories of consciousness and self-consciousness. Problems include the relation of self and other, consciousness and body, and self-consciousness and ethical agency. Readings will be selected from some of the following: Kant, Hegel, Nietzsche, and Heidegger, followed by phenomenologists, poststructuralists, and analytic philosophy. Students cannot receive credit for this course and course 290W. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 10. *D. Hoy*

190X. The Good Life. F

Study of alternative conceptions of the elements of a good life, including topics such as courage, loyalty, devotion to ideals, personal flourishing, commitment to a community or tradition, spiritual enlightenment, integrity, compassion, and intellectual understanding. Also covered are fundamental questions such as the meaning of life, the relationship of "living right" to "living well," and the role of feelings in the justification of action. Prerequisite(s): two from courses 100A, 100B, and 100C. Enrollment restricted to junior and senior philosophy majors. Enrollment limited to 20. *J. Ellis*

190Y. Insults and Intentions. *

The schoolyard wisdom about "sticks and stones" does not take one very far: insults not only take the form of words, and even words have effects. What kind of injury is an insult? Is it infliction determined by the insulter or the insulted? What does it reveal of the character of each and of the character of society and its conventions? What is its role in social and legal life (from play to jokes to ritual to war and from blasphemy to defamation to hate speech)? Philosophical, anthropological, psychoanalytic, and legal approaches to the questions are emphasized. Students cannot receive credit for this course and course 290Y. (Formerly Insults and Intentions.) Prerequisite(s): two from courses 100A, 100B, and 100C; and satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. Enrollment limited to 22. (General Education Code(s): W.) *J. Neu*

195A. Senior Essay. F,W,S

Preparation of senior essay (approximately 25 pages) during one quarter. Students submit petition to sponsoring agency. *The Staff*

195B. Senior Essay. F,W,S

Under exceptional circumstances, a second senior essay continuing the work of the first essay is permitted but only when the first senior essay has been completed. Students submit petition to sponsoring agency. *The Staff*

199. Tutorial. F,W,S

May be repeated for credit. *The Staff*

199F. Independent Study (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**201. First Quarter Seminar. ***

First quarter required course for philosophy graduate students. Introduces the work of the philosophy faculty members to the new graduate students. Helps new students form a cohort. Each week different faculty members will visit the class and discuss materials of their own as well as materials or topics that they study. Enrollment restricted to graduate philosophy majors. *P. Roth*

202. Topics in Ancient Greek Philosophy. *

Topics will vary each quarter and will focus on some major ancient Greek philosophical figure or work. Enrollment restricted to graduate philosophy majors. Enrollment limited to 20. *J. Bowin*

214. Probability and Confirmation. *

Studies the philosophical foundations of probability, induction, and confirmation. Different interpretations of probability studied, and solutions to various problems and paradoxes investigated. Students cannot receive credit for this course and course 114. Enrollment restricted to graduate students. *R. Otte*

219. Intermediate Logic. *

Natural deduction and semantics of first order predicate logic. Metatheory, including completeness theorems for propositional and predicate logic. Students cannot receive credit for this course and course 119. (Formerly course 217.) Prerequisite(s): course 9. Enrollment restricted to graduate students. Enrollment limited to 40. (S) *The Staff*

222. Metaphysics. *

Advanced introduction to topics in 20th century and contemporary analytic metaphysics. Divided into five main parts dealing, respectively, with issues about the nature of existence, properties, time, change and persistence, and material constitution. Students cannot receive credit for this course and course 122. Enrollment restricted to graduate philosophy majors. Enrollment limited to 10. *A. Stone*

223. Recent European Philosophy. *

Seminar on recent developments in European philosophy, with particular attention to German theorists such as Nietzsche, Heidegger, Gadamer, Horkheimer, Adorno, or Habermas. Theorists such as Sartre, Merleau-Ponty, Derrida, Foucault, Bourdieu, Levinas, Laclau, or Vattimo may be read as well. (Also offered as History of Consciousness 223. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *D. Hoy*

224. Philosophy of Language. *

Advanced introduction to issues in the philosophy of language—primarily concerning the nature of reference, meaning, and truth. Works from such 20th-century figures as Russell, Wittgenstein, Kripke, Lewis, and Putnam discussed. Topics include what it is for a sign or a bit of language to be meaningful, or for it to identify or represent something; what it is for a statement to be truthful; what it is to be a language; and how reference works when attributed to beliefs. Cannot receive credit for this course and course 123. Enrollment restricted to graduate philosophy majors. Enrollment limited to 10. *The Staff*

226. Scientific Reason. W

Addresses traditional questions of truth, reason, knowledge, practice, and "what there is" in a new way. It is not

about what we find out, but about how we find out: how our ways of finding out have come into being at different points in the past; what they have done to our conceptions of the world; and why they enable us to remake the world. Enrollment restricted to graduate students. Enrollment limited to 22. *I. Hacking*

231. Metaphysics and Epistemology. F

Focuses on topic or topics in metaphysics and/or epistemology. May focus on topics such as perception, naturalized epistemology, probabilistic epistemology, theories of justification, a priori knowledge, and memory. Topics might include one or more of causation, possible worlds, identity, necessity, time, realism, universals, and existence. Enrollment restricted to graduate philosophy students. Enrollment limited to 22. *J. Ellis*

232. Advanced Topics in Value Theory. *

Considers topics central to philosophical questions about value: ethics, normativity, practical reason, relativism, skepticism, responsibility, motivation, emotion, and so forth. In some instances, the investigation will proceed through influential historical figures, ancient to modern. Enrollment restricted to graduate philosophy majors. Enrollment limited to 20. *D. Guevara*

233. Seminar in Philosophy of Mind. *

Focuses on topics in the philosophy of mind. Topics may include consciousness, mental content, the mind-body problem, and mental causation. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *J. Ellis*

235. Philosophy of Psychology. *

Looks at philosophical issues raised by current research on the nature of perception, cognition, and consciousness in psychology and cognitive science. Can there be a science of the mind? Could machines be conscious? Do animals have minds? How did the mind evolve? These and a host of related questions form the subject matter of this course. Students cannot receive credit for this course and course 135. Prerequisite(s): One course in philosophy, psychology, or linguistics. Enrollment restricted to graduate students. *The Staff*

237. Making Up the Mind. *

How does the mind come to be a thing which science can study? Readings focus on how diagnostic categories, for example, multiple personality disorder, attain scientific cachet and what issues surround the "medicalization" of the mind. Enrollment restricted to graduate students. *P. Roth*

239. Philosophy of Religion. *

Investigation of various topics in philosophy of religion. Enrollment restricted to graduate philosophy majors. May be repeated for credit. *R. Otte*

240. The History of Ethics. *

Compares and contrasts two famous ethical works: Aristotle's *Nicomachean Ethics* and Kant's *Groundwork for the Metaphysics of Morals*. Traditionally, Aristotle and Kant are thought to offer opposing views of good action and good agents. Closely compares their ethical principles and arguments for these principles in order to understand each philosopher in his own terms, as well as to determine whether this traditional characterization is accurate. Students cannot receive credit for this course and course 140. Enrollment restricted to graduate philosophy majors. *The Staff*

241. Epistemology and Cognition. *

Epistemology is preoccupied with skepticism, the view that knowledge is unobtainable. Recently, there has been skepticism voiced about the status of epistemology itself; philosophers conversant in cognitive science suggest that

epistemology is beset with dubious presuppositions. We survey epistemology, cognitive science, and their interface. Students cannot receive credit for this course and course 141. Enrollment restricted to graduate philosophy majors. *The Staff*

245. Brave New World: Ethical Issues in Genetics. *

Ethical issues in genetic research and technology, including genetic engineering, cloning, stem cell research, uses of genetic information, and manipulation of human evolution. Also considers the moral responsibility of scientists, obligations to future generations, and the concept of human perfectibility. Students cannot receive credit for this course and course 145. Enrollment restricted to philosophy graduate students. *E. Suckiel*

247. Stem Cell Research: Scientific, Ethical, Social, and Legal Issues. *

Scientific, ethical, social, and legal dimensions of human embryonic stem-cell research, including the moral status of the embryo; the concept of respect for life; ethical constraints on oocyte procurement; creation of embryonic chimeras; federal policies; and political realities. (Also offered as Biology: Molecular, Cell, and Developmental Biology 288. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *E. Suckiel, The Staff*

252. Poststructuralism. *

French poststructuralism, with particular attention to the main philosophical texts of Jacques Derrida and Michel Foucault. Other representative theorists as well as critics of poststructuralism are studied as time permits. (Also offered as History of Consciousness 252. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *D. Hoy*

254. Politics of Temporality. *

Temporality is the way humans experience time. Examines how continental philosophers have described temporality and how they have explained the relation of temporality to objective clock-time. Phenomenologists such as Husserl, Heidegger, Sartre, and Merleau-Ponty discussed in light of their differences with Kant, Hegel, and Bergson regarding the relation of temporality and subjectivity. Examine Hegel, Benjamin, and Derrida on the relation of temporality and historicity. Enrollment restricted to graduate students. Enrollment limited to 22. *D. Hoy*

256. History of Consciousness. *

Examination of contemporary theories of consciousness in both analytic and continental traditions. Among those who deflate modern philosophy's preoccupation with consciousness are not only Dennett, Davidson, and Rorty, but also Heidegger, Foucault, and Derrida. Among those who argue for irreducibility of subjectivity are not only Searle, Nagel, and Chalmers, but also Sartre, Merleau-Ponty, and Levinas. Discussion of parallel readings from both philosophical perspectives. (Also offered as History of Consciousness 224. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Enrollment limited to 25. *D. Hoy*

280. Graduate Colloquia Course (2 credits). F,W,S

This colloquia series sponsors speakers each quarter. Students must attend all colloquia and are encouraged to form discussion groups after each lecture. Enrollment restricted to philosophy graduate students. *P. Roth*

290C. Advanced Topics in Contemporary Ethics.

Examines one or more leading ethical theories, such as Kantianism, Virtue Theory, Consequentialism, and Human ethical theory. Examines different foundational

ethical principles and arguments for those principles, contrasting accounts of moral action and moral motivation, as well as epistemological and motivational role of emotions in ethical theory. Students cannot receive credit for this course and course 190C. Enrollment restricted to graduate philosophy majors. Enrollment limited to 22. *D. Guevara*

290F. Topics in Philosophy of Biology. *

Philosophy of biology is one of the fastest-growing areas of philosophy of science. Course is designed to give seniors and graduate students an overview of many of the diverse topics currently under discussion in modern philosophy of biology and provide a foundation for further research, regardless of previous experience with the biological sciences. Students cannot receive credit for both this course and course 190F. Enrollment restricted to graduate students. Enrollment limited to 8. May be repeated for credit. *R. Winther*

290G. Wittgenstein. *

Focuses on the writings of the Austrian philosopher Ludwig Wittgenstein. Wittgenstein's work is typically divided into three periods: early, middle, and late. Topics covered include writings from one or more periods. Students cannot receive credit for this course and course 190G. Enrollment restricted to graduate students. *J. Ellis*

290H. Environmental Ethics. *

What is our proper moral stance toward the natural environment? This question encompasses our ethical relations to individual non-human animals, to other species of living beings, and toward the biotic community as a whole. It leads us to consider the broader question: What makes anything at all worthy of our moral respect or even our moral consideration? How are we to understand the very idea of the environment, the distinction between the human world, and the natural world, and the relationships between them. Students cannot receive credit for this course and course 190H. Enrollment restricted to graduate students. Enrollment limited to 10. *The Staff*

290J. Advanced Topics in the History of Ethics. S

Careful study of any one of the main moral theories in the history of philosophy, with some emphasis on the relation to contemporary moral philosophy. Students cannot receive credit for this course and course 190J. Enrollment restricted to graduate students. Enrollment limited to 10. *D. Guevara*

290K. Philosophical Matters of Scientific Practice. *

Considers the relevance of philosophical matters to the practice of science. Using quantum physics as a case study, explores historical and contemporary perspectives on issues such as those raised by the Schrödinger cat paradox, Bell's inequalities, and quantum erasers. Students cannot receive credit for this course and course 190K. Enrollment restricted to graduate students. Enrollment limited to 22. *K. Barad*

290M. Advanced Graduate Seminar: William James. *

Intensive study of James's philosophy, including his philosophical psychology and pragmatic method. Covers James's epistemology, metaphysics, ethics, and philosophy of religion. Recent critical analyses of the issues raised in James's philosophy will also be highlighted. Enrollment restricted to graduate students. Enrollment limited to 20. *E. Suckiel*

290P. Major Figures in Contemporary Philosophy. F

Focuses on philosophical writings and significance of a single figure in contemporary (20th- and 21st-century) philosophy. May include, but not be limited to, Russell,

Whitehead, Wittgenstein, Husserl, Carnap, Murdoch, Quine, Irigaray, Derrida, and Davidson. Students cannot receive credit for this course and course 190P. Enrollment restricted to philosophy graduate students. Enrollment limited to 22. May be repeated for credit. *A. Stone*

290Q. Philosophy of Mathematics. *

Introduction to the problems of contemporary analytic philosophy of mathematics. Do mathematical objects exist? Are mathematical statements true? How can we know? We will examine the historical background to contemporary debates and the positions which have been taken within them. Students cannot receive credit for both this course and course 190Q. Enrollment restricted to graduate students. Enrollment limited to 8. *A. Stone*

290S. Topics in the Philosophy of Science. W

An examination of a topic in current philosophy of science. The material for the course is chosen from topics such as realism and instrumentalism, scientific explanation, space and time, the confirmation of theories, laws of nature, and scientific abstraction. Students cannot receive credit for this course and course 190S. Enrollment restricted to graduate students. Enrollment limited to 20. *R. Winther*

290W. History of Consciousness. *

Historical study of philosophical theories of consciousness and self-consciousness. Problems include the relation of self and other, consciousness and body, and self-consciousness and ethical agency. Readings are from Kant, Hegel, Nietzsche, and Heidegger, followed by phenomenologists, poststructuralists, and analytic philosophy. Students cannot receive credit for this course and course 190W. Enrollment restricted to graduate students. Enrollment limited to 10. *D. Hoy*

290X. The Good Life. *

Proposed elements of a good life, e.g., courage, loyalty, devotion to ideals, personal flourishing, integrity, compassion, and intellectual understanding. Also discusses fundamental questions such as the meaning of life, the relationship of "living right" to "living well." Students cannot receive credit for this course and course 190X. Enrollment restricted to graduate philosophy majors. Enrollment limited to 20. *E. Suckiel*

290Y. On Insults. S

What is the role of insult in social and legal life (from play to jokes to ritual to war and from blasphemy to defamation to hate speech)? Emphasizes philosophical, anthropological, psychoanalytic, and legal approaches to the issues. Enrollment restricted to graduate students and by permission of instructor. Students cannot receive credit for this course and course 190Y. (Formerly course 236.) Enrollment limited to 20. *J. Neu*

294. Teaching-Related Independent Study. F,W,S

Directed graduate research and writing coordinated with the teaching of undergraduates. May be repeated for credit. *The Staff*

295. Directed Reading. F,W,S

Directed reading which does not involve a term paper. May be repeated for credit. *The Staff*

295F. Readings in Philosophy (2 credits). F,W,S

Focuses on selected philosophical areas and/or specific philosophers. Students meet with the instructor to discuss readings and deepen their knowledge on a particular subject. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

296. Special Student Seminar. F,W,S

A seminar for graduate students arranged between students and a faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

297F. Independent Study (2 credits). F,W,S

Students submit petition to course sponsoring agency. Enrollment restricted to graduate students. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Enrollment restricted to students who have advanced to candidacy. May be repeated for credit. *The Staff*

Physical and Biological Sciences

204 Natural Sciences 2 Annex
(831) 459-2931
<http://pbsci.ucsc.edu>

Program Description

A broad range of majors is offered through the physical and biological sciences. The intellectual rigor of these majors ensures that our graduates are well prepared for further studies in graduate and professional schools, as well as careers in scientific research, environmental research, medicine, law, engineering, technology, and business.

The Division of Physical and Biological Sciences' interdisciplinary framework provides students with the opportunity to attend classes and pursue research that ranges from the study of atoms to the examination of distant galaxies. From abstract number theory to the development of new chemical compounds, from evolution to plate tectonics, we provide students not only with the skills to explore and discover the world but also to define and improve it.

Departments and programs affiliated with the Division of Physical and Biological Sciences include the Departments of Astronomy and Astrophysics; Chemistry and Biochemistry; Earth and Planetary Sciences; Ecology and Evolutionary Biology; Microbiology and Environmental Toxicology; Mathematics; Molecular, Cell, and Developmental Biology; Ocean Sciences; Physics; and the Science Communication Program. Our undergraduate affairs office helps students understand and manage the breadth and diversity of academic programs and resources that are available to students in the physical and biological sciences. The Undergraduate Affairs Advising Center is located on the third floor of Thimann Laboratories, room 387.

Physical Education

East Field House
(831) 459-2531
<http://www.ucsc.edu/opers>

Faculty and Professional Interests**Executive Director**

RYAN ANDREWS

Faculty

RENA V. COCHLIN
International folk dance, Mexican dance, modern dance, ballet, yoga, pilates

Physical Education Instructor

RYAN ANDREWS
Strength training, wellness and physical conditioning

JOHN BARDOS
Racquetball

COURTNEY BLACKBURN
Tai chi ch'uan, fencing

CHELSEA GEORGE
Racquetball

LILLIAN HALLOCK
Strength training, physical conditioning

TODD M. HAMMONDS
Strength training

ROBERT W. HANSEN
Racquetball, tennis, basketball

GABRIELLE KILBURN
Sailing, rowing

JULIE KIMBALL
Yoga, swimming

RUSSELL KINGON
Sailing, rowing

DANIELLE LEWIS
Strength training, wellness

JOAN R. MCCALLUM
Swimming, lifeguard training, water safety

CYNTHIA MORI
Strength training, physical conditioning, wellness

KIM MUSCH
Swimming, lifeguard training, water safety

LISA K. NORRIS
Jazz dance, ballet

MICHAEL RONEARE
Soccer

YOSHIHITO SHIBATA
Aikido

CECILIA SHIN
Scuba

Program Description

Physical education offers students an opportunity to learn and improve skills in a variety of areas while gaining knowledge about the relationship between fitness and wellness. With this information, participants will be better prepared to make important choices leading to healthy lifestyles.

Physical education courses at UCSC, which are elective and without academic credit, are offered in a wide variety of activities. The courses consist of instruction, practice, and full participation consistent with each student's ability. While many of the courses are for students at the beginning level, some are designed for the more advanced student. Most courses involve class meetings of one hour's length, twice a week; but some consist of one and one-half hours twice a week or a single two-hour meeting per week. Students may enroll in as many courses as they desire and are permitted to repeat any course.

Lower-Division Courses**5A. Aquatics: Swimming Level I (no credit). F,W,S**

Coeducational. Water exploration and primary skills development. Course is designed to teach only "non-swimmers" how to swim. The following is taught: Red Cross swimming instruction in overcoming fears, water adjustment, floating, breath holding, and rhythmic breathing. Skills to be learned are: water entries, sculling, treading, elementary backstroke, freestyle, methods of water safety, and survival techniques. Students pay a course fee. Prerequisite(s): instructor determines skill level at first class meeting. Enrollment limited to 15. *J. Kimball*

5B. Aquatics: Swimming Level II (no credit). F,W,S

Coeducational. Stroke readiness and development. Course is for those who have completed Swimming Level I or who can swim freestyle and demonstrate elementary backstroke. Skills to be learned are underwater swimming, turns, improvement of freestyle and elementary backstroke, beginning side stroke, backstroke, breaststroke, diving, personal safety skills, and basic rescue techniques. Prerequisite(s): instructor determines skill level at first class meeting: pass Swimming Level I course or demonstrate equivalent skills. Students pay a course fee. Enrollment limited to 20. *J. McCallum, J. Kimball*

5C. Aquatics: Swimming Level III (no credit). F

Coeducational. Stroke refinement and skill proficiency. Course teaches refinement of basic strokes and introduces butterfly, plus backstroke, surface diving, turns, endurance swimming, and survival techniques. Students pay a course fee. Prerequisite(s): instructor determines skill level at first class meeting: pass in Swimming Level II course or possess equivalent skills in freestyle, sidestroke, elementary backstroke, and breaststroke. Enrollment limited to 30. *J. McCallum*

5D. Aquatics: Swimming Level IV (no credit). W,S

Coeducational. Advanced skills. Designed to perfect the techniques and skills of all basic strokes plus butterfly, surface dives, survival swimming, basic diving, endurance swimming, and personal and rescue skills. Students pay a course fee. Prerequisite(s): pass in Swimming Level III course or possess equivalent swimming skill requirements in freestyle, backstroke, sidestroke, or competitive swimming; instructor determines skill level. Enrollment limited to 30. *J. McCallum*

5E. Aquatics: Lifeguard Training (LT) (no credit). F,S

Red Cross certified lifeguard training. Provides the necessary minimum skills training to qualify as a non-surf lifeguard. Certification includes CPR Pro, AED, PDT, D2, ADMIN, and Title 22 First Aid. Candidates must successfully pass final skill tests and written final exam with 80 percent score. Students are billed for a course fee. Prerequisite(s): must have ability to swim 500 yards in ten minutes, tread water for one minute, strong swimming skills in free, back, breast, side, and elementary backstroke; must purchase Red Cross LT text book. Enrollment limited to 10. *K. Musch, J. McCallum*

5F. Water Safety Instructor (WSI) (no credit). S

Coeducational. A Red Cross course designed to certify students who complete all required work as swimming instructors. Instruction in teaching techniques, stroke analysis, skilled swimming, class organization, pool safety, and pool maintenance. Practice teaching assignments outside of class with practical and written final exams. Screening test given at first class meeting. Prerequisite(s): must be 17 years old, possess valid ARC Instructor Candidate Training card (ICT), and ARC swimmers-level skills. (Emergency Water Safety (EWS), or Lifeguard Training (LT) certificate

is highly recommended). Students pay a course fee. Enrollment limited to 10. *K. Musch, J. McCallum*

5G. Aquatics: Swimming/Conditioning (no credit). F,W,S

Open to all students who wish to explore swimming as a conditioning and fitness exercise. Students should know three competitive strokes, and should be able to swim fifteen minutes without stopping. Short health and fitness lectures precede some classes. Students pay a course fee. Prerequisite(s): instructor determination at first class meeting. Enrollment limited to 40. *The Staff, K. Musch, J. McCallum*

5H. Aquatics: Competitive Swimming (no credit). W

Emphasis on competitive swimming and conditioning techniques. For students who want instruction at the competitive level of swimming. Three hours per week. Students pay a course fee. Prerequisite(s): instructor determination at first class meeting. Enrollment limited to 50. *K. Musch*

5R. Aquatics: Basic Scuba Diving (no credit). F,W,S

Coeducational. Sections geared toward the successful completion of NAUI Scuba Diver Certification. The course is divided into three parts: lecture, pool lab, and open water experience. Four open water training dives are offered. Emphasis is on training for open water scuba diving, using the beach as a base of operation. Students pay a course fee. Prerequisite(s): pass swimming skills tests and medical clearance. It is strongly recommended that students enroll in course 5S. Enrollment limited to 24. *C. Shin*

5S. Aquatics: Advanced Scuba Diving (no credit). F,S

Coeducational. Sections are offered to facilitate the development of the basic scuba diver's open water techniques. A minimum of six open water experiences is offered. Course is geared toward successful completion of NAUI Advanced Scuba Diver Certification. Students pay a course fee. Prerequisite(s): course 5R or pass swimming skills test and medical clearance. (Formerly course 5T.) Enrollment limited to 25. *C. Shin*

5T. Scuba Rescue Diving (no credit). F,W,S

Coeducational. Course geared toward the successful completion of NAUI Rescue Diver Certification. Course consists of lecture, pool laboratory, and open-water experience. Emphasis is on training divers to manage risks and effectively handle limited in-water problems. Prerequisite(s): Scuba certification and medical clearance. Enrollment limited to 10. *C. Shin*

5U. Aquatics: Scuba Divemaster (no credit). F,W,S

Coeducational. A diving-leadership certification course for the experienced scuba student who wishes to assist with the scuba-instruction program at UCSC. Topics include teaching techniques, skin and scuba techniques, rescue techniques, and safety procedures. Specialty laboratories also offered with this course which cover a variety of diving skills. Students pay a course fee. Prerequisite(s): Basic Scuba Certification and special prerequisite checking by instructor. (Formerly Aquatics: Scuba Instruction.) Enrollment limited to 20. *C. Shin*

9B. Boating: Beginning Dinghy Sailing (no credit). S

Coeducational. Introductory course in practical boating safety using 15-foot sailboats. Includes introduction to rigging, nomenclature, seamanship, proper boat-handling techniques, and general boating and aquatic safety. Satisfactory completion meets prerequisites for intermediate-level dinghy course. Students pay a course fee. Prerequisite(s):

swimming ability. (Formerly *Boating: Basic Sailing*) Enrollment limited to 18. *R. Kingon, G. Kilburn*

9C. Boating: Intermediate Dinghy Sailing (no credit). F,W,S

Coeducational. Course includes a review of basic sailing with an emphasis on the further development and refinement of small-boat sailing techniques. Fifteen-foot sailboats are used with two students per boat. Students pay a course fee. (Formerly *Boating: Intermediate Sailing*) Prerequisite(s): course 9B or equivalent skills. Enrollment limited to 16. *R. Kingon, G. Kilburn*

9D. Boating: Advanced Dinghy Sailing (no credit). F,S

Coeducational. For students interested in high-performance sailing using Flying Juniors and Coronado 15s. Includes special techniques used in racing conditions. Students pay a course fee. (Formerly *Boating: Advanced Sailing*) Prerequisite(s): course 9C or equivalent skills. Enrollment limited to 12. *R. Kingon, G. Kilburn*

9E. Boating: Competitive Sailing (no credit). F

Coeducational. Instruction and coaching at the advanced sailing level in racing dinghies and keelboats. Emphasis on the physical and mental requirements for racing sailboats and the technical aspects of sail racing. Students will be involved in intercollegiate competition. Students pay a course fee. Prerequisite(s): advanced sailing ability. *R. Kingon*

9H. Boating: Basic Rowing (no credit). F,W,S

Coeducational. Course designed to cover types of rowing boats, nomenclature, fundamental skills, and specific safety and rescue aspects related to the activity. Students will row singly as well as in groups using 15-foot to 22-foot rowing dories. (Formerly course 9J.) Students pay a course fee. Prerequisite(s): swimming ability. Enrollment limited to 12. *R. Kingon, G. Kilburn*

9J. Boating: Intermediate Rowing (no credit). F,S

Coeducational intermediate course designed to cover more advanced rowing techniques and the skills needed for safe open water rowing. Students pay a course fee. Students pay a course fee. Prerequisite(s): basic rowing or permission of instructor. (Formerly course 9H.) Enrollment limited to 11. *R. Kingon, G. Kilburn*

9K. Boating: Ocean Kayaking (no credit). F,W,S

Co-educational course that teaches novice kayakers the skills to safely use UCSC kayaks in the Monterey Bay. Topics include: basic paddling strokes and maneuvers; self and assisted deep-water rescues; beach launching; landing through surf; and marine hazards and navigation. Students pay a course fee. Enrollment limited to 12. *R. Kingon, D. Johnston*

9S. Boating: Intermediate Keelboat Sailing (no credit). F,W,S

Coeducational. Combines hands-on rigging and docking practice in the harbor and sailing practice on Monterey Bay with instruction in sail-trimming, de-powering, powering-up, person-overboard recovery techniques, boating safety, weather, ocean conditions, sailing theory, rigging, navigation, and the maritime rules of the road. Twenty-seven foot, ultralight, displacement keelboats are used. Students pay a course fee. Enrollment limited to 16. *R. Kingon*

9T. Boating: Advanced Keelboat Sailing (no credit). F,S

Coeducational. Further development and refinement of boat-handling techniques, including advanced maneuvering, anchoring, and racing with an introduction to the use of spinnakers. Students pay a course fee. Prerequisite(s): course 9S. Enrollment limited to 12. *R. Kingon*

15B. Court Sports: Basketball (no credit). F,W,S

Coeducational. Instruction in fundamentals, offensive and defensive strategies, rules, and conditioning designed primarily for beginning and intermediate level players. Students pay a course fee. Enrollment limited to 20. *R. Hansen, The Staff*

15H. Court Sports: Racquetball (no credit). F,W,S

Coeducational. The beginning section provides an introduction to the basic knowledge and skills involved in this indoor racquet sport. The advanced beginning section continues the development of the basic skills emphasizing increased shot variety and advanced strategy. The intermediate section offers the opportunity for further skill development and introduces more advanced offensive skills. Students pay a course fee. Enrollment limited to 18. *C. George, J. Bardos*

15N. Court Sports: Tennis (no credit). F,W,S

Coeducational. The beginning section introduces the basics of forehand, backhand, and serve. Advanced beginning section reviews these basics and introduces the volley, overhead, and lob. The intermediate section reviews all stroke mechanics and covers basic singles and doubles strategy. The advanced section includes use of spins, practice principles, detailed stroke analysis, and advanced play situations. Competitive Tennis is a year-long program for members of the intercollegiate tennis teams. Students pay a course fee. Enrollment limited to 24. *R. Hansen, The Staff*

15T. Court Sports: Volleyball (no credit). F,W,S

Coeducational. Beginning/intermediate, intermediate, and advanced sections are offered for students who desire to learn and improve the basic skills, as well as to understand the rules. Competitive section is open to students interested in participation in the UCSC NCAA Women's Volleyball team. It covers information and practice in all aspects of the competitive volleyball season. Students pay a course fee. Enrollment limited to 25. *The Staff*

20A. Dance: Ballet (no credit). F,W,S

Coeducational. Sections offered at various technical levels graded from I to III. Emphasis on principles of movement, style, and execution of ballet technique. Section in ballet repertory where advanced students have the opportunity to perform is offered in the spring quarter. Students pay a course fee. *L. Norris, The Staff*

20B. International Folk Dance (no credit). F,W,S

Coeducational. International folk dance with an emphasis on Balkan and Israeli dances. Sections are also offered periodically in Mexican dance. Students pay a course fee. *R. Cochlin*

20C. Dance: Jazz (no credit). F,W,S

Coeducational. Sections offered at various technical levels graded from I to III. Exploration of jazz dance emphasizing basic technique, styling, rhythm, and isolations. Jazz and contemporary music is used as accompaniment. Some background in ballet strongly recommended before continuing to Jazz II or III. Section in jazz dance repertory where advanced students have the opportunity to perform is offered in spring quarter. Students pay a course fee. Enrollment limited to 40. *L. Norris, The Staff*

20D. Dance: Modern (no credit). F,W,S

Coeducational. Sections offered at various technical levels graded from I to III. Emphasis on basic techniques and building phrases of movement. Section in choreography and improvisation offered in spring quarter. Section in dance repertory offered periodically. Students pay a course fee. *R. Cochlin, The Staff*

20F. Dance: Individual Studies in Dance (no credit). F,W,S

Coeducational. Designed to give students the opportunity of pursuing their particular interests in the field of dance with the support and direction of a faculty member. Prerequisite(s): instructor determination at first class meeting. *L. Norris, R. Cochlin*

25A. Fencing: Épée (no credit). F,W,S

Coeducational. Basic instruction in the techniques, strategy, and general methodology of modern épée fencing. Emphasis on épée fencing as a development from the traditional French and Italian dueling sword styles as they have evolved to form the modern electrical épée game. Students pay a course fee. *C. Blackburn*

25B. Fencing: Foil (no credit). F,W,S

Coeducational. Instruction in modern competitive French-Italian foil techniques for beginning, intermediate, and advanced levels. Emphasis on physical and mental conditioning leading to improved skill in recreational and competitive areas of involvement. Students pay a course fee. *C. Blackburn*

25C. Fencing: Sabre (no credit). F,W,S

Coeducational. Instruction and practice in basic offensive and defensive skills of modern Hungarian sabre technique. Emphasis on physical and mental conditioning as a foundation for more advanced levels of instruction. Preparation for recreational and competitive involvement. Students pay a course fee. *C. Blackburn*

28K. Field Sports: Soccer (no credit). F,W,S

Coeducational/Women's. Sections are offered in field soccer and indoor soccer. Instruction in the basic techniques, tactics, laws of the game, and injury prevention for beginners and advanced players. Students pay a course fee. Prerequisite(s): determination at first class meeting. *M. Rumeare, The Staff*

30G. Fitness Activities: Physical Conditioning (no credit). F,W,S

Coeducational. An exercise course designed to increase the participants' strength, flexibility, coordination, and cardiovascular endurance. Special attention is given to understanding and utilizing sound and safe principles of body alignment and movement. Courses include, but not limited to: Pilates, cardio boxing, stretch and strengthen, and aerobics. Students pay a course fee. *L. Hallock, R. Cochlin, C. Mori, R. Andrews*

30H. Fitness Activities: T'ai Chi Ch'uan (no credit). F,W,S

Through balanced movement and breath control, T'ai Chi Ch'uan attempts to forestall many processes of aging by cultivating greater strength of body, mind, and spirit. Students pay a course fee. *C. Blackburn*

30J. Fitness Activities: Strength Training (no credit). F,W,S

Coeducational. An introduction to safe and effective methods of weight training and other personal conditioning activities. Topics covered include proper weight-training techniques, care of body and equipment, and elementary exercise physiology. Students pay a course fee. (Formerly *Fitness Activities: Weight Training*.) *L. Hallock, R. Andrews, T. Hammonds, D. Lewis, C. Mori*

30L. Fitness Activities: Yoga Exercises (no credit). F,W,S

Coeducational. Sections offered at beginning, continuing beginning, and advanced beginning levels of Hatha Yoga. Students pay a course fee. *R. Cochlin, J. Kimball*

43A. Martial Arts: Aikido (no credit). F,W,S

Coeducational. A nonviolent, noncompetitive Japanese

martial art emphasizing mind-body harmony, balance, relaxation, and the understanding of vital energy. Aikido self-defense techniques aim toward the creative resolution of conflict and the growth of the individual. Sections offered at beginning and experienced levels. Students pay a course fee. *Y. Shibata*

43G. Martial Arts: Tae Kwon Do (Karate) (no credit). F

Coeducational. Sections offered at the beginning and intermediate/advanced levels. Covering basic skills, knowledge, and philosophy of Tae Kwon Do and providing instruction in the following aspects of martial arts study: fundamental techniques of self-defense, physical conditioning, emotional control, self-discipline, and self-confidence. Students pay a course fee. Enrollment limited to 35. *The Staff*

Physics

211 Interdisciplinary Sciences Building
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*Faculty and Professional Interests***Professor**

THOMAS BANKS
String and particle theory, quantum gravity, and cosmology

DAVID P. BELANGER
Experimental condensed matter physics, phase transitions

FRANK G. BRIDGES, Emeritus

GEORGE BROWN, Emeritus

SUE A. CARTER
Experimental condensed matter physics, polymer physics, molecular electronics, phase transitions, electronic and optical properties of materials

JOSHUA M. DEUTSCH
Condensed matter theory

MICHAEL DINE
Theory of elementary particles

DAVID E. DORFAN, Emeritus

GEORGE D. GASPARI, Emeritus

HOWARD E. HABER
Theory and phenomenology of fundamental particles and their interactions

CLEMENS A. HEUSCH, Emeritus

ROBERT P. JOHNSON
Experimental high-energy physics, astrophysics

ONUTTOM NARAYAN
Theoretical condensed matter physics

MICHAEL NAUENBERG, Emeritus

JOEL R. PRIMACK
Cosmology, galaxy formation and evolution, particle astrophysics, nature of dark matter, gamma ray astronomy

STEVEN RITZ
Particle physics and astrophysics

BRUCE ROSENBLUM, Emeritus

MATTHEW SANDS, Emeritus

ZACK SCHLESINGER
Experimental condensed matter physics, infrared and optical

spectroscopy, strongly correlated electron systems, novel materials, negative thermal expansion, underconstraint and geometrical frustration

BRUCE SCHUMM
Experimental particle physics

PETER L. SCOTT, Emeritus

ABRAHAM SEIDEN
Experimental high-energy physics

B. SHASTRY
Condensed matter physics, strongly correlated matter, Mott-Hubbard physics, high T_c superconductivity, quantum magnetism, exactly integrable systems, exactly solvable models of many-body systems and in statistical mechanics, quantum chaos, geometric frustration

A. PETER YOUNG
Condensed matter theory, statistical mechanics

Associate Professor

ANTHONY AGUIRRE
Cosmology of the early and late universe: inflation and the global structure of cosmological models; the intergalactic medium and its enrichment with heavy elements; galaxy formation, evolution, and feedback processes; dark matter; theories of modified gravity

DAVID M. SMITH
High-energy astrophysics; X-ray and gamma-ray detectors and instrumentation; solar, terrestrial, and planetary sources of gamma radiation

Assistant Professor

GEY-HONG GWEON
Experimental condensed matter physics

JASON NIELSEN
Experimental high-energy physics

STEFANO PROFUMO
Theory of particle physics and particle astrophysics

ALEXANDER SHER
Development of experimental techniques for recording and stimulation of activity at hundreds of neurons and use of these techniques to study neural function, structure, and development

Lecturer

FRED KUTTNER
Foundations of quantum mechanics; physics education

**Professor**

GEORGE R. BLUMENTHAL (Astronomy and Astrophysics)
Cosmology, galaxy formation, high-energy astrophysics

WENTAI LIU (Electrical Engineering)
Retinal prosthesis, biomimetic systems, integrated neuro-electronics, molecular electronics, CMOS and SOI transistor design, current mode band limited signaling, microelectronic sensor, timing/clock recovery and optimization, noise characterization and modeling, and computer vision/image processing

WILLIAM G. MATHEWS, Emeritus

RICHARD MONTGOMERY (Mathematics)
Celestial mechanics, differential geometry, gauge theory, mechanics (quantum and classical), and control theory

ARTHUR RAMIREZ (Dean, Baskin Engineering) (Electrical Engineering)
Experimental materials physics encompassing a broad

range of systems including semiconductors, superconductors, magnets, thermoelectrics, and dielectrics. Research that connects materials and devices, with a focus on oxides and organics. Many-body physics that arises from geometrical frustration of low energy degrees of freedom. Techniques include ultra-low temperatures and high magnetic fields, thermodynamic and transport measurements, defect spectroscopy, and device characterization.

ALI SHAKOURI (Electrical Engineering)

Quantum electronics, nano- and microscale heat and current transport in semiconductor devices; thermoelectric/thermionic energy conversion; renewable energy sources; thermal imaging; micro-refrigerators on a chip; and optoelectronic integrated circuits

Associate Professor

JOEL A. KUBBY (Electrical Engineering)

Micro-Electro-Mechanical-Systems (MEMS), adaptive optics, integrated optics, bio-MEMS

Assistant Professor

PASCAL GARAUD (Applied Mathematics and Statistics)

Astrophysics, geophysics, fluid dynamics, numerical resolutions of differential equations, and mathematical modeling of natural flows

HOLGER SCHMIDT (Electrical Engineering)

Integrated optics for biomedicine and quantum optics, nanomagneto-optics, semiconductor physics, optoelectronic and photonic devices, ultrafast optics, quantum interference

JOHANNES WALCHER (Mathematics)

Siring theory, mirror symmetry, mathematical and particle physics

Adjunct Professor

WILLIAM ATWOOD

DONALD COYNE, Emeritus

ALAN LITKE

MICHAEL RIORDAN

HARTMUT F.-W. SADROZINSKI

TERRY L. SCHALK

DAVID A. WILLIAMS

Research Physicist

AL EISNER, Emeritus

VITALIY FADEYEV

ALEXANDER GRILLO

WILLIAM LOCKMAN

TROY PORTER

Program Description

Physics seeks to discover the fundamental regularities or "laws" that govern our universe and to apply these laws to explain the behavior of fundamental and complex systems. The same underlying principles describe the behavior of atoms, lasers, living cells, and galaxies. Physics is, therefore, at the base of all modern science and technology, and, even at an elementary level, this fundamental nature can be appreciated.

The Physics Department offers majors in physics, physics (astrophysics), applied physics, and physics education. These programs prepare students for graduate work in physics, astrophysics, and astronomy, for engineering and other technical positions in industry, and for careers in education. With appropriate courses in other disciplines, these majors provide excellent

preparation for advanced study in technical subjects such as biology, chemistry, engineering, geophysics, and the philosophy of science. The applied physics major is excellent preparation for positions in industry directly upon graduation.

Physics students and faculty often interact closely in both formal and informal settings. All undergraduate physics majors have the opportunity to work individually with a faculty member in completing the senior thesis requirement.

The main areas of physics research at UCSC are the study of fundamental particles and interactions (high-energy physics), the study of condensed matter physics, and astrophysics/cosmology.

Efforts in high-energy physics are aided by the presence of an organized research unit, the Santa Cruz Institute for Particle Physics (SCIPP). The SCIPP experimentalists play significant roles in experiments at some of the major accelerator laboratories in the world, including the Stanford Linear Accelerator Center (SLAC) at Stanford University and the European centers at CERN (European Organization for Nuclear Research) and DESY (Deutsches Elektronen Synchrotron). The SCIPP theorists are active in the phenomenology of high-energy particle interactions, the theory of strong and electroweak interactions, electroweak symmetry breaking and Higgs bosons, and theories of supersymmetry, superstrings, and gravity. SCIPP also maintains a vigorous program in particle astrophysics. SCIPP theorists are involved in research in high-energy astrophysics, dark matter, formation of galaxies and large-scale structure in the universe, and theories of cosmology. SCIPP experimentalists are playing an important role in creating the next major satellite for gamma-ray astronomy, the Fermi Gamma-ray Space Telescope. In addition, SCIPP experimentalists, working with colleagues at Los Alamos, conduct a thriving particle astrophysics program detecting TeV gamma rays.

The presence of the strong astrophysics group from the Astronomy and Astrophysics Department in the same building provides a healthy symbiosis in this area. Note that the Astronomy and Astrophysics Department does not offer an undergraduate major. UCSC is the headquarters for the University of California Observatories, which include Lick Observatory near San Jose and the Keck Observatory in Hawaii; these provide additional opportunities for collaboration between researchers in physics and astronomy.

Condensed matter physics research at UCSC covers a range of topics including the behavior of exotic many-electron systems (for example, superconductors); the study of magnetic phase transitions; the organization of complex systems (proteins, DNA, and polymers); the development of new electronic devices using novel materials and research in biophysics.

The experimental program uses X-ray and synchrotron radiation techniques at facilities such as the Stanford Synchrotron Radiation Laboratory (SSRL); neutron scattering techniques at various national laboratories; and optical, X-ray, and specific heat techniques at UCSC. Undergraduate students are actively involved in several condensed matter physics laboratories.

Courses

An undergraduate physics education is broad and basic. Undergraduate students, even in introductory classes, are exposed to new ideas associated with explorations at the boundaries of human knowledge.

The lower-division introductory courses in the major programs (Physics 5A, 5B, 5C, and 5D sequence) are well suited to students in the physical sciences and

engineering. The 6A, 6B, 6C sequence, which also provides a calculus-based introduction to the basic concepts in physics, is better suited to students in the life sciences. The Physics 6 sequence is also appropriate for nonscience students who have a calculus background. Students who take Physics 6A instead of Physics 5A, and do very well in it, may contact the department chair for permission to enter the major. The laboratory courses, 5L-5M-5N and 6L must be taken concurrently with the corresponding lecture courses.

Major Program

The physics, astrophysics, and applied physics major programs provide a comprehensive coverage of the field and the background necessary for graduate school or industrial careers. The physics education major provides the necessary background to enter a rigorous credential program and, ultimately, a career in high-school science education. Students earn a bachelor of science (B.S.) degree. The UCSC physics, astrophysics, applied physics, and physics education programs begin with a four-quarter presentation of the introductory concepts of the subject, *Introduction to Physics*. (Note: the applied physics program also requires completion of a general chemistry course.)

This is followed by courses which provide an introduction to relativity and quantum physics. The programs continue with a three-quarter sequence in mathematical methods of physics designed to provide the mathematics preparation necessary for most of the upper-division physics courses required for the majors. Included in the upper-division programs are two intensive laboratory courses designed to illustrate both historical experiments in the development of physics, astrophysics, and applied physics, and modern experimental methods. Advanced and especially motivated students may enroll in some graduate courses with the approval of the instructor and department chair.

The senior thesis, required of all physics, astrophysics, applied physics, and physics education majors at UCSC, provides the opportunity for students to apply their skills to problems of interest to them, either theoretical or experimental, usually with technical advice from a faculty member. The senior thesis may be based on research with a faculty member. Topics have included particle physics, condensed matter physics, astrophysics, biophysics, and various applied technologies. The senior thesis is a distinctive part of the UCSC physics major program and entails a substantial investment of both student and faculty time. The learning experience involved in the thesis, as well as the thesis itself, has proven extremely valuable to students in enhancing employment opportunities upon graduation or in gaining admission to graduate school.

The physics education major is designed to provide future K-12 physics and mathematics teachers with the necessary coursework aligned with the K-12 physics and mathematics standards necessary to pass the California Subject Matter Examinations for Teachers (CSET) in Physics and Mathematics. It also includes a thorough introduction to educational theory and practice including a sequence of three classroom-based internships. Students will be well prepared to enter a rigorous teaching credential program and ultimately a career in high school education. The senior comprehensive requirement involves a curriculum development project overseen by the Physics/Astronomy faculty, with co-supervision from CalTeach/Education faculty as needed.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. Students in physics, applied physics, physics (astrophysics), and physics education satisfy the DC requirement by completing courses 195A, 195B, and the senior thesis.

Admissions Policy

In order to be admitted to the physics, astrophysics, applied physics, or physics education majors students must pass Physics 5A, 5B and 5C with an average grade point average (GPA) in these three courses of 2.7 or higher. At least two of these three courses must be passed in the first attempt. If the third course is repeated, the grade from the second attempt will be considered. Students failing to meet these criteria must meet with a faculty adviser. The faculty adviser will make a recommendation to the department chair, who will then either finalize the denial of admission or specify further conditions for admission.

Letter Grade Policy

For all students entering UCSC in fall 2009 and later, all courses used to satisfy any of the physics majors must be taken for a letter grade.

Course Requirements

Physics

The requirements for the major include Physics 5A/L, 5B/M, 5C/N, and 5D; Mathematics 19A or 20A, 19B or 20B, 23A, and either 23B or Physics 14; plus the following upper-division courses: 101A-B, 105, 110A-B, 112, 116A-B-C, 133, 134, and 139A.

In addition, students must pass at least two upper-division electives chosen from physics or the following astronomy and astrophysics courses: 111 through 118. At least one of the two electives must be from the following physics courses: 129, 139B, 155, or 171. In some cases, the second elective requirement may be satisfied by an approved upper-division science or engineering course.

Students have to satisfy a computer programming requirement by taking one of the courses, Computer Science 5C, Earth and Planetary Sciences 119, or Physics 115. Computer Science 5C teaches programming in C/C++ for students with no prior experience. Earth and Planetary Sciences 119 teaches programming in IDL (commonly used by astronomers) and simple applications. Physics 115 does not teach programming; it assumes basic programming ability in C, C++ or Fortran and discusses numerical techniques relevant to physics. Students may also satisfy the computer programming requirement by demonstrating their knowledge of programming to a faculty member designated by the Physics Department.

Physics (Astrophysics)

The requirements for the major include Physics 5A/L, 5B/M, 5C/N, and 5D; Mathematics 19A or 20A, 19B or 20B, 23A, and either 23B or Physics 14; plus the following upper-division courses: 101A-B, 105, 110A-B, 112, 116A-B-C, 133, 135, and 139A.

In addition, students must pass at least three upper-division electives selected from the following upper-division courses: Astronomy and Astrophysics 111 through 118 or 171 (cross-listed with Physics 171).

Students have to satisfy a computer programming requirement by taking one of the courses Computer Science 5C, Earth and Planetary Sciences 119, or Physics 115. Computer Science 5C teaches programming in C/C++ for students with no prior experience. Earth and Planetary Sciences 119 teaches programming in IDL (commonly used by astronomers) and simple applications. Physics 115 does not teach programming; it assumes basic programming ability in C, C++ or Fortran and discusses numerical techniques relevant to physics. Students may also satisfy the computer programming requirement by demonstrating their knowledge of programming to a faculty member designated by the Physics Department.

Applied Physics

The requirements for the major include Physics 5A/L, 5B/M, 5C/N, and 5D; Mathematics 19A or 20A, 19B or 20B, 23A, and either 23B or Physics 14; Computer Science 5C; Chemistry 1A; plus the following upper-division physics courses: 101A-B, 105, 110A-B, 112, 116A-B-C, 133, and 134.

In addition, students must pass at least three upper-division applied physics electives selected from the following approved list of courses: Electrical Engineering 103, 127, 128, 145, Physics 107, 109, 115, 152, 155, 156, and 160; or other courses with approval from a faculty adviser.

Physics Education

The requirements for the major include Physics 5A/L, 5B/M, 5C/N, 5D, 101A and 101B, 133, and 134 or 135; Mathematics 19A or 20A, 19B or 20B, 23A, 23B or Physics 14; Mathematics 100, 128A, 181; Education 50B or 50C, 100B or 100C, 185L, 185B or 185C and one upper-division course dealing with issues of diversity in education; Applied Mathematics and Statistics 5 or 7; and Astronomy 12 or 13. One elective course must be taken from physics, astronomy, mathematics or education courses, or other courses with approval of the department.

Sample Physics Major Planner

The following is a recommended academic plan for students to complete during their four years to fulfill requirements for the physics major.

| Year | Fall | Winter | Spring |
|------------|---|------------------------------|------------------------|
| 1st (frsh) | MATH 19A or 20A PHYS 5A/L PHYS 10 (recommended) | MATH 19B or 20B PHYS 5B/M | MATH 23A PHYS 5C/N |
| 2nd (soph) | PHYS 101A PHYS 5D (2 credits) MATH 23B | PHYS 101B PHYS 116A | PHYS 116B PHYS 133* |
| 3rd (jr) | PHYS 105 PHYS 116C PHYS 135* | PHYS 110A PHYS 112 | PHYS 110B PHYS 139A |
| 4th (sr) | PHYS 195A PHYS elective** | PHYS 195B PHYS elective** | |

* Course 133 is offered winter and spring quarters. Course 134 is offered fall and winter quarters and may be taken junior or senior year after completing course 133.

**Students should look into taking electives earlier where possible, as some courses are only offered every alternate year.

Sample Physics (Astrophysics) Major Planner

| Year | Fall | Winter | Spring |
|------------|---|------------------------------------|---|
| 1st (frsh) | MATH 19A or 20A PHYS 5A/L PHYS 10 (recommended) | MATH 19B or 20B PHYS 5B/M | MATH 23A PHYS 5C/N |
| 2nd (soph) | PHYS 101A PHYS 5D (2 credits) MATH 23B | PHYS 101B EART 119 PHYS 116A | PHYS 116B PHYS 133* |
| 3rd (jr) | PHYS 105 PHYS 116C PHYS 135* | PHYS 110A PHYS 112 | PHYS 110B PHYS 139A ASTR elective |
| 4th (sr) | PHYS 195A ASTR elective** | PHYS 195B ASTR elective** | |

* Physics 133 is offered winter and spring quarters. Physics 135 is offered some academic years as a multiple-term course: 135A in fall and 135B in winter or spring, depending on astronomical conditions.

** Students should look into taking electives earlier where possible, as some courses are only offered every alternate year.

Sample Applied Physics Major Planner

The following is a recommended academic plan for students to complete during their four years to fulfill requirements for the physics major.

| Year | Fall | Winter | Spring |
|------------|--|-----------------------------------|---|
| 1st (frsh) | MATH 19A or 20A PHYS 5A/L | MATH 19B or 20B PHYS 5B/M | MATH 23A PHYS 5C/N CMPS 5C |
| 2nd (soph) | PHYS 101A PHYS 5D (2 credits) MATH 23B | PHYS 101B PHYS 116A CHEM 1A | PHYS 116B PHYS 133* |
| 3rd (jr) | PHYS 105 PHYS 116C PHYS 134* | PHYS 110A PHYS 112 | PHYS 110B Apph elective PHYS 11 (recommended) |
| 4th (sr) | PHYS 195A Apph elective | PHYS 195B | Apph elective |

* Course 133 is offered winter and spring quarters. Course 134 is offered fall and winter quarters and may be taken junior or senior year after completing course 133.

** Students should look into taking electives earlier where possible, as some courses are only offered every alternate year.

Sample Physics Education Major Planner

| Year | Fall | Winter | Spring |
|------------|----------------------------------|--|--|
| 1st (frsh) | MATH 19A or 20A PHYS 5A/L | MATH 19B or 20B PHYS 5B/M | MATH 23A PHYS 5C/N |
| 2nd (soph) | PHYS 101A PHYS 5D (2 credits) | PHYS 101B MATH 100 | PHYS 133* EDUC 100B or 100C (2 credits) |
| 3rd (jr) | PHYS 134 or 135* AMS 5 or 7 | MATH 128A EDUC 185B/C EDUC 185/L (2 credits) | MATH 181 |
| 4th (sr) | EDUC diversity course Thesis | elective Thesis | |

*Physics 133 is offered winter and spring quarters. Physics 134 is offered in fall and winter quarters and may be taken in the junior or senior year after completing Physics 133. Physics 135 is offered

some academic years as a multiple-term course: 135A in fall and 135B in winter or spring, depending on astronomical conditions.

Students who take Physics 6A instead of Physics 5A, and do very well in it, may contact the department chair for permission to enter the major.

Depending on the student's interests, further preparation for graduate school in physics, astrophysics, applied physics, or for other careers is obtained by electing more specialized or applied courses (see the descriptions of courses below). In addition, again depending on the student's academic focus, elective courses may be selected in mathematics, astronomy and astrophysics, and/or other areas of physical science.

For further information about the physics program, please request the undergraduate handbook, *A Physics Major's Guide*, from the Physics Department office, or look for it online at <http://physics.ucsc.edu>.

Comprehensive Requirement

The comprehensive exit requirement is normally satisfied by the submission and approval of a thesis. To satisfy the comprehensive requirement via a thesis Physics 195A and 195B are required. Note that successful completion of 195A and 195B satisfies the Disciplinary Communication requirement or Writing Intensive general education requirement.

In special cases, minor modifications of these requirements may be granted to suit the specific program of a particular student. Before embarking on a program needing such waivers, students should discuss their plans with a physics adviser and seek approval by petition from the Physics Department office.

Honors

The department awards "honors" (3.5 grade point average or better) and "highest honors" (3.8 GPA or better) to top graduating students each year. Recommendations for these awards are made by the department chair and are based upon excellence of academic performance, particularly in upper-division physics courses, as reflected in grades and the narrative evaluations. The department also awards "honors" for outstanding work on the senior thesis, made upon the recommendation of the senior thesis supervisor and the thesis technical adviser.

Minor Requirements

Requirements for the minor in physics include Physics 5A/L, 5B/M, 5C/N, 5D (or Physics 6A/L, 6B/M, 6C/N with minimum GPA of 3.5); Mathematics 19A or 20A, 19B or 20B, 23A, 23B or Physics 14; Physics 101A, 101B, 133, and one upper division elective (and any prerequisites) from physics or from a list of courses from other departments approved by the Physics Undergraduate Committee. See the Physics Department for the listing.

Advising and Preparation for the Major

Because the courses for the physics major are sequential, it is strongly advised that students declare their major in physics, astrophysics, or applied physics as early as possible (either at initial registration or by the end of the first year). Students who do not begin the lower-division requirements during their first year may have difficulty completing the program within four years. Transfer students may also have problems completing the program within the usual time, depending upon whether they took equivalent courses at their previous institutions. The department adviser works closely with students interested in pursuing the major to ensure that they

begin the program immediately and follow the appropriate steps toward its completion.

High school students coming directly to UCSC should emphasize their mathematics preparation with the expectation that they will take calculus in their first quarter at UCSC in order to concurrently take the Physics 5 series, calculus-based physics for physics majors.

Students transferring to UCSC as junior physics, astrophysics, or applied physics majors should have completed three quarters of introductory calculus-based physics with laboratory and three quarters of calculus. It is also desirable to have an introductory course in modern physics as well as mathematics courses in linear algebra, vector calculus, and differential equations. The Physics Department advises each junior transfer student individually upon their arrival.

Graduate Programs

The Physics Department offers graduate programs leading to the master of science (M.S.) and/or the doctor of philosophy (Ph.D.) degrees. In the first year of study, Ph.D. students are expected to take two core graduate-level courses per quarter, including the courses required for the Ph.D. degree (210, 212, 214, 215, 216, 219) and other courses specific to the student's field of interest. All first-year students also take 205, *Introduction to Research*. All graduate students also attend a weekly colloquium, 292. Each student has a faculty adviser who helps to determine which courses are most appropriate, taking into account the student's background and interests. The student-faculty ratio is low so that M.S. and Ph.D. students can work closely with faculty and pursue programs that fit their individual needs. Research is currently conducted in theoretical and experimental particle physics, theoretical and experimental condensed matter physics (including materials physics and biophysics), and in theoretical and experimental high-energy astrophysics (including cosmology). After passing a written qualifying examination, Ph.D. students pursue independent research leading to an oral examination and completion of a doctoral dissertation.

Students may obtain a master's degree through course work (eight physics graduate courses) and submission of an approved thesis. The thesis may be waived by passing four sections of the written Ph.D. qualifying examination. Master's candidates are encouraged to write a research thesis and may do so in any of the research fields in the program, thereby developing laboratory and computational skills in areas such as electronics design, computer simulation and visualization, cryogenics, X-ray scattering, complex novel materials and devices, or materials science. Each M.S. student is assigned a faculty adviser who helps to design a course work plan suited to the interests of the student.

Physics students and faculty use a number of UCSC research facilities (described at the beginning of this section and elsewhere in this catalog): the Santa Cruz Institute for Particle Physics (SCIPP) and Lick Observatory (headquartered at UCSC). There is strong interaction with other disciplines, especially astronomy and astrophysics, biology, chemistry, Earth sciences, electrical engineering, and mathematics. Proximity to the Stanford Linear Accelerator Center and the Stanford Synchrotron Radiation Laboratory provides additional local research opportunities. UCSC faculty and graduate students also participate in research programs at CERN in Geneva, Los Alamos, Oak Ridge National Laboratory, NASA, Ames, NREL, Lucent, Xerox, IBM, Bell Labs, and other national and international laboratories.

Application materials and brochures describing the physics M.S. and Ph.D. graduate programs in more detail may be obtained by visiting our web site at <http://physics.ucsc.edu/> or by contacting the Division of Graduate Studies at <http://graddiv.ucsc.edu>.

Lower-Division Courses

1. Conceptual Physics. W

Topics in classical and quantum physics and their relation to physical phenomena in the world around us, including modern electronics. Concepts are stressed, but some practical calculational techniques are developed. Working knowledge of high school algebra and geometry is essential. (General Education Code(s): SI, IN, Q.) *S. Carter*

2. Elementary Physics of Energy. S

The physics of energy developed in a course accessible to non-science majors as well as science majors. Fundamental principles and elementary calculations, at the level of basic algebra, developed and applied to the understanding of the physics of energy. Topics include fossil fuels, renewable energy, solar cells and waste energy, waste-energy recovery, nuclear power, and global greenhouse effects. (General Education Code(s): SI.) *B. Shastri*

5A. Introduction to Physics I. F

Elementary mechanics. Vectors, Newton's laws, inverse square force laws, work and energy, conservation of momentum and energy, and oscillations. Corequisite(s): concurrent enrollment in course 5L and Mathematics 19A or 20A is required. (General Education Code(s): ME, IN, Q.) *J. Nielsen*

5B. Introduction to Physics II. W

A continuation of 5A. Wave motion in matter, including sound waves. Geometrical optics, interference and polarization, statics and dynamics of fluids. Prerequisite(s): courses 5A/L and Mathematics 19A or 20A; concurrent enrollment in course 5M is required. Corequisite: Mathematics 19B or 20B. (General Education Code(s): SI, IN.) *R. Johnson*

5C. Introduction to Physics III. S

Introduction to electricity and magnetism. Electromagnetic radiation, Maxwell's equations. Prerequisite(s): courses 5A/L and Mathematics 19B or 20B. Concurrent enrollment in 5N is required. Corequisite: Mathematics 22 or 23A. Courses 5B/M recommended. (General Education Code(s): SI, IN.) *A. Sher*

5D. Heat, Thermodynamics, and Kinetics (2 credits). F

Introduction to temperature, heat, and thermal conductivity, ideal gases, the first and second laws of thermodynamics, and an introduction to kinetic theory. Prerequisite(s): courses 5A/L and Mathematics 19B or 20B. *J. Primack*

5I. Introduction to Physics Honors I (2 credits). F

Weekly 90-minute section covering advanced and modern topics. Topics may include the theory of relativity; complicated dynamics (air resistance, planetary dynamics, etc.); fallacies in perpetual-motion machines; the Euler disk and unusual tops; elasticity of materials applied to structures. Concurrent enrollment in course 5A is required. *J. Primack*

5J. Introduction to Physics Honors II (2 credits). W

Weekly 90-minute section covering advanced and modern topics. Topics may include nonlinear oscillators and chaos; waves in deep water and inside the earth; redshift in astronomy; negative refractive index materials; photons and matter waves; holography; viscosity; and turbulence. Concurrent enrollment in course 5B is required. *F. Kuttner*

5K. Introduction to Physics Honors III (2 credits). S

Weekly 90-minute section covering advanced and modern topics. Topics may include atmospheric electricity; shielding; tensor polarization; alternative energy sources; semiconductor devices; particle accelerators and relativistic electrodynamics; Thomson scattering; digital and analog communication. Concurrent enrollment in course 5C is required. *J. Primack*

5L. Introduction to Physics Laboratory (1 credit). F

Laboratory sequence illustrating topics covered in course 5A. One three-hour laboratory session per week. Prerequisite(s): concurrent enrollment in course 5A is required. *The Staff*

5M. Introduction to Physics Laboratory (1 credit). W

Laboratory sequence illustrating topics covered in course 5B. One three-hour laboratory session per week. Prerequisite(s): courses 5A/L; concurrent enrollment in course 5B is required. *The Staff*

5N. Introduction to Physics Laboratory (1 credit). S

Laboratory sequence illustrating topics covered in course 5C. One three-hour laboratory session per week. Prerequisite(s): courses 5A/L. Concurrent enrollment in 5C is required. Courses 5B/M recommended. *The Staff*

6A. Introductory Physics I. F,W

Elementary mechanics. Vectors, Newton's laws, inverse square force laws, work and energy, conservation of momentum and energy, and oscillations. Prerequisite(s): Concurrent enrollment in course 6L required. Corequisite: Mathematics 11A or 19A or 20A. (General Education Code(s): MF, IN, Q.) (FS) *F. Kuttner*, (W) *B. Schumm*

6B. Introductory Physics II. W,S

A continuation of 6A. Geometric optics; statics and dynamics of fluids; introduction to thermodynamics, including temperature, heat, thermal conductivity, and molecular motion; wave motion in matter, including sound waves; introduction to electricity and magnetism. Prerequisite(s): courses 6A/L or 7A/L and Mathematics 11A or 19A or 20A; Corequisite: Mathematics 11B or 19B or 20B. (General Education Code(s): SI, IN.) (W) *R. Dewey*, (W) *F. Kuttner*, (S) *A. Steinacker*

6C. Introductory Physics III. F,S

Introduction to electricity and magnetism. Elementary circuits; Maxwell's equations; electromagnetic radiation; interference and polarization of light. Prerequisite(s): courses 6A and 6L and Mathematics 11B or 19B or 20B. (General Education Code(s): SI, IN.) (F) *Z. Schlesinger*, (S) *R. Dewey*

6L. Introductory Physics Laboratory (1 credit). F,W

Laboratory sequence illustrating topics covered in course 6A. One three-hour laboratory session per week. Prerequisite(s): Concurrent enrollment in course 6A required. *The Staff*

6M. Introductory Physics Laboratory (1 credit). W,S

Laboratory sequence illustrating topics covered in course 6B. One three-hour laboratory session per week. Prerequisite(s): courses 6A and 6L or courses 7A and 7L. *The Staff*

6N. Introductory Physics Laboratory (1 credit). F,S

Laboratory sequence illustrating topics covered in course 6C. One three-hour laboratory session per week.

Prerequisite(s): courses 6A and 6L; courses 6B and 6M are recommended. *The Staff*

10. Overview of Physics (2 credits). *

One lecture per week providing a descriptive overview of major areas in the discipline. These include fundamental particles, solid state, fluids, nonlinear dynamics, biophysics, and cosmology. Lectures by various faculty with research interests in these fields. The course is suggested for prospective physics majors, or others, before they enroll in the Physics 5 sequence. *F. Kuttner*

11. The Physicist in Industry (2 credits). S

One two-hour meeting per week. Subjects include roles of the physicist in industry, the business environment in a technical company, economic considerations, job hunting, and discussions with physicists with industrial experience. Enrollment by permission of instructor. Priority given to applied physics upper-division students; other majors if space available. Enrollment limited to 15. *B. Rosenblum*, *F. Kuttner*

14. Introduction to Vector Calculus with Applications (2 credits). *

Partial differentiation, the chain rule, multiple integrals, Jacobians, surface integrals and the divergence, line integrals and the curl, Stokes theorem, gradients and directional derivatives. Prerequisite(s): Mathematics 22 or 23A. *The Staff*

42. Student-Directed Seminar.

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

75. The Observer in Quantum Mechanics (2 credits). W

Non-mathematical seminar discussing the mysteries arising with the role of the observer in quantum mechanics. Addressed to majors in the physical or biological sciences. Covers material largely untreated in the usual science curriculum. Enrollment restricted to sophomores, juniors, seniors, and graduate students. Enrollment limited to 14. *B. Rosenblum*

80A. Physics and Psychophysics of Music. *

Fundamental theory of vibration, sound waves, sound propagation, diffraction, and interference. Free, coupled, and driven oscillations. Resonance phenomena and modes of oscillation. Fourier's theorem. Anatomy and psychophysics of the ear. Musical scales and intervals. Nature of plucked and bowed strings; guitar, violin, piano. Woodwind and brass instruments. Architectural acoustics. High school algebra and basic knowledge of musical notation recommended. (General Education Code(s): T2-Natural Sciences, Q.) *The Staff*

80D. The Quantum Century. *

Survey of 20th-century physics, emphasizing quantum theory and its impact upon science and culture. Includes relativity, atomic and nuclear structure, and applications in transistors, lasers, and nuclear weapons. Ends with discussions of elementary particle physics and quantum cosmology. Aimed at non-science majors as it stresses historical and philosophical perspectives rather than calculations (only non-calculus math will be used), but will also be of interest to science majors. (General Education Code(s): T6-Natural Sciences or Humanities and Arts, Q.) *E. Riordan*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

101A. Introduction to Modern Physics I. F
Special theory of relativity. Early experiments and models

in quantum physics. Introduction to concepts and calculations in quantum mechanics. Single-electron atoms. Prerequisite(s): courses 5A/L, 5B/M, and 5C/N or 6A/L, 6B/M, and 6C/N. *S. Ritz*

101B. Introduction to Modern Physics II. W

Topics in quantum physics, including angular momentum and spin, the Pauli exclusion principle, and quantum statistics. Applications in multi-electron atoms, molecules, solid state physics, and nuclear and particle physics. Prerequisite(s): course 14 or Mathematics 23B; course 101A; 5A/L, 5B/M, and 5C/N or 6A/L, 6B/M, and 6C/N. *D. Smith*

105. Mechanics. F

Particle dynamics in one, two, and three dimensions. Conservation laws. Small oscillations, Fourier series and Fourier integral solutions. Phase diagrams and nonlinear motions, Lagrange's equations, and Hamiltonian dynamics. Prerequisite(s): courses 5A/L, 5B/M, 5C/N, and 116A-B. *G. Gweon*

107. Introduction to Fluid Dynamics. W

Covers fundamental topics in fluid dynamics: Euler and Lagrange descriptions of continuum dynamics; conservation laws for inviscid and viscous flows; potential flows; exact solutions of the Navier-Stokes equation; boundary layer theory; gravity waves. Students cannot receive credit for this course and Applied Mathematics and Statistics 217. (Also offered as Applied Math and Statistics 107. Students cannot receive credit for both courses.) Prerequisite(s): Mathematics 107 or Physics 116C or Earth and Planetary Sciences 111. *The Staff*

110A. Electricity, Magnetism, and Optics. W

Maxwell's equations, electrostatics, magnetostatics, induction, electromagnetic waves, physical optics, and circuit theory. Prerequisite(s): 116A-B-C. *J. Deutsch*

110B. Electricity, Magnetism, and Optics. S

Maxwell's equations, electrostatics, magnetostatics, induction, electromagnetic waves, physical optics, and circuit theory. Prerequisite(s): course 110A, and 116A-B-C. *A. Seiden*

112. Thermodynamics and Statistical Mechanics. W

Consequences of the first and second laws of thermodynamics, elementary statistical mechanics, thermodynamics of irreversible processes. Prerequisite(s): courses 5B/M, 5C/N, 5D, 101A, 101B, 105, and 116A-B. *A. Young*

115. Computational Physics. S

This course will apply efficient numerical methods to the solutions of problems in the physical sciences which are otherwise intractable. Examples will be drawn from classical mechanics, quantum mechanics, statistical mechanics, and electrodynamics. Students will apply a high-level programming language, such as Mathematica, to the solution of physical problems and develop appropriate error and stability estimates. Prerequisite(s): courses 101B, 105, 116A-B-C, or equivalent. Basic programming experience in C or Fortran. No previous experience with Mathematica is required. *A. Young*

116A. Mathematical Methods in Physics. W

Infinite series, power series and asymptotic series, complex numbers and complex functions, topics in linear algebra including vector spaces, matrices and determinants, systems of linear equations, eigenvalue problems and matrix diagonalization, tensor algebra, asymptotic expansions, and special functions defined by integrals. Prerequisite(s): courses 5A/L, 5B/M, 5C/N; Mathematics 23A, 23B. *H. Haber*

116B. Mathematical Methods in Physics. S

Fourier series and transforms, ordinary differential equations, calculus of variations, and functions of a complex variable. Prerequisite(s): courses 5A/L, 5B/M, 5C/N, 116A; and Mathematics 23A and 23B. *S. Profumo*

116C. Mathematical Methods in Physics. F

Series solutions of ordinary equations, Legendre polynomials, Bessel functions, sets of orthogonal functions, partial differential equations, probability and statistics. Prerequisite(s): courses 5A/L, 5B/M, 5C/N, 116A-B, Mathematics 23A and 23B. *B. Shastry*

120. Polymer Physics. *

Statistical properties polymers; scaling behavior, fractal dimensions; random walks, self avoidance; single chains and concentrated solutions; dynamics and topological effects in melts; polymer networks; sol-gel transitions; polymer blends; application to biological systems; computer simulations will demonstrate much of the above. Students cannot receive credit for this course and course 240. Prerequisite(s): courses 112, 116A-B-C. Offered in alternate academic years. *J. Deutsch*

129. Nuclear and Particle Physics. W

Properties and classification of the elementary particles, their weak and strong interactions, nuclear physics, high energy phenomena analyzed by quantum mechanical methods, experimental methodology. Prerequisite(s): courses 116A-B-C and 139A; students with equivalent course work may contact instructor for permission to enroll. Offered in alternate academic years. *A. Seiden*

133. Intermediate Laboratory. W,S

Demonstration of phenomena of classical and modern physics. Development of a familiarity with experimental methods. Special experimental projects may be undertaken by students in this laboratory. Prerequisite(s): course 101A. *S. Ritz, G. Gweon*

134. Physics Advanced Laboratory. W,S

Individual experimental investigations of basic phenomena in atomic, nuclear, and solid state physics. Prerequisite(s): courses 133 and 101B. May be repeated for credit. (W) *A. Sher, (S) D. Smith*

135. Astrophysics Advanced Laboratory. *

Introduction to the techniques of modern observational astrophysics at optical and radio wavelengths through hands-on experiments. Offered in some academic years as a multiple-term course: 135A in fall and 135B in winter, depending on astronomical conditions. (Also offered as Astronomy and Astrophysics 135. Students cannot receive credit for both courses.) Prerequisite(s): course 133 and at least one astronomy course. Intended primarily for juniors and seniors majoring or minoring in astrophysics. *R. Dewey*

135A. Astrophysics Advanced Laboratory (3 credits). F

Introduction to techniques of modern observational astrophysics at optical and radio wavelengths through hands-on experiments. Intended primarily for juniors and seniors majoring or minoring in astrophysics. Offered in some academic years as single-term course 135 in fall, depending on astronomical conditions. (Also offered as Astronomy and Astrophysics 135A. Students cannot receive credit for both courses.) Prerequisite(s): course 133 and at least one astronomy course. *R. Dewey*

135B. Astrophysics Advanced Laboratory (2 credits). W

Introduction to techniques of modern observational astrophysics at optical and radio wavelengths through hands-on experiments. Intended primarily for juniors and seniors

majoring or minoring in astrophysics. Offered in some academic years as single-term course 135 in fall, depending on astronomical conditions. (Also offered as Astronomy and Astrophysics 135B. Students cannot receive credit for both courses.) Prerequisite(s): course 133 and at least one astronomy course. *R. Dewey*

139A. Quantum Mechanics. S

The principles and mathematical techniques of nonrelativistic quantum mechanics: the Schrödinger equation, Dirac notation, angular momentum, approximation methods, and scattering theory. Offered in spring. Prerequisite(s): courses 101A, 101B, 116A-B-C. *J. Nielsen*

139B. Quantum Mechanics. F

The principles and mathematical techniques of nonrelativistic quantum mechanics: the Schrödinger equation, Dirac notation, angular momentum, approximation methods, and scattering theory. Offered in fall. Prerequisite(s): courses 101A, 101B, 116A-B-C and 139A. *R. Johnson*

143. Supervised Teaching (2 credits). F,W,S

Supervised tutoring in selected introductory courses. Students should have completed course 101A and 101B as preparation. Students submit petition to sponsoring agency. *The Staff*

152. Optoelectronics. *

The first half of the course covers the theory of optoelectronics including wave, electromagnetic, and photon optics, modulation of light by matter, and photons in semiconductors. The second half covers applications including displays, lasers, photodetectors, optical switches, fiber optics, and communication systems. Prerequisite(s): courses 101A, 101B, and 110A. *S. Carter*

155. Solid State Physics. W

Interatomic forces and crystal structure, diffraction, lattice vibrations, free electron model, energy bands, semiconductor theory and devices, optical properties, magnetism, magnetic resonance, superconductivity. Prerequisite(s): courses 112 and 139A; students with equivalent course work may contact instructor for permission to enroll. *O. Narayan*

156. Applications of Solid State Physics. S

Emphasizes the application of condensed matter physics to a variety of situations. Examples chosen from subfields such as semiconductor physics, lasers, superconductivity, low temperature physics, magnetism, and defects in crystals. Prerequisite(s): courses 101A and 101B. *G. Gweon*

160. Practical Electronics. S

Provides a practical knowledge of electronics that experimentalists generally need in research. The course assumes no previous knowledge of electronics and progresses according to the interest and ability of the class. Based on weekly lectures. However, with the aid of the instructor, the students are expected to learn mainly through the design, construction, and debugging of electronics projects. Students are billed a materials fee. Prerequisite(s): courses 5C and 5N or 6C and 6N. Offered in alternate academic years. *R. Johnson*

171. General Relativity, Black Holes, and Cosmology. F

Special relativity is reviewed. Curved space-time, including the metric and geodesics, are illustrated with simple examples. The Einstein equations are solved for cases of high symmetry. Black-hole physics and cosmology are discussed, including recent developments. (Also offered as Astronomy and Astrophysics 171. Students cannot receive credit for both courses.) Prerequisite(s): courses 105, 110A, 110B, and 116A-B-C. *A. Aguirre*

180. Biophysics. S

Physical principles and techniques used in biology: X-ray diffraction; nuclear magnetic resonance; statistics, kinetics, and thermodynamics of macromolecules; viscosity and diffusion; DNA/RNA pairing; electrophoresis; physics of enzymes; biological energy conversion; optical tweezers. Prerequisite(s): course 112; students who have a biochemistry background may contact instructor for permission. Enrollment restricted to juniors and seniors. *J. Deutsch*

191. Teaching Practicum. F,W,S

Designed to provide upper-division undergraduates with an opportunity to work with students in lower division courses, leading discussions, reading and marking submissions, and assisting in the planning and teaching of a course. Prerequisite(s): excellent performance in major courses; instructor approval required; enrollment restricted to senior physics majors. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Prerequisite(s): upper-division standing; submission of a proposal supported by a faculty member willing to supervise. *The Staff*

195A. Senior Thesis Research (3 credits). F

A seminar course to help students explore their theses topics and plan, organize, and develop their theses. Choosing a thesis topic, preparing a work plan for the research, assembling an annotated bibliography, and writing a draft outline of the thesis. Students must complete 5 credits in the 195 series to satisfy the writing intensive (W) general education requirement. Prerequisite(s): Entry Level Writing and Composition requirements. *A. Steinacker*

195B. Senior Thesis Research (2 credits). W

Seminars to help students explore their theses topics and plan, organize, and develop their theses. Refining the thesis outline; preparing draft sections, preparing a written progress report; delivering an oral progress report. Students must complete 5 credits in the 195 series to satisfy the writing intensive (W) general education requirement. Prerequisite(s): Entry Level Writing and Composition requirements. (General Education Code(s): W.) *A. Steinacker*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits).

Tutorial. May be repeated for credit. *The Staff*

*Graduate Courses***205. Introduction to Research in Physics (2 credits). W**

Introduction to current research opportunities at UCSC for graduate students. Topics include: elementary particle physics, condensed matter and solid state physics, high energy astrophysics, biophysics, and cosmology. Selected topics related to career development may also be included. Enrollment restricted to graduate students or by permission of instructor. *J. Primack*

210. Classical Mechanics. F

Generalized coordinates, calculus of variations, Lagrange's equations with constraints, Hamilton's equations, applications to particle dynamics including charged particles in an electromagnetic field, applications to continuum mechanics including fluids and electromagnetic fields, introduction to nonlinear dynamics. Enrollment restricted to graduate students only, except by permission of instructor. *O. Narayan*

212. Electromagnetism I. F

Electrostatics and magnetostatics, boundary value problems with spherical and cylindrical symmetry, multipole expansion, dielectric media, magnetic materials, electromagnetic properties of materials, time-varying electromagnetic fields, Maxwell's equations, conservation laws, plane electromagnetic waves and propagation, waveguides and resonant cavities. Enrollment restricted to graduate students only, except by permission of instructor. *M. Dine*

214. Electromagnetism II. W

Lorentz covariant formulation of Maxwell's equations, dynamics of relativistic charged particles and electromagnetic fields, scattering and diffraction. Topics in classical radiation theory: simple radiating systems radiation by moving charges, multipole radiation, synchrotron radiation, Cerenkov radiation, bremsstrahlung and radiation damping. Prerequisite(s): course 212. Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *M. Dine*

215. Introduction to Non-Relativistic Quantum Mechanics. W

Mathematic introduction; fundamental postulates; time evolution operator, including the Heisenberg and Schrödinger pictures; simple harmonic oscillator and coherent states; one-dimensional scattering theory, including S-matrix resonant phenomena; two-state systems, including magnetic resonance; symmetries, including rotation group, spin, and the Wigner-Eckart theorem; rotationally invariant problems, including the hydrogen atom; gauge invariance, including Landau levels; introduction to path integral. Enrollment restricted to graduate students only, except by permission of instructor. *B. Shastry*

216. Advanced Topics in Non-Relativistic Quantum Mechanics. S

Approximate methods: time-independent perturbation theory, variational principle, time-dependent perturbation theory; three-dimensional scattering theory; identical particles; permutation symmetry and exchange degeneracy, anti-symmetric and symmetric states; many-body systems and self-consistent fields; variational calculations; second quantized formalism, including Fock spaces/number representation, field operators and Green functions; applications: electron gas; quantization of the electromagnetic field and interaction of radiation with matter: absorption, emission, scattering, photoelectric effect, and lifetimes. Prerequisite(s): course 215. Enrollment restricted to graduate students only, except by permission of instructor. *A. Aguirre*

217. Quantum Field Theory I. F

Lorentz invariance in quantum theory, Dirac and Klein-Gordon equations, the relativistic hydrogen atom, Green functions and canonical approach to field theory, quantum electrodynamics, Feynman diagrams for scattering processes, symmetries and Ward identities. Students learn to perform calculations of scattering and decay of particles in field theory. Prerequisite(s): course 216. Enrollment restricted to graduate students only, except by permission of instructor. *S. Profumo*

218. Quantum Field Theory II. W

Path integral approach to quantum field theory. Theory of renormalization and the renormalization group, introduction to gauge theories and spontaneously broken field theories. Applications to the standard model of strong, weak, and electromagnetic interactions. Prerequisite(s): course 217. Enrollment restricted to graduate students only, except by permission of instructor. *T. Banks*

219. Statistical Physics. S

The basic laws of thermodynamics, entropy, thermody-

amic potentials, kinetic theory of gases, quantum and classical statistical mechanics, virial expansion, linear response theory. Applications in condensed matter physics. Enrollment restricted to graduate students only, except by permission of instructor. *O. Narayan*

220. Theory of Many-Body Physics. *

Finite temperature Green functions, Feynman diagrams, Dyson equation, linked cluster theorem, Kubo formula for electrical conductivity, electron gas, random phase approximation, Fermi surfaces, Landau fermi liquid theory, electron phonon coupling, Migdal's theorem, superconductivity. Prerequisite(s): courses 216 and 219. Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *B. Shastry*

221A. Introduction to Particle Physics I. F

First quarter of a two-quarter graduate level introduction to particle physics, including the following topics: discrete symmetries, quark model, particle classification, masses and magnetic moments, passage of radiation through matter, detector technology, accelerator physics, Feynman calculus, and electron-positron annihilation. Prerequisite(s): course 217 or concurrent enrollment. Enrollment restricted to graduate students only, except by permission of instructor. *B. Schumm*

221B. Introduction to Particle Physics II. W

Second quarter of a two-quarter graduate level introduction to particle physics, including the following topics: nucleon structure, weak interactions and the Standard Model, neutrino oscillation, quantum chromodynamics, CP violation, and a tour of the Stanford Linear Accelerator Center. Prerequisite(s): course 221A; course 217 or concurrent enrollment. Enrollment restricted to graduate students only, except by permission of instructor. *J. Nielsen*

222. Quantum Field Theory III. S

Focuses on the theoretical underpinnings of the standard model, including the spontaneous symmetry breaking, the renormalization group, the operator product expansion, and precision tests of the Standard Model. Prerequisite(s): courses 218 and 221B. Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *M. Dine*

224. Origin and Evolution of the Universe. *

Introduction to the particle physics and cosmology of the very early universe: relativistic cosmology, initial conditions, inflation and grand unified theories, baryosynthesis, nucleosynthesis, gravitational collapse, hypotheses regarding the dark matter and consequences for formation of galaxies and large scale structure. (Also offered as Astronomy and Astrophysics 224. Students cannot receive credit for both courses.) Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *J. Primack*

226. General Relativity. *

Develops the formalism of Einstein's general relativity, including solar system tests, gravitational waves, cosmology, and black holes. (Also offered as Astronomy and Astrophysics 226. Students cannot receive credit for both courses.) Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *S. Profumo*

227. Advanced Fluid Dynamics. *

Fundamentals of heat transfer and fluid flow: thermal convection, gravity waves, vortex dynamics, viscous flows, instabilities, turbulence, and compressible flows. Students develop computer program for simulating thermal convection and gravity waves. Vector calculus and computer programming experience required. (Formerly *Fluid Dy-*

namics.) An introductory course in fluid dynamics recommended as preparation. Enrollment restricted to graduate students. Offered in alternate academic years. *The Staff*

231. Introduction to Condensed Matter Physics. F

Crystal structures, reciprocal lattice, crystal bonding, phonons (including specific heat), band theory of electrons, free electron model, electron-electron and electron-phonon interactions, transport theory. Prerequisite(s): course 216. Enrollment restricted to graduate students only, except by permission of instructor. *J. Deutsch*

232. Condensed Matter Physics. *

Magnetism (para, ferro, anti-ferro, ferri), spin waves, superconductivity, introduction to semiconductors. Prerequisite(s): course 231. Enrollment restricted to graduate students only, except by permission of instructor. *S. Carter*

233. Advanced Condensed Matter Physics. S

A special topics course which includes areas of current interest in condensed matter physics. Possible topics include superconductivity, phase transitions, renormalization group, disordered systems, surface phenomena, magnetic resonance, and spectroscopy. Prerequisite(s): course 231. Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *S. Carter*

234. Soft Condensed Matter Physics. *

A selection of topics from: liquid crystals, biological systems, renormalization group and critical phenomena, stochastic processes, Langevin and Fokker Planck equations, hydrodynamic theories, granular materials, glasses, quasicrystals. Prerequisite(s): courses 219 and 232. Enrollment restricted to graduate students. *A. Young, O. Narayan*

240. Polymer Physics. *

Statistical properties polymers. Scaling behavior, fractal dimensions. Random walks, self avoidance. Single chains and concentrated solutions. Dynamics and topological effects in melts. Polymer networks. Sol-gel transitions. Polymer blends. Application to biological systems. Computer simulations demonstrating much of the above. Students cannot receive credit for this course and course 120. Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *J. Deutsch*

242. Computational Physics. S

This course will apply efficient numerical methods to the solution of problems in the physical sciences which are otherwise intractable. Examples will be drawn from classical mechanics, quantum mechanics, statistical mechanics, and electrodynamics. Students will apply a high-level programming language such as Mathematica to the solution of physical problems and will develop appropriate error and stability estimates. Prerequisite(s): basic programming experience in C or Fortran. No previous experience with Mathematica is required. Enrollment restricted to graduate students only, except by permission of instructor. *A. Young*

250. Mathematical Methods. *

Probability theory with applications to data analysis, complex variables, Cauchy's residue theorem, dispersion relations, saddle-point type asymptotic methods for integrals, integral transforms, ordinary differential equations and orthogonal polynomials, partial differential equations and boundary value problems, and Greens functions. Integral equations also included if time permits. Enrollment restricted to graduate students. *A. Young*

251. Group Theory and Modern Physics. S

Finite and continuous groups, group representation theory, the symmetric group and Young tableaux, Lie

groups and Lie algebras, irreducible representations of Lie algebras by tensor methods, unitary groups in particle physics, Dynkin diagrams, Lorentz and Poincaré groups. Enrollment restricted to graduate students only, except by permission of instructor. Offered in alternate academic years. *H. Haber*

290. Special Topics. *

A series of lectures on various topics of current interest in physics at UC Santa Cruz. Enrollment restricted to graduate students only, except by permission of instructor. May be repeated for credit. *T. Banks*

291A. Cosmology (2 credits). F,W,S

Intensive research seminar on cosmology and related topics in astrophysics: nature of dark matter; origin of cosmological inhomogeneities and other initial conditions of the big bang; origin and evolution of galaxies and large scale structure in the universe. Enrollment restricted to graduate students only, except by permission of instructor. *The Staff*

291C. Developments in Theoretical Particle Physics (2 credits). F,W,S

Seminar on the current literature of elementary particle physics, ranging from strong and weak interaction phenomenology to Higgs physics, supersymmetry, and superstring theory. Students may present their own research results. Prerequisite(s): course 218; enrollment restricted to graduate students. May be repeated for credit. *M. Dine, H. Haber*

291D. Experimental High-Energy Collider Physics (2 credits). F,W,S

Seminar on current results in experimental high-energy particle physics. Topics follow recently published results, including design of experiments, development of particle detector technology, and experimental results from new particle searches, quantum chromodynamics, and properties of heavy flavor quarks. Enrollment restricted to graduate students. May be repeated for credit. *J. Nielsen*

291E. Applied Physics (2 credits). F,W,S

Intensive research seminar on applied physics and related topics in materials science, including semiconductor devices, optoelectronics, molecular electronics, magnetic materials, nanotechnology, biosensors, and medical physics. Students may present their own research results. Enrollment restricted to graduate students. May be repeated for credit. *G. Alers, S. Carter*

291F. Experimental High-Energy and Particle Astrophysics Seminar (2 credits). F,W,S

Survey of current research in experimental high-energy and particle astrophysics. Recent observations and development in instrumentation for x-rays, gamma rays, and neutrinos, and evidence for dark matter and other new particles. Students lead discussion of recent papers. Enrollment restricted to seniors and graduate students and by permission of instructor. Enrollment limited to 15. May be repeated for credit. *D. Smith*

291G. Condensed Matter Physics Research Seminar (2 credits). F,W,S

Weekly seminar series covering topics of current interest in condensed matter physics. Local and external speakers discuss their work. Enrollment restricted to graduate students. May be repeated for credit. *A. Young*

292. Seminar (no credit). F,W,S

Weekly seminar attended by faculty and graduate students. Directed at all physics graduate students who have not taken and passed the qualifying examination for the Ph.D. program. Enrollment restricted to graduate students only, except by permission of instructor. *D. Belanger*

297. Independent Study. F,W,S

Enrollment restricted to graduate students only, except by permission of instructor. *The Staff*

298. Theoretical and Experimental Research Project. F,W,S

Enrollment restricted to graduate students only, except by permission of instructor. *The Staff*

299. Thesis Research. F,W,S

Enrollment restricted to graduate students only, except by permission of instructor. *The Staff*

Plant Sciences

See Biological Sciences, page 151.

Politics

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politics@ucsc.edu
http://politics.ucsc.edu

Faculty and Professional Interests

Professor

MICHAEL K. BROWN, Emeritus

J. PETER EUBEN, Emeritus

KENT EATON, Chair

Comparative politics, international relations, political economy, public policy, territorial conflict, federalism, decentralization, party and electoral systems, Latin America, the Philippines

ISEBILL V. GRUHN, Emerita

BRUCE D. LARKIN, Emeritus

RONNIE D. LIPSCHUTZ

International relations; global political economy; globalization; foreign policy; resource/environmental politics; global political networks; global civil society and social movements; popular culture and politics; technology and society; risk society, state transformation and global governmentality

JOHN A. MARCUM, Emeritus

JOHN H. SCHAAR, Emeritus

DAVID J. THOMAS, Emeritus

MICHAEL E. URBAN

Russian politics, postcommunist transitions, U.S.-Russian relations, political language and ideology, revolution

GEORGE E. VON DER MUHLL, Emeritus

DANIEL J. WIRLS

American politics, including national political institutions (Congress) and the President; public policy (military and foreign policy) and political history

Associate Professor

EVA C. BERTRAM

American politics, including the welfare state and social policy; political economy and the politics of labor markets; civil society and non-governmental organizations; public policy, including drug-control policy

DEAN MATHIOWETZ

Political theory, philosophy of language, classical political economy

VANITA SETH

Early modern and modern political theory, feminist theory, cultural history, race politics, postcolonial theory

MEGAN THOMAS

Political theory, especially of the 19th century; nationalist thought; Orientalism; comparative colonialism; Southeast Asia

Assistant Professor

MARK FATHI MASSOUD

Law and society; politics of human rights; international law and development, with a special interest in Sudan; field research, with an emphasis on qualitative and ethnographic methods

ELEONORA PASOTTI

Comparative urban politics, democratization, public policy, sub-national political economy and party politics

BENJAMIN READ

Comparative politics with special interest in the politics of China; theories of associations and social networks; communist and post-communist states; political participation and collective action

ROGER SCHOENMAN

Post-socialism, political economy, comparative capitalism, politics of pipelines, politics of memory, political networks, politics and money, Balkan and East European politics, Central Asian transitions



Professor

EDMUND BURKE III (History)

BARBARA EPSTEIN (History of Consciousness)

JONATHAN A. FOX (Latin American and Latino Studies)

WALTER L. GOLDFRANK, Emeritus (Sociology)

DAVID E. GOODMAN, Emeritus (Environmental Studies)

PAUL M. LUBECK (Sociology)

ROBERT L. MEISTER (Professor of Political and Social Thought)

HECTOR PERLA (Latin American and Latino Studies)

DANIEL M. PRESS (Environmental Studies)

CRAIG REINARMAN (Sociology)

ALAN RICHARDS (Environmental Studies)

ANDREW SZASZ (Sociology)

DAVID WELLMAN (Community Studies)

DONALD A. WITTMAN (Economics)

Program Description

In describing the department and major at UCSC, the term politics (rather than political science or government) is used because the study of political life requires a far more inclusive approach than that which is associated with conventional political science methods, and because politics happens in places other than governments. More specifically, the study of politics is the study of the way human communities shape and share a common life through their institutional practices, ideas, interests, and expectations. It looks at the way collective decisions are made and at the obstacles citizens meet as they try to forge a shared and just life. Courses address

issues central to public life, such as democracy, power, freedom, political economy, social movements, international law and conflict, institutional reforms, and how public life, as distinct from private life, is constituted.

A major in politics is appropriate for students interested in careers in law, journalism, or teaching; in political and governmental work from local to international settings; and in corporations dealing with global issues. Many UCSC politics graduates have also gone on to do advanced work in distinguished graduate and professional schools. Others have found active and challenging careers in business and community organizing. Still others have turned to scholarship and writing. But regardless of career direction, the most significant purpose of the politics major is to help educate a reflective and activist citizenry capable of sharing power and responsibility in a contemporary democracy.

The study of politics is a critical part of a liberal arts education. Since political issues and practices are embedded in and reflective of the whole experience of a community, the study of politics can constitute the center of a broad-based course of study drawing on history, sociology, anthropology, philosophy, economics, literature, and law.

The programs offered by the UCSC Politics Department are designed to acquaint students with a broad range of issues studied by those in the field. The department offers an undergraduate major, a minor, a combined Latin American and Latino studies/politics major, and a doctoral degree. The Politics Department also houses a program in legal studies; see the Legal Studies Department, for details.

UCSC politics students have many opportunities for field work and for internship placements. Students are encouraged to develop their own extensive independent research projects.

Politics faculty members give students individual attention to help them in their studies. Faculty members are firmly committed to the value of a liberal arts education, but they are also actively engaged in programs of research and writing. The research interests of the faculty range from the theory of justice to the problem of war, from campaign strategy to relations between the rich and the poor countries of the world.

No specific courses at the high school level are required for admission to the major in politics at UCSC. Courses in history, literature, philosophy, and the social sciences, whether taken at the high school or college level, are appropriate background and preparation for the politics major.

Major Requirements as Follows

Two lower-division politics courses. All students are required to complete and pass two courses from those numbered 1 through 79, as a prerequisite to upper-division courses in politics and prior to declaring the major. (These have an IS general education code.) These courses are normally taken during the first year.

A student who has not been able to satisfy the pre-declaration requirement (a passing grade in two politics lower-division classes) may petition the department for an exception. The letter of petition must explain and document the circumstances that might justify an exception. The department will consider the request and notify the student of its decision within two weeks of receiving the petition or within 10 days of the start of the following quarter, whichever is later.

Four upper-division politics core courses. The following four groups of courses constitute the core of the politics major. Four courses are required: two courses from one group, one course from a second group, and

one course from a third group. In general, upper-division courses are not recommended for freshmen.

Theory

- 105A *Ancient Political Thought*
- 105B *Early Modern Political Thought*
- 105C *Modern Political Thought*
- 105D *Late 20th Century Political Thought*

U.S. Politics

- 120A *Congress, President, and the Court in American Politics*
- 120B *Society and Democracy in American Political Development*
- 120C *State and Capitalism in American Political Development*

Comparative

- 140A *Politics of Advanced Industrialized Societies*
- 140B *Comparative Post-Communist Politics*
- 140C *Latin American Politics*
- 140D *Politics of East Asia*

International

- 160A *International Politics*
- 160B *Global Organization*
- 160C *Security, Conflict, Violence, War*

Politics 160A, normally offered fall quarter, is very strongly recommended prior to taking the other international core courses.

Five upper-division politics electives. Five additional politics courses are to be selected from courses numbered 101–199. One of these courses may satisfy the senior comprehensive requirements.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement for politics majors is satisfied by completing any three of the four required core courses. The politics core course list is detailed above in the major requirement.

Comprehensive Requirements

The comprehensive requirement in the Politics Department can be satisfied in any of the following methods:

- Successful completion of a politics senior seminar (190-series) that includes the writing of an extensive paper (no less than 15 pages) with a substantial research content. To enroll in a specific 190 seminar, students must have successfully completed the prerequisite courses listed in the seminar's catalog course description;
- Successful completion of a politics graduate core seminar (enrollment in which is contingent on the written recommendation of two politics faculty) that includes the writing of an extensive paper (no less than 15 pages) with a substantial research content;
- Successful completion of a senior thesis (Politics 195A–B–C) of approximately 50 pages with a substantial research content, supervised by a politics faculty member with a second reader;
- Successful completion of one additional politics upper-division course. In addition to the existing

requirements of this course the student must receive faculty approval for and enroll in a two-credit independent study, Politics 199F, which requires completion of a substantial writing component.

Honors

Honors in the politics major are awarded to graduating seniors, based primarily on a review of grades and narrative evaluations, whose academic performance is judged to be consistently excellent by a committee of politics faculty. Highest honors in the major are reserved for students with consistently outstanding academic performance.

Minor Requirements

All students are required to complete and pass one lower-division politics course from those numbered 1 through 79, as a prerequisite to upper-division courses in politics and prior to declaring the minor. Additionally, five upper-division politics courses are required. Of these, four are to be selected from the core courses: two from one subfield and two from another subfield; these courses are listed above. The fifth course is to be selected from courses numbered 101–199.

General Undergraduate Information

Combined major. The Politics Department offers a combined major with the Latin American and Latino Studies Department. Requirements may be reviewed in the Latin American and Latino Studies section of the catalog.

Double majors. The department accepts proposals for double majors. A student pursuing a double major meets the full requirements of the politics major as well as the full requirements of the other major subject.

Advising. Declaring the major in politics is a four-step process: 1) complete and pass two lower-division politics courses (numbered 1–79) with a grade of C or better; 2) attend a declaration orientation workshop, 3) meet with your faculty adviser, and 4) meet with the politics undergraduate adviser. Each student meets with an assigned faculty adviser to discuss an intended program of study, including its breadth and purpose. The faculty adviser may suggest additional courses so that the student can achieve greater breadth or concentration. Students are encouraged to select related courses from other departments which complement their interests in politics.

Course credit from other institutions. Courses from another institution may be considered only if they appear on the student's Transfer Credit Summary. Students who wish to substitute courses taken elsewhere for the Politics Department's requirements should discuss the procedure with the department adviser.

Senior thesis. Students interested in working on original research and writing under the supervision of a faculty member may pursue an independent study, Politics 195A–B–C. Completion of the senior thesis satisfies the comprehensive requirement.

Transfer students. A student transferring to UCSC must meet with the politics undergraduate adviser as early as possible to discuss declaring the major and course enrollment. This will ensure a smoother transition. Students should bring a copy of their UCSC Transfer Credit Summary which may be printed from the student portal.

A junior transfer student may satisfy the requirement for one of the two lower-division courses by completing

an equivalent course in a political science or equivalent department with a grade of C or better. Courses from another institution may be considered only if they appear on the UCSC Transfer Credit Summary.

Graduate Program

The Faculty

The UCSC Politics Department's faculty provides a distinctive mix of senior scholars whose work has led the field toward interdisciplinary and engaged research, and junior scholars whose work represents the diverse cutting edge of U.S. and international political research. The small size of the program encourages close interaction among faculty and students.

The department enjoys several areas of special strength, including American political development and a focus on the social foundations of democratic politics and democratization. Clusters of faculty also specialize in the study of varieties of capitalism and post-communist politics and economy; the politics of Southeast Asia and Latin America; the study of race and politics; the politics of language; post-colonial theory and nationalist discourse; early modern political thought; and informal and translocal political organization.

The Curriculum

The Politics Department is impressed by the fact that many of the best studies of politics today disregard the conventional boundaries of the political science's disciplinary subfields. Therefore, the core graduate curriculum and qualifying examination process are structured around four interrelated themes central to political inquiry. Each of these areas of emphasis focuses, in a different way, on the relations among material life, institutional authority, collective mobilization, and political vision at all levels of politics.

Political and Social Thought. Brings together the history of political thought; contemporary social and critical theory; and the contributions of legal and institutional analysis of various kinds. This area of inquiry emphasizes the critical study of political practices that are experienced or understood as in some way limiting, oppressive, or wrong. The work of political and social theory as we see it is to transform our understanding of these practices; to see their contingent conditions; and to articulate the possibilities of governing ourselves differently.

States and Political Institutions. Emphasizes the comparative and international study of political institutions as instruments of collective decision-making and action. This area of inquiry focuses on the state and on transnational, subnational, and regional political institutions. In this area, we emphasize historical patterns of institutional development in relation to domestic political conflict and the changing contours of international political economy and patterns of conflict and cooperation among states.

Political Economy. Focuses on the relationship between states, markets, and societies. This area of inquiry explores the various understandings of political economy that have emerged within a number of different theoretical perspectives, including Marxism, realism, and liberalism. At subnational, national, and supranational levels, this area seeks to understand political economy outcomes as the result of the mutual interactions between political institutions, societal interests, and ideas and norms.

Political and Social Forces. Concerns the interaction of social forces and political forces, drawing upon the work of scholars focused on social mobilizations and histories. Accordingly, this area of inquiry focuses

on the articulation and organization of political interest and identities. This area studies the mutual interaction of these interests and identities with structure (states, discourses, public policy, and the law) uniting substantive and theoretical concerns across regional, national, and global politics.

The politics graduate curriculum works critically upon and within conventional social science research and also ranges beyond its methods, drawing upon cultural studies, historical sociology, and history as they inform the study of politics. Students in the politics graduate program also work with faculty in other distinguished departments at UCSC, including literature, history of consciousness, history, Latin American and Latino studies, environmental studies, philosophy, international economics, and feminist studies.

Scholars and students in the program emphasize the articulation of important questions prior to the development of methods for grappling with them, while recognizing the importance of appropriate methodological tools for doing meaningful political research.

Graduate students may also obtain a parenthetical notation on the politics doctor of philosophy (Ph.D.) diploma indicating that they have specialized in Latin American and Latino studies or feminist studies. This notation recognizes the scholarly expertise obtained after the completion of additional curriculum that is required by these departments.

Teaching

Throughout its history, the department has been strongly committed to undergraduate teaching. The graduate program offers graduate students the opportunity to work closely with faculty and undergraduates as teaching assistants. The Politics Department's faculty is committed to "the teaching of teaching": its training of college educators emphasizes the importance of civic education in undergraduate instruction.

See our web site, <http://politics.ucsc.edu>, for details about the policies for admission to graduate standing as well as the application, and information about financial-support opportunities. For more information, refer to the Graduate Division web site.

Ph.D. Program Requirements

The graduate curriculum in politics includes six stages: 1) five core seminars; 2) seven other graduate-level courses, four of which must be Politics Department courses, along with further training as appropriate in language and methodology; 3) teaching assistant seminar and graduate colloquia; 4) a qualifying examination consisting of written and oral parts; 5) the research and writing of the dissertation; and 6) its oral defense.

Note: Please check with the department office for updated listings of course offerings and the appropriate year in which to undertake specific electives.

M.A. Degree

Our program is intended to lead to a Ph.D. in politics; there is no separate master of arts (M.A.) program. All curricular requirements are aimed at preparing students for timely and successful completion of a doctoral dissertation. However, all students will be eligible to receive an M.A. upon successfully passing the coursework requirements and completing an acceptable 30-page, journal-quality paper, either within the context of a course or independently, although not the written qualifying exam. Students will be advanced to candidacy only upon successful completion of the coursework requirements and the qualifying examination.

Lower-Division Courses

1. Democratic Politics. S

Systematic introduction to the nature of politics and government, organized around the dynamic relationship between power, principle, and process in democratic politics. Provides historic and contemporary overview; explores the interactions among government, laws, and societies at the national and international levels. (General Education Code(s): PE-H, IS.) *D. Wirks*

3. Keywords: Concepts in Politics. *

Introduces key concepts in political discourse and key debates generated by contested terms such as "powers," "ideology," and "multiculturalism." Students read from canonical texts, feminist scholarship, historical materials, and contemporary cultural and postmodernist writings. (General Education Code(s): IS.) *V. Seth*

4. Citizenship and Action. *

What does a citizen do? Uses political theory to answer this question as it relates to a number of issues, such as voting rights, diversity, gay marriage, and revolution. Draws on texts ranging from Aristotle to contemporary legal and cultural debates, to bear on the relationship of citizen action and identity. Other readings include Thoreau, Ellison, Rousseau, Marx, Arendt, and Socrates. (General Education Code(s): TA, IS.) *D. Mathiowetz*

7. Politics of Religion. F

Considers both the religious sources of political ideas and the political sources of religious ideas, addressing topics such as sovereignty, justice, love, reason, revelation, sacrifice, victimhood, evil, racism, rebellion, reconciliation, and human rights. (General Education Code(s): IS.) *R. Meister*

15. Digital Democracy. *

Links the study of democratic theories with an interdisciplinary approach to issues at the intersection of democracy and technology, such as participation, freedom of speech, access with regard to diversity, and income inequality. (General Education Code(s): PE-T, IS.) *E. Pasotti*

17. U.S. and the World Economy. *

Explores intellectual and empirical trends shaping the U.S. relationship with the global economy. Traces debates about liberalism and interventionism, surveys post-war American foreign economic policy and discusses varieties of capitalism emerging around the world. (General Education Code(s): IS.) *R. Schoenman*

20. American Politics. *

Analysis of the development and operation of American political institutions, focusing on the constitutional powers of the Congress, presidency, and Supreme Court; and the development of the American political parties. Topics include the ideological underpinnings of American democracy; the changing balance of power between the executive, legislative, and judicial branches; the expansion of national government power; the expansion of the right to vote and political representation; and the rising power of "non-governmental" forces. (Formerly *Democracy and Liberalism in American Politics*.) Satisfies American History and Institutions Requirement. (General Education Code(s): TA, IS.) *The Staff*

25. American Social Policy. *

Examines role of ideas, interests, and institutions in shaping contemporary social policy in the U.S. Focuses on political struggles and policy debates in the areas of crime and drug control, health care, and income security. (General Education Code(s): TA, IS.) *E. Bertram*

43. Eurasian Politics. *

Following a survey of the development of the former USSR that emphasizes those factors responsible for its dissolution, focuses on the politics of nation building and international reintegration, and the prospects of democratic or authoritarian futures. (General Education Code(s): CC, IS.) *M. Urban*

60. Comparative Politics. W

Introduces the study of politics through the analysis of national political systems within or across regions from the developing world to post-industrial nations. Typical topics include: authoritarian and democratic regimes; state institutions and capacity; parties and electoral systems; public policies; social movements; ethnic conflict; and globalization. (General Education Code(s): CC, IS.) *B. Read*

70. Global Politics. F

Can common global interest prevail against particular sovereign desires? Surveys selected contemporary issues in global politics such as wars of intervention, ethnic conflict, globalization, global environmental protection, and some of the different ways in which they are understood and explained. (General Education Code(s): PE-H, IS.) *R. Lipschutz*

75. The Nation–State and Global Politics. *

Examines role of nation-state in global politics by studying processes of state formation in four regions: Europe, Africa, Asia, and Latin America. Evaluates recent challenges to the state that have begun to emerge from above and below. (General Education Code(s): IS.) *K. Eaton*

*Upper-Division Courses***103. Feminist Interventions. W**

Situates ongoing debates around feminist theory and practice within the context of political theory, the role of the state, and the position of women in contemporary (predominantly Western) society. Engages with classical political theory, second wave feminism, and the role of the state on matters pertaining to pornography and prostitution. Enrollment restricted to politics, legal studies, and Latin American and Latino studies/politics combined majors during priority enrollment only. *V. Seth*

104A. American Political Thought. *

Basic problems of political theory within the American setting. The course explores both the mainstream tradition and some branches of the counter tradition of political ideas in America, focusing on the themes of authority, community, equality, and liberty. Enrollment restricted to politics, legal studies, and Latin American and Latino studies/politics combined majors during priority enrollment only. Satisfies American History and Institutions Requirement. *J. Schaar*

105A. Ancient Political Thought. F

Ancient political ideas in context of tension between democracy and empire, emergence of the psyche, and shift from oral to written culture. Emphasis on Athens, with Hebrew, Roman, and Christian departures and interventions. Includes Sophocles, Thucydides, Socrates, Plato, Aristotle, Stoics, the Bible, and Augustine. (Also offered as Legal Studies 105A. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *D. Mathionetz*

105B. Early Modern Political Thought. S

Studies republican and liberal traditions of political

thought and politics. Authors studied include Hobbes, Locke, and Rousseau. Examination of issues such as authorship, individuality, gender, state, and cultural difference. (Also offered as Legal Studies 105B. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *V. Seth*

105C. Modern Political Thought. W

Studies in 19th- and early 20th-century theory, centering on the themes of capitalism, labor, alienation, culture, freedom, and morality. Authors studied include J. S. Mill, Marx, Nietzsche, Foucault, Hegel, Fanon, and Weber. (Also offered as Legal Studies 105C. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *M. Thomas*

105D. Late 20th Century Political Thought. *

The politics of identity and recognition as the basis for institutional legitimacy and social struggles in the late 20th century. Conflicting views of Hegel's master-slave dialectic are used to relate, e.g., Sartre, Fanon, Bataille, Merleau-Ponty, Foucault, Lacan, Levinas, Derrida, Deleuze, Zizek, and Badiou to present-day concerns. (Also offered as Legal Studies 105D. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment. *R. Meister*

106. Marxism as a Method. *

Examines Marx's use of his sources in political philosophy and political economy to develop a method for analyzing the variable ways in which social change is experienced as a basis for social action. Provides a similar analysis of contemporary materials. Contrasts and compares Marxian critiques of these materials and readings based on Nietzsche, psychoanalysis, cultural studies, and rational choice materialism. (Also offered as Legal Studies 106. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

107. After Evil: Political Morality of Survivorship and Recovery. *

What are the continuing relationships between victims, perpetrators, and beneficiaries of a past that is recognized as evil? Focus on contrast between the competing moral logics of struggle and reconciliation, and various rationales for allowing beneficiaries to keep their gains in order to bring closure to the past. Theoretical perspectives drawn from law, philosophy, theology, and psychoanalysis. (Also offered as Legal Studies 107. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Meister*

108. Political Theologies of Milton and Dante. *

Focuses on reading texts written by Milton and Dante, including *Paradise Lost* and *Purgatorio*. Topics of political theology, medieval and reformation Christian thought and related historical studies are examined. Enrollment restricted to politics majors. *R. Meister*

109. Orientalism. S

Studies "Orientalism" as a concept of political theory and as a historical practice. Considers how "Western" views of

the peoples, cultures, and governments of "the East" influenced political, intellectual, and aesthetic projects of the 18th and 19th centuries, with attention to the themes of colonialism, nationalism, language, and gender. Also considers Orientalism as a subject of post-colonial thought. Prerequisite(s): course 105A, or 105B, or 105C, or 105D; or by permission of instructor. Enrollment restricted to politics majors. *M. Thomas*

110. Law and Social Issues. *

Examines current problems in law as it intersects with politics and society. Readings are drawn from legal and political philosophy, social science, and judicial opinions. (Also offered as Legal Studies 110. Students cannot receive credit for both courses.) Enrollment restricted to politics, legal studies, and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

111A. Constitutional Law. S

An introduction to constitutional law, emphasizing equal protection and fundamental rights as defined by common law decisions interpreting the 14th Amendment, and also exploring issues of federalism and separation of powers. Readings are primarily court decisions; special attention given to teaching how to interpret, understand, and write about common law. (Formerly *Problems in Constitutional Law*.) (Also offered as Legal Studies 111A. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

112. Women and the Law. *

Interdisciplinary approach to study of law in its relation to category "women" and production of gender. Considers various materials including critical race theory, domestic case law and international instruments, representations of law, and writings by and on behalf of women living under different forms of legal control. Examines how law structures rights, offers protections, produces hierarchies, and sexualizes power relations in both public and intimate life. (Also offered as Feminist Studies 112. Students cannot receive credit for both courses.) Enrollment restricted to politics, feminist studies, legal studies, and Latin American and Latino studies/politics combined majors during priority enrollment only. *G. Dent*

114. Thinking Green: Politics, Philosophies, and Practices of Sustainability. S

A course on the political and philosophical sources of ecological and social sustainability and how they affect and inflect the design, implementation, and practices of sustainability. Asks whether they offer a "realistic" alternative to liberalism and other political and economic ideologies and practices. (Formerly *Thinking Green: Politics, Ethics, Political Economy*.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Lipschutz*

115. Foundations of Political Economy. W

Examines how ideas about labor, rights, exchange, capital, consumption, the state, production, poverty, luxury, morality, procreation, and markets were woven in political-economic discourse from 1690-1936. Readings include Locke, Mandeville, Smith, Malthus, Mill, Hegel, Marx, Lenin, and Veblen. Particular focus given to theoretical origins of and justifications for property and implications of economic interdependence for politics. Prerequisite(s): course 105B, 105C, or 120C. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *D. Mathionetz*

116. Comparative Law. *

Explores legal systems and legal rules around the world, for a better understanding of the factors that have shaped both legal growth and legal change. Particular attention given to differences between common and civil law systems, changes brought about by the European Union, and expansion of legal norms around the globe. (Also offered as Legal Studies 116. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

117. U.S. Telecommunications Law and Policy. F

Surveys the U.S. telecommunications and broadcasting law and policy from the mid-19th century through the present. Offers a range of perspectives from the vantage point of the telecommunications industry, government, and the media-reform movement. Enrollment restricted to politics majors during priority enrollment only. *The Staff*

120A. Congress, President, and the Court in American Politics. W

Study of political development, behavior, performance, and significance of central governmental institutions of the U.S. Emphasizes the historical development of each branch and their relationship to each other, including changes in relative power and constitutional responsibilities. (Also offered as Legal Studies 120A. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Satisfies American History and Institutions Requirement. *D. Wirls*

120B. Society and Democracy in American Political Development. F

Examines role of social forces (e.g., race, class, and gender) in development of the American democratic processes and in the changing relationship between citizen and state. Course materials address ideas, social tensions, and economic pressures bearing on social movements, interest groups, and political parties. (Also offered as Legal Studies 120B. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics majors during priority enrollment period. Satisfies American History and Institutions Requirement. *M. Brown*

120C. State and Capitalism in American Political Development. S

Examines the relationship between state and economy in the U.S. from the 1880s to the present, and provides a theoretical and historical introduction to the study of politics and markets. Focus is on moments of crisis and choice in U.S. political economy, with an emphasis on the rise of regulation, the development of the welfare state, and changes in employment policies. (Also offered as Legal Studies 120C. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics, Latin American and Latino studies/politics, and legal studies majors during priority enrollment only. Satisfies American History and Institutions Requirement. *E. Bertram*

121. Black Politics and Federal Social Policy. *

Examination of changes in the political and economic status of African Americans in the 20th century; particular focus on the role of national policies since 1933 and the significance of racism in 20th-century U.S. political development. (Formerly course 127.) (Also offered

as Legal Studies 121. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. (General Education Code(s): E.) *The Staff*

122. Politics, Labor, and Markets in the U.S.. W

Examines political and social dimensions of recent transformations in the U.S. labor market. Includes classical and contemporary theoretical debates over the nature and functions of work under capitalism. Focuses on shifts in the organization and character of work in a globalizing economy. Addresses recent trends in economic inequality, low-wage and contingent work, job mobility and security, and work/family relations. Includes attention to the roles and responses of business, labor, government, and social movements. Enrollment restricted to politics and Latin American and Latino studies/politics combined major during priority enrollment. *E. Bertram*

124. Politics, Poverty, and Inequality in America. *

Investigation of the causes and consequences of poverty and income inequality in the U.S., including racial and gender inequality. Consideration of the origins of contemporary anti-poverty policies and evaluation of current policy alternatives. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *E. Bertram*

125. Political Organizations in American Politics. *

Introduces the literature on interest groups and attempts to answer the question: Do such groups promote or hinder American democracy? Class readings and lectures review and assess the participation of interest groups in the electoral process and in Congress, the executive branch, and the courts. Pays particular attention to the role business and environmental groups play in American politics and policy. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *S. Kamieniecki*

129. Policies and Politics of American Defense. F

Examines the evolution of the policy and politics of American national security, from the Cold War to the present. Content of military policy explored with analytic focus on formation of policy and interactions between military policies and domestic policies. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *D. Wirls*

132. California Water Law and Policy. *

Explores the rich history and fundamental legal concepts surrounding water in California. Students identify, evaluate, and debate some critical water policy questions faced by Californians today and in the future. (Also offered as Legal Studies 132. Students cannot receive credit for both courses.) *R. Langridge*

133. Law of Democracy. *

Explores the role of law in both enabling and constraining the actions of elected politicians in the U.S. Among issues examined are voting rights, redistricting, and campaign finance. Course asks how the law shapes and limits our ability to choose our elected leaders, and in turn, how the law is shaped by political forces. (Also offered as Legal Studies 133. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

140A. Politics of Advanced Industrialized Societies. F

Explores the political and economic systems of advanced industrialized societies. In addition to specific comparisons between the countries of western Europe and the United States, covers important themes and challenges, including immigration, globalization, and the crisis of the welfare state. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority period. *E. Pasotti*

140B. Comparative Post-Communist Politics. S

Comparative study of revolutionary transformations of East European, Soviet, and former Soviet nations to post-Communist political orders. Focus on reemergence of political society, social and economic problems of transition, and maintenance of many cultural norms and authority patterns associated with previous regime. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. *M. Urban*

140C. Latin American Politics. W

Overview of major approaches to the study of Latin American politics. Introductory survey of historical and contemporary democratic, populist, authoritarian, and revolutionary regimes. Special attention to local, national, and global forces shaping development strategies and public policies; changing institutional arrangements and shifting discourses of domination; and social movements and strategies of resistance among subaltern social groups and classes. Students cannot receive credit for this course and course 241. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics, Latin American and Latino studies, and politics/Latin American and Latino studies combined majors during priority period. (General Education Code(s): E.) *K. Eaton*

140D. Politics of East Asia. *

Explores dynamics of political and economic development in Northeast and Southeast Asia following WWII. Students apply theories of comparative politics to empirical case studies, integrating statist, social, and cultural factors into their understanding of development. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. (General Education Code(s): E.) *The Staff*

140E. Postcolonial States and Societies. *

Explores key contemporary issues and conflicts in post-colonial states and societies from a range of methodological and theoretical perspectives. While readings focus on South Asia, Middle East, and southeast Asia, they reflect issues of broad theoretical and comparative significance, emphasizing constitutive role of colonialism, modernist projects, and social movements in shaping both post-colonial politics and scholarship. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. (General Education Code(s): E.) *The Staff*

141. Politics of China. F

Introduces themes of Chinese politics from 1949 to present, including: the establishment and substantial dismantling of socialism; movements and upheavals, such as the Cultural Revolution and 1989; and issues, such as Tibet and Taiwan. Surveys current institutions, leaders, and policies. (Formerly *China*.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. (General Education Code(s): E.) *B. Read*

142. Russian Politics. F

Historical-political survey of Russia within the U.S.S.R. is followed by examination of the 1991 revolution, the attempt to recover a national identity and establish a unified Russian state. Highlighted in this course are cultural and political factors central to the Russian experience: personalistic modes of political organization, a remote and corrupt state apparatus, collectivist forms of thought and self-defense. *M. Urban*

144. Andean Politics. *

Examines similar political trends in four Andean countries: Bolivia, Colombia, Ecuador, and Peru. Trends include mobilization of indigenous populations, breakdown of traditional party systems, and reconstruction efforts in post-conflict environments. Students who have taken prior courses in Latin American politics, including course 140C, will be best prepared for this course. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *K. Eaton*

146. The Politics of Africa. W

Comparative study of contemporary sub-Saharan African states. Selected issues and countries. Internal and external political institutions and processes are studied in order to learn about politics in contemporary Black Africa and to learn more about the nature of politics through the focus on the particular issues and questions raised by the African context. Enrollment restricted to politics majors during priority enrollment only. (General Education Code(s): E.) *The Staff*

148. Social Movements. S

Overview of social movements by analysis of specific theories and examples. Course connects the study of theories and movements to larger political processes. Topics may include: New Social Movement theory; gender and social movement; democratic, historical, transnational, global and/or local social movements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

149. Democratic Transitions. F

Explores democratization processes from a variety of historical and geographical perspectives. Examines the role of foreign influences, economic development, civil society, elites, and institutions in the transition and consolidation of democratic systems. Enrollment restricted to politics and Latin American and Latino studies/politics majors during priority enrollment only. *E. Pasotti*

150. Democratization, Citizenship, and Human Rights in South America. *

Examines military regimes, transitions to civilian rule, and politics of democratization in contemporary Brazil, Argentina, and Chile. Focus on the contradictions and legacies of transition politics, the challenges of democratizing political institutions, and the political and social consequences of neoliberalism. Emphasis on human rights, citizens' movements (especially feminisms), changing dynamics of civil society, and contemporary efforts to deepen democracy and extend meaningful citizenship to subaltern social groups and classes. Prerequisite(s): course 140C or permission of instructor. *The Staff*

151. Politics of Law. W

Uncovers the important debates in politics and law around the functions of courts, litigation, and rights--and the political nature of law itself. Course is interdisciplinary, and draws from literature in political science, law, and sociology. (Also offered as Legal Studies 151. Students cannot receive credit for both courses.) Enrollment re-

stricted to politics, legal studies, and Latin American and Latino studies/politics combined majors during priority period. *M. Massoud*

160A. Theories of International and World Politics. W

Examination of analytical perspectives on international and world politics, international and global political economy, war and conflict, corporations and civil society. Explores theoretical tools and applications, recurring patterns of global conflict and cooperation, the nexus between domestic politics, foreign policy and international and world politics. This is not a current events course. (Formerly *International Politics*.) Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Lipschutz*

160B. Global Organization. *

Addresses whether and how global organizations are changing the international system. Examines multilateral institutions, regional organizations, and nonstate actors. Overriding aim is to discern whether these global organizations are affecting the purported primacy of the state. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

160C. Security, Conflict, Violence, War. S

Genesis and theories of conflict and war and their avoidance (past, present, future). Relationship between foreign policy and intra- and interstate conflict and violence. National security and the security dilemma. Non-violent conflict as a normal part of politics; violent conflict as anti-political; transformation of conflict into social and interstate violence. Interrelationships among conduct of war, attainment of political objectives, and the end of hostilities. Civil and ethnic wars. Political economy of violence and war. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

161. Foreign Relations of China. *

Surveys China's foreign policy from 1949 to today, including the Korean War; Sino-Soviet ties; relations with the United States; tension with Taiwan; and China's rise to geopolitical prominence. Introduces the major theoretical approaches to international relations. (Formerly course 143) Enrollment restricted to politics and politics/Latin America and Latino studies combined majors during priority enrollment. *B. Read*

162. Political Integration in Europe, The Atlantic Community and Africa. *

Analyzes concepts, movements, and institutions fostering transnational community. Compares and contrasts functional and federal approaches; the roles of the European, Atlantic Union, and Pan-African Movements; and explores efforts at socio-economic transformation via institutions such as the European Union, Council of Europe, NATO, OSCE, and African Union. Enrollment restricted to politics and politics/Latin American and Latino studies combined majors during priority enrollment. *J. Marcum*

163. U.S. Foreign Policy. *

Provides overview of U.S. foreign policy formulation: considers how U.S. political culture shapes foreign policy; examines governmental actors involved: the president, executive branch agencies, and Congress; then considers non-governmental actors: the media, interest groups,

and public opinion. (Formerly *How U.S. Foreign Policy Gets Made*.) Enrollment restricted to politics and politics/Latin American and Latino studies combined majors. *The Staff*

171. Law of War. *

Examines legal regulation of international violent conflict. Students examine development of normative standards within international law and creation of institutions to both adjudicate violations and regulate conduct. (Also offered as Legal Studies 171. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *The Staff*

172. Liberalism, the State, and the War on Terror. *

Examines the relation between the liberal State and perceived challenges to State sovereignty posed by transnational terrorism. How does terrorism as both a symbol and empirical phenomenon fit within the horizon of liberal ideology? What claim to sovereignty does the State make in the face of acts of terror? What political logic is required in/for a War on Terror? Students may not take both course 72 and this course for credit in the major. Enrollment restricted to politics and politics/Latin America and Latino studies majors during priority enrollment. *The Staff*

173. International Law. F

Origins and development of international law: international law is examined both as a reflection of the present world order and as a basis for transformation. Topics include jurisdiction and sovereignty, treaties, the use of force, and human rights. (Also offered as Legal Studies 173. Students cannot receive credit for both courses.) Enrollment restricted to politics and Latin American and Latino studies/politics majors during priority enrollment. *M. Massoud*

174. Global Environment Politics. *

Focus on global environmental "problematique" and how it is being played out in a variety of political arenas. Includes technical overview of global environmental movement; perspectives on alternative political approaches to environmental problems. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Lipschutz*

175. Human Rights. W

Embraces an interdisciplinary approach to the study of human rights. Captures the malleable nature of human rights and the contours of its dual role as both law and discourse. (Also offered as Legal Studies 175. Students cannot receive credit for both courses.) Prerequisite(s): course 173 or Legal Studies 173. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment. *M. Massoud*

176. International Political Economy. S

Surveys and critically examines long-standing theoretical debates within international political economy (liberalism, mercantilism, Marxism) with context of important historical and contemporary international political economy issue areas (international monetary systems, organization of international trade, regulation of foreign direct investment, development policies, etc.). Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Schoenman*

177. The United States and the World. *

Examines political, economic, and cultural relationship between the U.S. and the rest of the world, including historical background and foreign policy. Special focus

on U.S. involvement in the Middle East and Persian Gulf and the politics of economics of that region. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Lipschutz*

178. U.S. Foreign Economic Policy. *

Theoretical and historical survey of U.S. foreign economic policy. First part explores theoretical frameworks and covers historical events in the U.S.'s relationship with world economy. The second part focuses on postwar foreign economic policy; surveys different theoretical approaches to U.S. foreign policy; and examines fundamental developments and issues in trade, monetary, development, and investment policies. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Schoenman*

179. The Atomic Enterprise: Nuclear Physics, History, Strategy, Policy. *

Informs and educates about "The Atomic Enterprise," that panoply of science, technology, projects, events, policies, health effects, industry, and controversies related to the discovery, development, deployment, and domestication of nuclear fission and fusion. Enrollment restricted to politics or politics/Latin American and Latino studies majors during priority enrollment only. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment only. *R. Lipschutz*

183. Asian Security. *

Explores the sources of cooperation and conflict in modern Asia from the waning years of the Imperial Age to the present, with stops en route such as the three Indo-Pakistani wars and conflicts in the Taiwan Strait. Enrollment restricted to politics and Latin American and Latino studies/politics combined majors during priority enrollment. *The Staff*

190. Senior Comprehensive Seminar.

These courses, offered at different times by different instructors, focus on current problems of interest across the discipline. Courses offer a flexible framework within which those mutually interested in specific issues can read, present papers, and develop their ideas. Students who do not meet the restrictions and prerequisites may contact the instructor for permission to enroll. *The Staff*

190A. State and Revolution. F

Investigates the process of rapid and fundamental political change from the standpoint of both the structures of states in which revolutions have occurred and the structures of states issuing from revolutions. A number of cases are examined, but particular emphasis is given to the "classic" revolutions in France (1789) and Russia (1917). Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors; major restrictions lifted during open enrollment. Enrollment limited to 20. *M. Urban*

190B. Humanity, Sovereignty, and War. *

Examines how enmity, the state, and war serve as limits for political conceptions of who "we" are, and the liberal and humanitarian efforts to surmount these limits. Students examine works written prior to the liberal period (Hobbes), in response to it (Hegel and Schmitt) and finally a 20th-Century liberal revival (Rawls), and discuss rights, conscience, political obligation, war, and the state. (Formerly *The Juridical and the Political*.) Prerequisite(s): two of the following: course 103, 105A, 105B, 105C, 105D, 107, 109, or 115. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *D. Mathiowetz*

190C. U.S.-Russian Relations. *

Examines the cold war and its aftermath. Focuses on interstate conflict and its roots in domestic politics. Topics include issues of national security, military competition, transnational movements, regional and global hegemony. Prerequisite(s): one of the following: 140B, 141, or 142. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *M. Urban*

190D. Early Anarchist and Socialist Thought. F

Studies in 19th- and early 20th-century anarchist and socialist thought. Themes covered include property, labor, marriage, and the state. Readings drawn from Bakunin, Goldman, Fourier, Kropotkin, Perkins-Gilman, Proudhon, and Stirner. Prerequisite(s): two of the following: courses 103, 105A, 105B, 105C, 105D, 109, or 115; or by permission of instructor. Enrollment restricted to senior politics majors. Enrollment limited to 20. *M. Thomas*

190E. European Integration. S

Focuses on the origins and development of the European Union. Addresses historical and contemporary issues, including the political, economic, social, and cultural dimensions of European integration and expansion. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *R. Schoenman*

190G. Issues in International Law. *

Explores theory and reality of international law; how it determines or governs or modifies policies of government. Emphasis on contemporary political and economic forces and international law in nuclear age, competing areas for new law, law of seas, human rights, new international economic issues, the environment. Enrollment restricted to senior legal studies, politics, and Latin American and Latino studies/politics combined majors during priority enrollment only; major restrictions will be lifted during open enrollment. Enrollment limited to 20. *The Staff*

190H. The Substance of Democracy. W

What is democracy? Why do we care about it? How can we identify it? Through political science, law, and philosophy, the course explores these questions and the issues of patronage, media manipulation, lobbying, campaign finance reform, and participation. Enrollment restricted to senior politics and combined politics/Latin American and Latino studies majors. Enrollment limited to 20. *E. Pasotti*

190J. Politics and Inequality. W

Considers causes and consequences of inequality in modern societies. Emphasizes empirical analysis of contemporary forms of class, racial, and gender inequality and examination of normative theories of distributive justice. Major restrictions lifted during open enrollment. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *D. Wirls*

190L. Poverty Politics. F

Examines theoretical, historical, and contemporary sources of poverty, politics, and policies in the U.S. Explores competing theories of the causes of poverty and the consequences of social provision. Focuses on successive historical reform efforts and contemporary dilemmas of race, gender, low-wage labor, and the politics of welfare reform. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *E. Bertram*

190M. American Politics Through American Literature. *

Most major American writers offer perspectives outside "official" mainstream political culture; the raising of countervoices; concern about common, public lives, not just personal experience; exploring persistent tensions (dualisms) and deeper meanings, how we really live, how it is concealed from understanding, and political/moral costs. Prerequisite(s): course 101, 105A, 105B, 105C, 120B, or 120C. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *J. Schaar*

190N. Congress: The Politics of Representation and Legislation. *

Examination of U.S. Congress in theoretical, comparative, and historical perspective. Topics include tension between representative and legislative processes, parliamentary versus presidential systems, party organization versus the new entrepreneurship. Special attention given to nature and consequences of bicameralism. Prerequisite(s): course 120A. Enrollment restricted to senior legal studies, politics, and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *D. Wirls*

190O. Women and Politics: Electoral Influence and Policymaking. *

Focuses on the impact women have on the political process in the U.S. Examines women's mass-level political participation with focus on the gender gap; women as candidates, women officeholders and their impact, and expectations for the future. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *The Staff*

190P. Race: History of a Concept. *

Examines how we came, by the late 19th century, to classify humanity into racial categories. In an effort to trace emergence of this very modern phenomenon, explores historical shifts that informed Europe's representation of cultural difference from the writings of ancient Greeks to the social Darwinism of 19th-century Britain. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment. Enrollment limited to 20. *V. Seth*

190Q. Theorizing Modernity. *

Introduces central categories and material implications that underwrite discourses on modernity since the late 18th century. Students read across the disciplines in fields such as political theory, postcolonialism, history, science studies, anthropology, and feminist criticism. Prerequisite(s): any two of the following courses: 105A, 105B, 105C, 105D. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment. Enrollment limited to 20. *V. Seth*

190S. Empire and After. *

Examines the literature on American empire, beginning with the founding parents (e.g., Jefferson), continuing through the revisionist literatures (e.g., Williams) and more recent work (e.g., Hardt and Negri), and ending with contemporary critiques and predictions. Enrollment restricted to senior politics majors. Enrollment limited to 20. *R. Lipschutz*

190T. Governance and Conflict in East Asia. *

Students read recent books on East Asian countries (emphasis on China) that engage the long-standing themes of state power and societal resistance. Prerequisite(s): course

141 or 143 or 109, or by permission of instructor. Enrollment restricted to senior politics majors. Enrollment limited to 20. *B. Read*

190V. Problems in Latin American Politics. S

Research seminar allows advanced students to engage in current scholarly debates in the sub-field of Latin American politics. Topics and countries covered vary from year to year but may include civil society, citizenship and cultural politics in Latin/o America, comparative perspectives on democratization, politics and culture in Brazil, feminisms and women's movements in Latin America, the politics of race and ethnicity in the Americas, and human rights and social justice in a neoliberal era. Prerequisite(s): course 140C. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Students with equivalent coursework may enroll with permission of instructor. Enrollment limited to 20. *K. Eaton*

190W. Living in the Aftermath of Evil. *

Draws on a variety of sources to understand metaphors of war and peace as potentially appropriate attitudes toward evil and as potentially rational compromises with evil; investigates respects in which constitutional regimes of post-traumatic societies can be understood as "peace programs" that preserve and transcend the identities of the victims and perpetrators of past atrocities while creating a new identity based on their common survivorship; explores the constraints placed on "nation in recovery" by the public commitment to create an official version of a past that must be remembered so that it will not be repeated. Prerequisite(s): two of the following: course 105A, 105B, 105C, 106, and 107. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *R. Meister*

190X. Global Capital and Capitalism. S

Examines the history and organization of global capital and capitalism, through political economy, with a focus on major historical works and recent writings, especially in relation to the crisis of globalization and the global economy. (Formerly *Global Civil Society—Theories, Debates, Practices*.) Prerequisite(s): One of course 115, 120C, 160A, 176, or 178. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors during priority enrollment only. Enrollment limited to 20. *The Staff*

190Y. Political Theories of Luxury. *

Examines conceptions of luxury as they have appeared in classical, Christian, early modern, and contemporary discourses and debates. How have people sought to define luxury; for what political purposes; and what promise and peril do such definitions have? What is the shape and power of luxury in political communities today? (Formerly *Political Theory of Luxury*.) Enrollment restricted to senior politics and politics/Latin American studies majors. Enrollment limited to 20. *D. Mathiowetz*

190Z. International Security. *

Examination of selected issues, controversies, and theories relevant to "security" between and among nations. Topics vary, but may include: war, peace, nuclear proliferation, arms control, military and foreign policies, alternative conceptions of security. Enrollment restricted to senior politics and Latin American and Latino studies/politics combined majors. Enrollment limited to 20. *The Staff*

193. Field Study in Politics. F,W,S

Individual studies undertaken off campus with direct faculty supervision. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Various topics to be announced before each quarter. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195A. Senior Thesis. F,W,S

Preparation of a senior thesis over two or three quarters, beginning in any quarter. The grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students submit petition to sponsoring agency. *The Staff*

195B. Senior Thesis. F,W,S

Preparation of a senior thesis over two or three quarters, beginning in any quarter. The grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students submit petition to sponsoring agency. *The Staff*

195C. Senior Thesis. F,W,S

Preparation of a senior thesis over two or three quarters, beginning in any quarter. The grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students submit petition to sponsoring agency. *The Staff*

198. Independent Field Study. F,W,S

Individual studies undertaken off-campus for which faculty supervision is not in person (e.g. supervision is by correspondence). Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198E. Independent Field Study (2 credits). F,W,S

Individual studies undertaken off-campus for which faculty supervision is not in person, but by correspondence. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

A student normally approaches a member of the faculty and proposes to take a course 199 on a subject he or she has chosen which is not offered in other politics courses. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199E. Tutorial (2 credits). F,W,S

A student normally approaches a member of the faculty and proposes to take a course 199 on a subject he or she has chosen which is not offered in other politics courses. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

200A. Interpretive Problems in Political Theory: Language and Power. *

Examines intersections of philosophy of language, language philosophy, political theory, and politics. How can we read texts and discourses in a manner both historically and textually grounded? Must these readings be compatible with a democratic ethos? If so, how? (Formerly *Interpretive Methods in Political Theory: Language and Politics*.) Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

200B. Social Forces and Political Change Core Seminar. F

Concerns transformation of social forces into political ones. Focuses on formation, articulation, mobilization, and organization of political interests and identities, their mutual interaction, and their effects on state structures and practices and vice versa. Major themes are 1) social bases of political action: class, gender, race, and other de-

terminants of social division and political identity and 2) relevant forms of political agency and action, including development of political consciousness and representation of interests and identities in the public sphere. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Read*

200C. States and Political Institutions Core Seminar. *

Introduces study of political institutions as instruments of collective decision making and action. Explores alternative theoretical approaches to development of political institutions, state and political economy, and security dilemmas. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Wirls*

200D. Political Economy Core Seminar. W

Introduction to the theories and methodologies of political economy. Focuses on the relationship between states and markets and considers the politics of economic choices and institutions germane to both national and global political institutions. Addresses origins and development of markets and capitalism; historical evolution of states and their economies; relationship between labor, capital, production, and consumption; regulation of production; macroeconomics and management of economies; and issues of national and global social welfare. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Schoenman*

201. Logics of Inquiry. S

Investigates approaches to study of politics and to enterprise of social science in general. Works from positivist, interpretive, historical, and critical approaches provide examples held up to critical and epistemological reflection. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Lipschutz*

203. Making of the Modern. S

Introduces, at the graduate level, some of the central conceptual categories and material implications that underwrite the world of the modern. Explores concepts including the individual, historicism, contract, and objectivity. Enrollment restricted to graduate students. Enrollment limited to 15. *V. Seth*

204. Bodies in History. *

The human body has been productive of a wide range of varied and competing discourses. Among the themes covered are sexuality, hygiene, the grotesque, and criminality. Enrollment restricted to graduate students. Enrollment limited to 15. *V. Seth*

205. Political and Social Thought: Politics of Recognition. *

Investigates issues about identity and recognition as basis for claims about institutional legitimacy and social struggle. Paradigm is Hegel's account of relation of master and slave in Phenomenology of Spirit. Contemporary political philosophy examines differing accounts of reason, power, resistance, liberation, morality, difference, and the other. Concludes with discussion of identity and interest politics, multiculturalism and assimilation, and moral bases of struggle, reconciliation, and compromise in the political arena. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Meister*

206. Topics in Political Theory. *

Readings focus on the early 20th-century rediscovery of political theory; its use in theorizations of the Holocaust; and its return in 21st-century debates on empires, war, terror, enmity, reconciliation, fanaticism, human rights, political economy, and global catastrophe. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Meister*

207. Political Economies of Affect. F

Explores the intersections of classical and philosophical political economy and theories of affect, from emotion to aesthetics and sensibility, in early modern and late modern contexts. Readings include Deleuze, Hobbes, Hume, Negri, Massumi, Sedgwick, Smith, Spinoza. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Mathiowetz*

211. Marxism. *

Examines how Marx arrived at his substantive political standpoint through a critique of the modes of theory through which state and society are interpreted from within. Also considers how far it is possible to apply the methods Marx used, in learning from the sources available in our own contemporary material, and whether this process of interpretation will lead us to similar conclusions. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Meister*

214. Thinking Green: Politics, Ethics, Political Economy. *

Green political thought, philosophy, debates, and practices; history of ecological thought and comparative study of competing ideas and proposals. Critical examination of neo-liberal environmentalism. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Lipschutz*

222. Conflict and Change in American Politics and Policy. *

Explores the dynamic and contested interaction between politics and policy in the U.S. context, through examining the historical development of key contemporary policy debates and political conflicts. Introduces recent scholarship, drawing on history, sociology, and political economy that has challenged traditional behaviorist approaches to understanding American politics and policy development. Enrollment restricted to graduate students. Enrollment limited to 15. *E. Bertram*

232. United States Political History. *

Covers several important themes and sets of readings from the literature on American political development. Topics include the origins and development of American political institutions, the evolution of democratic mechanisms, the rise and fall of social movements, and debates about the sources of policy regimes and political change, including the role of war. Enrollment restricted to graduate students. Enrollment limited to 15. *D. Wirls*

233. Interrogating Race. *

Critically examines alternative theoretical and methodological approaches to study of race and racism. Considers alternative explanations for origins and persistence of racism and racial inequality and suggests the relevance of a socio-political understanding. Enrollment restricted to graduate students. Enrollment limited to 15. *The Staff*

245. Latin American Politics. *

Surveys the Latin American political literature by studying: 1) critical moments in political development (e.g., state formation, democratization); 2) important political institutions (e.g., presidentialism, party, and electoral systems); and 3) influential political actors (e.g., unions, business associations, social movements). Enrollment restricted to graduate students. Enrollment limited to 15. *K. Eaton*

247. Comparative Urban Politics. W

Focuses on local government structures and the relationships with other levels of government. Examines institutions and administration; urban political economy (fiscal strain, poverty, inequality, and the efforts to attract economic investment); political machines; race and ethnicity.

Enrollment restricted to graduate students. Enrollment limited to 15. *E. Pasotti*

251. Discourse. F

Utilizing a variety of approaches—discourse analysis, semiotics, critical theory, and linguistics—analyzes how language constructs the political world. Focuses on the symbolic mediation, normalization, and reproduction of power and subjugation present in the discourses through which they are apprehended and expressed. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Urban*

255. Comparative Anti-Colonialisms. *

Political thought of anti-colonial movements in comparative, historical perspective, including 18th- to 20th-Century European colonies of America and Asia. Focuses both on the contemporary political thought of these movements as well as on historiographical approaches of secondary literature. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Thomas*

265. Nationalism. *

Survey of theories of nationalism, with selected nationalist thinkers and case studies. Emphasis on historical analyses and cases. Topics include: origins and typologies of nationalisms, racism, gender, revolution, and the state. Enrollment restricted to graduate students. Enrollment limited to 15. *M. Thomas*

272. Critical Interventions in IR Theory and Global Political Economy. *

Seminar examines selections from the canonical literature in international relations theory and global political economy through a number of critical lenses, including constructivist, feminist, historical materialist, and subaltern approaches. Enrollment restricted to graduate students. Enrollment limited to 15. *R. Lipschutz*

275. New Approaches to the Study of Capitalism. *

Examines genesis of new institutions within the force of social ties and networks. Studies how social and organizational relationships achieve individual or group goals in political and economic life, and influence institutional design. Considers when and what ties contribute to governance and economic performance, and when informal and formal organizations constitute an obstacle. (Formerly *Network and Organization Theory Approaches to the Study of Capitalism*.) Enrollment restricted to graduate students. Enrollment limited to 15. *R. Schoenman*

291. Teaching Assistant Seminar (2 credits). *

Two-hour weekly seminar required of teaching assistants in which pedagogic and substantive issues will be considered. The experience of performing teaching assistant duties constitutes subject matter for discussion. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

293. Field Study. F,W,S

Individual study undertaken off campus with direct faculty supervision. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

295A. Research Colloquium (2 credits). *

Weekly venue for Ph.D. students to present current research, exchange information on sources and resources, discuss and critique epistemologies and methods, and to formulate topics for QE field statements and the dissertation. There are no assigned readings. May be repeated for credit twice. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *The Staff*

295B. Advanced Research Seminar. *

Weekly seminar for Ph.D. students in which to develop and write extended research papers on selected topics, to present current work, to discuss methods, data sources, and fieldwork, and to receive critiques and assessments from fellow students. May be repeated for credit twice. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

A student approaches a member of *The Staff* and proposes to take a course 297 on a subject he or she has chosen that is not covered in other politics graduate courses or plans a graduate independent study that includes an undergraduate course. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Enrollment restricted to graduate students and permission of instructor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Porter College

College Office
(831) 459-2071
<http://www2.ucsc.edu/porter>

For college description and list of faculty, see page 96.

Lower-Division Courses

12. The ArtsBridge Experience (2 credits). *

Weekly meetings on pedagogy in the arts, lesson planning for arts teaching in schools, and submission of teaching portfolio core of this class. Prerequisite(s): permission of instructor; student must be an ArtsBridge scholar. May be repeated for credit. *M. Foley*

14. Jazz Vocal Ensemble (2 credits). *

Study of vocal techniques in the context of ensemble rehearsals, often culminating in public performance. Familiarity with musical notation recommended. Admission by audition. May be repeated for credit. (General Education Code(s): A.) *The Staff*

19. Chicana/Latina Identity (2 credits). *

An exploration of Chicana/Latina identity within the context of developmental theories and heterogenous cultural influences on identity formation, including the acculturation process. Students explore their own identities within the previously stated context. Enrollment limited to 20. *The Staff*

20. Dance/Theater Practicum.

The practice of dance/theater in a particular world area (i.e., Philippines, Mexico, U.S.). Students learn the dance or theater art of one world area and study the associated cultural background. *The Staff*

20A. Filipino Dance Practicum (2 credits). *

Students are introduced to the different folk dances of the Philippine Islands. Folk dances of the tribal mountain region, of the Spanish Era in the Philippines (Maria Clara Era), and dances of the regional and rural countryside are emphasized. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *W. Manuntag*

20C. Korean Dance Practicum (2 credits). *

Students are introduced to the different dances of Korea related to folk tradition. Movement concepts of music

and the relation to culture are explored through demonstration, practice, and performance. Enrollment limited to 15. Offered in alternate academic years. (General Education Code(s): A.) *The Staff*

20D. Dance Improvisation (2 credits).*

Dance practicum emphasizing spontaneous movement in response to diverse media including visual art and music. Special emphasis given to the conceptual approaches taken by American artists such as Merce Cunningham, John Cage, and Robert Rauschenberg. Enrollment limited to 25. (General Education Code(s): A.) *The Staff*

21. Music Practicum.

21A. Korean Music and Culture (2 credits). †

Introduction to the farmers band tradition. Theory and practice of drumming are emphasized, resulting in a group performance. Enrollment limited to 20. Offered in alternate academic years. (General Education Code(s): A.) *The Staff*

21C. Gospel Choir (2 credits). W,S

Instruction in vocal performance in the tradition of gospel choirs. Music is transmitted aurally rather than by notation. The ensemble prepares a range of traditional and contemporary gospel music for performance. Ensemble performs publicly at least once each quarter. Enrollment limited to 60. May be repeated for credit. (General Education Code(s): PR-C, A.) *V. Fiddmont*

22. Art Practicum (2 credits). W

The practice of art in a particular world area (i.e., Japan, Pacific Islands, U.S.). Explores the art and craft of one world area and studies the associated cultural background. Enrollment limited to 15. (General Education Code(s): A.) *The Staff*

22A. Day of the Dead (2 credits). F

Day of the Dead: Creating an Exhibition—an exploration of art created to celebrate death in Mexican, Chicano, and American culture. Culminates in the creation of a Day of the Dead ceremony and community altar including students' individual art pieces. Enrollment restricted to college members. Enrollment limited to 25. (General Education Code(s): A.) *E. Sanchez*

22E. Vietnamese Festivals (2 credits).*

Vietnamese festivals and the arts they generate, from carving to water puppetry, will be explored for cultural, aesthetic, and iconographic principles, through viewing, discussion and a creative project. Enrollment limited to 20. (General Education Code(s): A.) *The Staff*

22G. Literary Magazine Publishing (3 credits).*

Learn about and practice basics in publishing a national literary magazine with focus on poetry and the arts. Three-part focus: soliciting/editing, design/publishing, and publicizing/distributing. Students decide which poems published and awarded prizes in the "Viz. 25 and Under Awards" section. Audition for admission at first class with demonstrated experience in related field: creative writing, desk top publishing, art, graphic design, business, etc. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): A.) *R. Hamilton*

23. Film/Theater Practicum.

The practice of film/theater from the perspective of a particular culture, genre, or technical approach. *The Staff*

23A. Film Practicum: Talking in Pictures (2 credits).*

Introductory survey of the language of film and television. Considers the roles these media play in the shaping of cultural identity. Creative projects in the conceptual preparation for the making of films and videos. Enrollment limited to 25. (General Education Code(s): A.) *The Staff*

ment limited to 25. (General Education Code(s): A.) *The Staff*

23B. Personal Narratives in Theater and Film (2 credits). S

Considers filmmakers and monologue performers as they come to terms with their identity in autobiographical works. Students write responses to texts and create their own brief personal narratives. Enrollment limited to 25. (General Education Code(s): PR-C, A.) *R. Giges*

23C. Documentary/Mockumentary Films (2 credits).*

The mockumentary grows out of the documentary tradition, but instead of pretending to truthfully capture reality, it blatantly distorts, revealing the subjectivity inherent in cinematic representation. Includes ethnographic, music, political and Hollywood mockumentaries, and critical readings on documentary film. Enrollment limited to 25. (General Education Code(s): A.) *R. Giges*

28. Sound Art (2 credits). S

Several composers and performers of contemporary "art music" discuss the processes by which works are conceived in imagination, transcribed in notation, and realized in sound. After a brief introduction to contemporary music aesthetics, students attend a series of related presentations, seminars, and concerts. Enrollment restricted to college members. Enrollment limited to 18. (General Education Code(s): A.) *The Staff*

32A. Queering the Arts (2 credits). S

Exploration of the arts as a way to understand and experience how queerness has been expressed, repressed, denigrated, and celebrated in visual arts, music, film, poetry, and dance. Enrollment restricted to college members. Enrollment limited to 30. (General Education Code(s): A.) *The Staff*

33. Seminar in Arts (2 credits). W

Theoretical and historical aspects of the arts from one culture or world area are explored through seminar discussion, library research, and film/video presentations. Enrollment limited to 20. (General Education Code(s): A.) *The Staff*

33A. African Global Art and Music (2 credits).*

The theme of "Changing the Global Community Through the Arts" explored in African global art and music through readings, listening sessions, and interactions with academics and performers. Culmination will be the African Global Festival and Symposium in April. Enrollment limited to 25. (General Education Code(s): A.) *E. Cameron*

34B. Fractals, Chaos Theory, and the Arts (2 credits). S

A consideration of chaos theory and fractal geometry as applied by 20th-century artists in all media. All necessary math and computer skills are covered. Students complete essays or art projects. Enrollment restricted to college members. Enrollment limited to 25. (General Education Code(s): A.) *R. Abraham*

35. Experiencing Live Performance (2 credits).*

Students' attendance at live regional theater performances informed by artists' talks, class lectures, and readings. Students participate in informal performance workshops and write short critical essays. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): A.) *The Staff*

38. Working in . . . Series.

Writers, directors, technical workers, visual artists, and professionals in a diverse range of media discuss current work, paths that led to their creative endeavors, and constraints to working in the industry. *The Staff*

38B. Working in TV and Film (2 credits). W

Writers, directors, and technical workers in areas of TV and film discuss current work, paths that led to their creative endeavors, and constraints of working in the industry. Students research aspects of film and TV professional work. Cannot be repeated for credit. (General Education Code(s): A.) *L. Steck*

39. Jewish Personal Narratives on Film (2 credits). S

Considers Jewish-American filmmakers as they come to terms with their identity in autobiographical works. Students write responses to texts and create their own brief personal narratives. Enrollment restricted to college members. Enrollment limited to 25. (General Education Code(s): PR-C, A.) *R. Giges*

80A. Introduction to University Discourse: Writing Across the Arts. F

Explores rhetorical principles and conventions of university discourse, providing intensive practice in analytical writing, critical reading, and speaking. Study, discuss, and write about social, political, and aesthetic issues raised by selected works of literature and art in a variety of media. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. (General Education Code(s): T4-Humanities and Arts, C1.) *The Staff*

80B. Rhetoric and Inquiry: Writing Across the Arts. F

Explores the intersections between rhetoric (persuasion) and inquiry (investigation) and hones strategies for effective reading, writing, speaking, and research. Read, discuss, research, and write about social, political, and aesthetic issues raised by selected works of literature and art in a variety of media. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. (General Education Code(s): T4-Humanities and Arts, C2.) *The Staff*

80E. Arts Education in the Community. W

Organized in small teams, participants engage with students from public elementary classrooms to develop fully-staged group performance projects by end of term. Students are guided by instructor's models of teaching techniques, designed to stimulate the imagination, and by diverse readings. Enrollment restricted to college members. Enrollment limited to 30. (General Education Code(s): T4-Humanities and Arts, A.) *T. Beal*

80G. Making Poetry: Readings/Writing (2 credits).*

Guest poets read work and discuss their approaches to writing. Students develop their own poems and the class culminates in a poetry reading of student work. Enrollment limited to 25. (General Education Code(s): A.) *The Staff*

80K. Ways of Knowing. W

Creativity in different disciplines is developed via different ways of knowing. Musical, visual, scientific, and spatial literacy demand understanding which is not primarily logocentric. Explores how practitioners of arts and science develop their work and conceptualize its execution. Enrollment restricted to college members. (General Education Code(s): T6-Natural Sciences or Humanities and Arts.) *J. Todd*

80L. Documenting Oral History. F

Students learn basic techniques of interview and camera work to document on film oral histories collected from community elders. Students develop their skills in writ-

ing, theater, visual art, music, or film to reinterpret oral histories as artwork. Enrollment limited to 30. (General Education Code(s): T5-Humanities and Arts or Social Sciences, A.) *T. Beal*

80W. Writing Across the Arts. *

Explores the intersections between rhetoric (persuasion) and inquiry (investigation) and hones strategies for effective reading, writing, speaking, and research. Students read, discuss, research, and write about social, political, and aesthetic issues raised by selected works of literature and art in a variety of media. Prerequisite(s): satisfaction of the Entry Level Writing Requirement, and C1 and C2 requirements. Enrollment restricted to college members. Enrollment limited to 22. (General Education Code(s): T4-Humanities and Arts, W.) *The Staff*

83. Pacific Rim Film Festival: Viewing Across Cultures (2 credits). F

Involves viewing Asian and Pacific films at the annual Pacific Rim Film Festival, participating in post-screening discussions with area experts, and writing on the issues of cross-cultural viewing/reading of film. Enrollment restricted to college members. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): A.) *M. Foley*

99. Tutorial.

Various topics to be arranged. Students submit petition to sponsoring agency. *The Staff*

99F. Tutorial (2 credits).

Various topics to be arranged. Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

120. Advanced Dance/Theater Practicum (2 credits). *

The practice of dance/theater in a particular world area or culture. Students learn the art of one world area or era and the associated cultural background. Prerequisite(s): audition; prior training in the discipline is required. Enrollment limited to 15. May be repeated for credit. (General Education Code(s): A.) *The Staff*

121. Advanced Music Practicum (2 credits).

The practice of music in a particular area of the world at an advanced level. Students learn the music of one world area or culture over the quarter and study the associated cultural background. Enrollment limited. May be repeated for credit. (General Education Code(s): A.) *The Staff*

121C. Opera Workshop/Music Practicum (2 credits). F

Rehearsal of the principal vocal parts of an opera in preparation for a full production. Consideration of the dramatic aspects of each role and the interrelationships of the characters. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *N. Paiement*

126. South Asia Seminar (2 credits). *

South Asian issues in arts, technology, culture, and history will be presented in weekly seminar. Students will attend lectures, read supplementary articles, and write a short paper on a South Asian topic. Enrollment limited to 15. *M. Foley*

141. New Works Research Laboratory. *

Artists from different disciplines (i.e., art and music, design and creative writing, performance art and dance, etc.) collaborate with students to research and create new pieces. Students are involved in phases of the development from the conception to presentation of the work.

Enrollment limited to 20. May be repeated for credit. *The Staff*

180. Writing Across the Arts: Pedagogical Practicum. F

Advanced undergraduates selected for this course lead small group sections that explore social, political, and aesthetic issues raised by selected works of art in a variety of media. Participants also tutor first-year students in writing about these arts texts. Apply and interview for this course in the spring. Enrollment limited to 25. (General Education Code(s): IM.) *R. Giges*

194. Group Tutorial.

A program of independent study arranged between a group of students and a faculty instructor. *The Staff*

199F. Tutorial (2 credits).

Individual projects carried out under the supervision of a Porter faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Portuguese

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Lecturer

ANA MARIA C. SEARA
Portuguese language; literature, film, and music of Brazil and the Portuguese-speaking world; acquisition and teaching of foreign, second, and heritage languages

Program Description

Students interested in acquiring proficiency in Portuguese may choose to enroll in either of two accelerated introductory tracks: courses 1A–B are designed as a two-quarter sequence for students who have no previous experience with the Romance languages; courses 60A–B are a two-quarter sequence designed for students who have a strong background in the Romance languages (typically Spanish) or some previous rudimentary knowledge of Portuguese. Both sequences are accelerated. A second-year Portuguese sequence, also accelerated, courses 65A–B, follows the first-year sequence, and is offered over two quarters. The completion of this sequence fulfills the two-year language requirement for study abroad programs.

The program is aimed at enabling students to gain proficiency in listening comprehension, speaking, reading, and writing. Instruction takes place in Portuguese from the beginning and draws heavily on Brazilian culture through popular music and cinema.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

Students may apply to spend time either in Rio de Janeiro, Brazil or in Salvador (Bahia) through the UC Education Abroad Program (EAP). Courses taken abroad can, with approval of an adviser, be applied

to major requirements. For more information on the program, see UC Education Abroad Program. For information on credit applied to a major, contact the appropriate department.

Lower-Division Courses

1A. Intensive Elementary Portuguese. F

Intensive instruction in elementary Portuguese, emphasizing oral proficiency as well as reading and writing skills. Taken together, courses 1A and 1B are equivalent to first-year instruction. Enrollment limited to 25. *The Staff*

1B. Intensive Elementary Portuguese. W

Sequential to course 1A, completes first-year accelerated instruction. Intensive instruction in elementary Portuguese, emphasizing oral proficiency as well as reading and writing skills. Taken together, courses 1A and 1B are equivalent to first-year instruction. Prerequisite(s): course 1A. Enrollment limited to 25. *The Staff*

60A. Advanced Beginning and Intermediate Portuguese. F

This sequence is designed for students with an equivalent of four quarters of college level study of Spanish, French, Italian, or Catalan or for native speakers of these Romance languages (including heritage speakers of Portuguese). Prepares students in all language skills. Prerequisite(s): Spanish 4 or Spanish for Spanish Speakers 64 or French 4 or Italian 4 or Spanish Placement Examination score of 50. *The Staff*

60B. Advanced Beginning and Intermediate Portuguese. W

Sequential to course 60A, completes first-year accelerated instruction of Portuguese for speakers of Spanish and other Romance languages. This sequence is designed for students with an equivalent of four quarters of college level study of Spanish, French, Italian, or Catalan or for native speakers of these Romance languages (including heritage speakers of Portuguese). Prepares students in all language skills. Prerequisite(s): course 60A or placement by examination. (General Education Code(s): IH.) *The Staff*

65A. Intermediate Portuguese. S

A systematic grammar review is combined with literacy and cultural readings, while communicative exercises focus on improving students' ability to understand and hold sustained conversations. Students expand their vocabulary and knowledge of Brazil and other Portuguese-speaking cultures through films, popular music, and other cultural authentic materials. Prerequisite(s): course 1B or 60B, or by instructor approval. (General Education Code(s): CC, IH.) *The Staff*

65B. Intermediate Portuguese. F

Sequential to course 65A, completes second-year accelerated instruction. A systematic grammar review is combined with literacy and cultural readings, while communicative exercises focus on improving students' ability to understand and hold sustained conversations. Students expand their vocabulary and knowledge of Brazil and other Portuguese-speaking cultures through films, popular music, and other cultural authentic materials. Prerequisite(s): course 65A or by instructor approval. (General Education Code(s): CC, IH.) *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Psychology

273 Social Sciences 2 Building

(831) 459-2002

<http://psych.ucsc.edu>

Faculty and Professional Interests

Professor

NAMEERA AKHTAR

Cognitive and social cognitive processes in early language development, social-cognitive development in infants

MARGARITA AZMITIA

How culture, peers, family, and schools provide a context for children's and adolescents' development. Special emphasis on how close relationships influence the educational pathways and identity development of ethnically and socioeconomically diverse populations

HEATHER E. BULLOCK

Poverty and economic inequality, welfare policy, feminist psychology, discrimination

MAUREEN A. CALLANAN

Cognitive and language development in the social context of family activities, development of word meanings and concepts, the construction of causal explanations in parent-child conversations

CATHERINE R. COOPER

Cultural perspectives on child and adolescent development; linkages among families, peers, schools, and work; issues of diversity, ethnicity, and gender in identity; research, practice, and policy in university outreach programs; linking qualitative and quantitative research

FAYE J. CROSBY

Gender, social identity, and social justice, especially affirmative action

JEAN FOX TREE

Psycholinguistics: production and comprehension of spontaneous speech, disfluencies and discourse markers in speech, gestures, the effects of communicative technologies on how people communicate

RAYMOND W. GIBBS JR.

Language, thought, and embodiment; special emphasis on metaphor, pragmatics, and cognitive science

CRAIG W. HANEY

Applications of social psychological principles to legal settings, assessment of the psychological effects of living and working in institutional environments, social contextual origins of violence, development of alternative legal and institutional forms

AIDA HURTADO

Social identity, feminist theory, social psychology of education, survey methodology

CAMPBELL LEAPER

Social construction and socialization of gender in childhood, adolescence, and adulthood; self-concept and social identity; language and social interaction; social relationships, gender bias and academic achievement; images of gender in the media; perceptions and consequences of sexism

ANTHONY R. PRATKANIS

Social influence; attitude structure, function, and change

BARBARA ROGOFF

Human development in sociocultural activity; informal and formal arrangements for learning; adult/child and peer communication in families and schools in diverse cultural communities (especially in Guatemala Mexico and the U.S.); learning through observation and collaboration

AVRIL THORNE

Personality development in adolescence and young adulthood, especially in the context of conversations with family members and friends; autobiographical memories; storytelling and the development of a sense of self; the affordances of introverted and extraverted friends

EILEEN L. ZURBRIGGEN

Connections between power and sex; sexual aggression and abuse; trauma; sexual decision-making; sexuality and media, the sexualization of girls and women; authoritarianism; feminist political psychology; motivation, especially power and affiliation-intimacy motives

Associate Professor

ALAN H. KAWAMOTO

Empirical and computer simulation approaches to the study of perceptual and cognitive processes, reading, speech production

REGINA D. LANGHOUT

School-community-university collaboration; how schooling and neighborhood experiences are informed by social class, race, and gender; participatory action research

TRAVIS L. SEYMOUR

Role of immediate memory, consciousness, and executive control on the human performance of laboratory and applied tasks; cognitive processes amenable to strategic control and how they influence the way in which we maintain situational awareness; high levels of performance in complex and cognitive tasks

SU-HUA WANG

Cognitive development, infant cognition, mental representations, theory of mind, how experience shapes early learning, parental child-rearing beliefs, cross-cultural perspectives on children's learning

AARONETTE WHITE

Adult feminist-identity development; personality correlates of feminist activism; feminist masculinities studies; feminist perspectives on peace and violence; narrative psychology and adult personality change; Black feminist political psychology in the U.S. and abroad; critical psychology

MARGARET L. WILSON

Embodied cognition, broadly defined. Specific interests include person perception, imitation, visual cognition, working memory, sign language, and the evolution of cognition

Assistant Professor

SHELLY A. GRABE

Sexual objectification of women and women's bodies as a pervasive global phenomenon played out in different ways across different cultures; how "embodied oppression" affects women's psychological well-being and empowerment

PHILLIP L. HAMMACK

Cultural psychology, culture and identity, conflict and intergroup relations, political violence, political psychology, narrative, sexual identity

Lecturer

DAVID A. "TONY" HOFFMAN

Child and adolescent development, developmental psychopathology, child and adolescent assessment, school psychology, pediatric psychology, children and war, children in high risk situations

RALPH H. QUINN

Clinical psychology, moral development, psychology and religion, existential-humanistic psychology

DONALD T. SAPOSNEK

Childhood psychopathology, special needs children, parenting and family interactions, socialization of children, children and divorce, family mediation, conflict resolution

VERONICA K. TONAY

Clinical psychology, psychotherapy outcome, community mental health, dreams, personal narratives, creativity

Emeriti

ELLIOT ARONSON, Emeritus

BRUCE BRIDGEMAN, Emeritus

MARTIN M. CHEMERS, Emeritus

G. WILLIAM DOMHOFF, Emeritus

PER F. GJERDE, Emeritus

DAVID M. HARRINGTON, Emeritus

MICHAEL KAHN, Emeritus

PAVEL MACHOTKA, Emeritus

DOMINIC W. MASSARO, Emeritus

MELANIE J. MAYER, Emeritus

BARRY McLAUGHLIN, Emeritus

THOMAS F. PETTIGREW, Emeritus

M. BREWSTER SMITH, Emeritus



DANE ARCHER, Professor Emeritus, Sociology

SRI KURNIAWAN, Assistant Professor, School of Engineering

Human-computer interaction; human factors and ergonomics; accessibility; assistive technology; usability; empirical studies; user-centered design

JEROME NEU, Professor, Humanities

Philosophy of mind, emotions and culture, philosophy of law, psychoanalytic theory

ROLAND G. THARP, Professor Emeritus, Education and Psychology

Program Description

Psychology majors at UCSC are introduced to theory and scientific research in the field. Students begin with lower-division courses that include introductory psychology, precalculus, statistics, and introduction to developmental psychology. Majors take a total of nine upper-division courses. These include Psychology 100, *Research Methods in Psychology*; seven courses in the four areas of psychology—developmental, cognitive, social, and personality psychology; and one upper-division course outside the major from an approved list.

Cognitive psychology focuses on topics such as perception; brain and behavior; motor control; learning and memory; thinking, feeling, and emotions; psycholinguistics; and computational modeling. Our cognitive psychologists extend traditional boundaries in the study of cognition to encompass bodies, physical environments, sociocultural contexts, and information technologies. Social psychology addresses topics such as persuasion and influence, motivation, group processes, intergroup relations, psychology and law, and social justice. Developmental psychology is concerned with processes of cognitive, language, social, emotional, and personality development across the life span.

Additionally, both developmental and social psychology are concerned with issues of diversity including ethnicity, culture, gender, income, and family structure. Personality psychology focuses on person-centered processes including creativity, attachment, depression, and life stories.

In addition to the general psychology major, an intensive major and a minor (described below) are also available. (Students primarily interested in clinical and counseling psychology should realize that training in these areas does not occur at the undergraduate level but requires professional training through an advanced degree. UCSC does not offer advanced degrees in clinical psychology or counseling.)

Students are encouraged to carry out research projects. Interested psychology majors will find research opportunities in courses, as research assistants in faculty members' research programs, or through faculty-sponsored independent study. This research may be carried out in specialized research laboratories or in the field. Students usually join an ongoing project in which a faculty member is engaged. Students who are especially interested in a career involving empirical research should become involved in a professor's ongoing research by their junior year. Some recent research topics include "Making Decisions," "How Do You Organize Your World?" "I'm Every Woman: A Look at Female Perspectives," "Family Story Telling," and "Friendship and the College Transition."

Preparation for the Major

Students interested in pursuing the psychology major should complete Psychology 1, 2, and the precalculus mathematics requirement. After completing these three lower-division required courses, students may then declare the psychology major.

High school students considering psychology as their university major find that the best preparation is a solid general education in English, mathematics through precalculus, natural sciences, social sciences, and writing.

Transfer Students

Junior transfer students should express an interest in psychology on their UCSC application for admission.

It is expected that prospective transfer students will have completed most, if not all, of the lower-division requirements. The psychology faculty recommends that all lower-division requirements be completed by the end of the sophomore year.

Several measures are taken to control over enrollment in the psychology major. At the time of transfer, students must have a 3.0 or higher grade-point average in all UC-transferable course work, with at least a 3.1 in all psychology courses. Junior-level students with 120+ quarter credits will not be admitted into the pre-major. This occasionally affects transfer students who have many credits on their records. It can also affect students who want to change their major in mid-junior year. Senior-level students with 135+ quarter credits will not be admitted into the major. This affects seniors who want to add a minor or double major in psychology (it does not affect those who have already declared a pre-psychology major). Students who want to fulfill requirements with courses taken at other colleges must petition for the substitution of their transfer courses at an orientation session or at an appointment with the department adviser. Students planning to transfer to UCSC should check with the advising office of their present college, or refer to www.assist.org.

Transfer students are strongly encouraged to speak with an academic adviser at the Psychology Department

office prior to enrolling in classes in order to determine their status and begin the actual declaration of major process.

General Psychology Major

Thirteen courses are required for the general major: four lower-division courses in preparation for the major and nine upper-division courses. The lower-division courses are prerequisites for virtually all of the upper-division courses and should be completed as early as possible, or by the end of the sophomore year. Some upper-division courses have additional prerequisites. Once Psychology 1, 2, and mathematics required lower-division courses have been completed, a student may petition to declare the psychology major.

Lower-Division Requirements

Psychology

- 1 *Introduction to Psychology* (or equivalent)
- 2 *Introduction to Psychological Statistics* (or equivalent)
- 10 *Introduction to Developmental Psychology*

Mathematics 3 Precalculus (or equivalent)

Psychology 20, 40, and 60 are strongly recommended.

Upper-Division Requirements

Students must complete at least nine upper-division courses (a minimum of 47 credits), including appropriate substitutions noted below. The courses include Psychology 100, *Research Methods in Psychology*; two courses from each of any three of the following subfields, one course from the remaining subfield; and one course from outside the major.

Psychology 100, *Research Methods in Psychology*

Developmental (courses numbered 101-119)

Cognitive (courses numbered 120-139)

Social (courses numbered 140-159)

Personality (courses numbered 160-179)

Upper-division courses and their catalog descriptions are grouped within each of the subfields. At least one upper-division seminar course must be completed; these courses are identified within their catalog description by the phrase "satisfies seminar requirement." No more than two psychology courses numbered 193, 194, and 195 may be used toward the upper-division requirements; however, these 190 series courses cannot be substituted for 101-179 courses in the same subfield as each other, or in a subfield in which the student has not taken a course in the 101-179 series. The ninth upper-division requirement must be a five-unit UCSC course outside of psychology chosen from a list of courses approved by the subfield in which students may have taken only one upper-division course. If students have taken two upper-division psychology courses in each of the four subfields, their required outside course can be chosen from a list approved by any of the four subfields. These lists of approved non-psychology courses are posted on the Psychology Department web site. At least seven of the nine courses must be taken through the psychology program at UCSC, not transferred from elsewhere; this requirement occasionally affects the plans of transfer students arriving at UCSC with many psychology courses on their transcript. An exception will be made so that students can receive credit for up to three preapproved EAP courses toward their upper-division major requirements. Students requesting this exception would be required to take at least six of their nine upper-division courses through the psychology program at UCSC. After all substitutions have been made, students must satisfy the fundamental require-

ment that they take at least one upper-division UCSC psychology course from each of the four subfields.

The Psychology Department recommends that students take substantive courses in related disciplines such as anthropology, biology, community studies, computer science, education, linguistics, philosophy, and sociology.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) requirement. The DC requirement in psychology is satisfied by completing Psychology 100, *Research Methods in Psychology*, and one of the following psychology courses: 110, 119E, 119F, 119H, 119M, 139G, 139H, 140G, or 159H.

Program Planning Notes

Because some upper-division courses have additional prerequisites, students should read the descriptions of the upper-division courses carefully, noting the prerequisites for courses of interest to them.

Psychology Major Planners

Following are two recommended academic plans for students to complete during their first two years as preparation for the psychology major. Plan One is a suggested guideline for students who are committed to the major early in their academic career. Plan Two is for students who are considering the major or who need more preparation. Students should note that Mathematics 3 is a requirement for the major and a prerequisite for Psychology 2. Courses 20, 40, and 60 are recommended electives and are prerequisites for some upper-division psychology courses.

Plan One

| Year | Fall | Winter | Spring |
|------------|------------------|--|--------------------------|
| 1st (frsh) | MATH 3 PSYC 1 | PSYC 2 | PSYC 10 |
| 2nd (soph) | PSYC 100 | PSYC 40 (recommended) (Begin upper-division course-work) | PSYC 60 (recommended) |

Plan Two

| Year | Fall | Winter | Spring |
|------------|---------|-------------------------|--------------------------|
| 1st (frsh) | MATH 3 | PSYC 1 (recommended) | PSYC 10 (recommended) |
| 2nd (soph) | PSYC 40 | PSYC 2 | PSYC 100 PSYC 60 |

The Intensive Psychology Major

The intensive major is an option that any psychology major may choose to undertake. The intensive major would be advantageous for a student intending to go on to a graduate program in any area of psychology. Students intending to take the intensive major should declare this on their proposed study plan during the junior year, outlining their plan for completing the requirements. The intensive major requires 18 courses.

Requirements for the Intensive Major

Lower-Division Requirements

Psychology 1 *Introduction to Psychology* (or equivalent)

Psychology 2 *Introduction to Psychological Statistics* (or equivalent)

Psychology 10 *Introduction to Developmental Psychology*
Mathematics 3 *Precalculus* (or equivalent)

Once Psychology 1, 2, and mathematics required lower-division courses have been completed, a student may petition to declare the psychology major.

Upper-Division Requirements

Fourteen upper-division courses are required for the intensive major. These courses must include Psychology 100 and two courses from each of the following four subfields, one of which must be a seminar:

Developmental (courses numbered 101–119)

Cognitive (courses numbered 120–139)

Social (courses numbered 140–159)

Personality (courses numbered 160–179)

Psychology 181, *Psychological Data Analysis*, or an equivalent course approved by the department

Two quarters of Psychology 194, *Advanced Research* or 195, *Senior Thesis*

Two upper-division courses from one or more related areas outside of psychology from lists of courses pre-approved by the Psychology Department and posted on the department's web site, <http://psych.ucsc.edu>. These two courses will not count toward the nine upper-division requirements listed above. (These courses may not include psychology courses cross-listed with other programs or taught by psychology faculty.) These courses also cannot be counted twice in cases of double majors or minors.

Minor in Psychology

To obtain a minor in psychology, a student must complete the following courses:

- Psychology 1 (or equivalent), 2 (or equivalent), and 10
- Mathematics 3 (or equivalent)
- six (32 units) upper-division courses in psychology. These courses must be from Psychology 100 and at least two of the four subfields: developmental, cognitive, social, and personality.

Once Psychology 1, 2, and mathematics required lower-division courses have been completed, a student may petition to declare the minor in psychology.

No more than one psychology course numbered 191–199 may be used toward the upper-division requirements. At least three of the upper-division psychology courses (101–199 range) must be taken through the psychology program at UCSC, not transferred from elsewhere; this requirement occasionally affects the plans of transfer students arriving at UCSC with many psychology courses on their transcript.

Comprehensive Requirement

UCSC requires that every student satisfy a senior exit/comprehensive requirement prior to graduation. Psychology students will satisfy this requirement by receiving a passing grade in one of our seminars. Passing a seminar course is also required for the major. Courses that meet this requirement are designated as seminars in the campus catalog as “satisfies seminar requirement.”

Academic Advising

Students are encouraged to approach faculty in their area of interest for further advising no later than the first quarter of their junior year to discuss an upper-division program of study and to plan for graduate training in psychology. As a supplement to academic advising offered by faculty members, the Psychology

Department has an advising office located at 273 Social Sciences 2 Building, (831) 459-2002. The adviser assists students in obtaining information regarding major requirements and petitions, course planning, substitution of transfer courses for advance enrollment, careers, and graduate schools. Students can also get advice about the Graduate Record Examination and assistance in initiating a senior thesis and independent studies. Students are encouraged to take advantage of the advising office throughout their college career.

Disqualification from the Major/Minor

Students who receive a No Pass, D, and/or F twice in any one of courses Psychology 1, 2, 10, or Mathematics 3 (or equivalent), or who receive a No Pass, D, and/or F in three or more of these courses combined, will be considered to be not making normal progress in the major or minor and will be subject to disqualification from the major or minor. Students who feel that there were extenuating circumstances surrounding their failure of a course for the second time or their failure in three courses may appeal their disqualification from the major or minor and/or later petition the department for reinstatement. For further information regarding the disqualification process, contact the Psychology Department office.

Senior Thesis

Students with adequate substantive and methodological preparation and a consistent record of strong academic performance may be eligible to apply to write a senior thesis. Students should initiate plans for a thesis no later than the first quarter of their senior year. Most faculty prefer to sponsor senior theses that are integrated with faculty research, so students are encouraged to talk with faculty before choosing a senior thesis topic. Information and applications are available in the department office, 273 Social Sciences 2.

Honors

Honors in the psychology major are awarded to graduating seniors whose academic performance is judged to be consistently excellent by a committee of psychology faculty. Highest honors in the major are reserved for students with consistently excellent academic performance and an honors-level senior thesis.

Psychology Field-Study Program

The Psychology Field-Study Program provides qualified students an opportunity to apply classroom learning to direct experience in a community agency. Each year about 200 students develop new skills and clarify personal and professional goals by working as interns in schools, corporations, law enforcement agencies, research organizations, mental health services, and other social service agencies where they are supervised by professionals. Psychology faculty members sponsor the students' field study helping them to integrate their field experience with course work and guiding them in related academic projects.

The two-quarter program is open to junior and senior psychology majors who must apply at least one quarter in advance. There are information meetings and individual meetings to help students develop a learning plan, select a placement, and choose an academic project. Application information is included in the information meetings.

Graduate Program

The psychology program offers three areas of specialization leading to the doctoral degree: cognitive, developmental, and social psychology. The program does not offer courses, training, or supervision in clinical psychology. The program prepares students for research, teaching, and administrative positions in colleges and universities as well as for positions in schools, government, and other public and private institutions. Each student is primarily associated with one of the three research areas and participates in the courses and research forums sponsored by the faculty in that area. The program requires full-time enrollment as a graduate student. Although applicants for a master's degree are not accepted, students in the doctor of philosophy (Ph.D.) program may obtain a master of science (M.S.) degree by fulfilling specific requirements.

Graduate work in cognitive psychology trains students in the traditional methods of experimental psychology while mastering contemporary knowledge of cognitive psychology. The cognitive faculty have specific expertise in psycholinguistics, memory, and perception. Research interests of the faculty include human information processing, cognitive and social processes in learning and memory, language and discourse comprehension, reading, speech perception and production, computer simulation and mathematical modeling of cognitive processes, spatial vision, and visual psychophysics.

Graduate work in developmental psychology is concerned with the integration of individual, interpersonal, and cultural processes of development. Our faculty study these developmental processes in diverse communities and institutions, including families, peer groups, schools, museums, and close relationships. We use a mixture of quantitative and qualitative methods. This integrative training is supported by a National Institutes of Health (NIH) training grant that provides funding for graduate students and post-doctoral trainees. Some research interests of the faculty include: learning by observing, overhearing, and participating; infants' and children's cognitive and language development; conversation, narrative, and memory sharing; academic achievement and career aspirations; family/peer/school links; gender development and discrimination; personality development; personal and social identities; intergroup relations; ethnicity, culture, and development; social policy and educational practice.

The social psychology graduate program at UCSC has a unique mission and focus. We use Kurt Lewin's model of “full-cycle” (theory-application-action) social psychology to study a broad range of topics related to social justice. Our students learn to apply psychological theories and data to the analysis and solution of a wide range of social problems. Knowledge gained in action-oriented research leads, in turn, to the development of new theory. We examine justice-related issues in different cultural, political, and policy contexts, through a variety of research methods. Our students are trained in laboratory, field, and survey methods; they are encouraged to attend to issues of race, class, sexuality, ethnicity, gender, and physical ableness; and, in addition to traditional social psychological approaches, are steeped in critical theoretical perspectives such as feminist theory. Our graduates go on to successful careers in academia as well as in community, government, and non-profit settings. Our approach to research and training, combined with the quality and competencies of our faculty, make our program among the nation's best for the psychological study of social justice issues. Current faculty research interests include educational access,

sexuality, poverty and economic justice, psychology and law, aggression and trauma, peace psychology, intergroup relations, social identity, social policy analysis, structural inequality, intersectionality, political psychology, institutional analysis, and feminisms.

Students in all three research areas acquire teaching experience as teaching assistants for a minimum of two courses during their graduate career.

Graduate students in psychology may obtain a notation on the psychology Ph.D. diploma indicating that they have specialized in feminist studies and/or Latino American and Latino Studies (LALS) if they meet requirements spelled out by a committee composed of psychology and feminist studies faculty, or psychology and LALS faculty.

Details on the policies for admission to graduate standing and requirements for the Ph.D. degree, as well as the online application can be found on the Division of Graduate Studies web site. The department's graduate program brochure, and faculty research are available on the department web site.

Students enrolled in the psychology graduate program will complete a first-year and second-year research project. All graduate students must enroll and participate in the colloquium series each quarter (Psychology 230 for cognitive, Psychology 242 for developmental, and Psychology 231 for social.) First-year students must take two courses in statistics (Psychology 204 and Psychology 214A) and a two-quarter proseminar sequence during fall and winter quarters. (Psychology 224A and 224B for cognitive, Psychology 244A and 244B for developmental, and Psychology 211A and 211B for social.) Each student is also required to serve as a teaching assistant for at least two courses during his or her graduate career (one of which must be Psychology 10 for developmental and Psychology 40 for social).

Additional requirements for the cognitive area include: three advanced cognitive graduate courses, a graduate course in developmental psychology, a graduate course in social psychology, and a substantive advanced course in a discipline other than psychology.

Additional requirements for the developmental area include: Psychology 225A, Psychology 225B, Psychology 246, one other advanced developmental graduate seminar course, a graduate course in cognitive psychology, a graduate course in social psychology, and a substantive advanced course in a discipline other than psychology. Developmental graduate students are also required to complete a professional practicum between the end of their second year and end of their third year.

Additional requirements for the social area include: Psychology 210, Psychology 248, Psychology 249, one other advanced social graduate seminar, a graduate course in cognitive psychology, a graduate course in developmental psychology, and a substantive advanced course in a discipline other than psychology.

After satisfying the formal course and research requirements, psychology graduate students must take an oral examination to qualify as a candidate for the Ph.D., usually by the end of their third year. The qualifying examination is intended to assess a student's knowledge of psychology and competence to conduct the dissertation research. For the qualifying examination, students write a major paper that reflects a conceptual analysis of their main research area, prepare a list of readings representative of their expertise in three areas of psychology, and satisfactorily complete an oral qualifying examination.

Within two quarters of advancing to candidacy, students will prepare a written dissertation proposal that should demonstrate the student's in-depth knowledge of

some research topic, along with a detailed outline of the empirical research to be conducted for the dissertation. The student's dissertation committee reviews the proposal, and the student will orally defend the proposal for approval by the committee. After the final draft of the dissertation has been completed and submitted to the faculty committee members, students must defend their thesis in an oral exam. The Ph.D. degree is awarded upon successful completion and submission of the dissertation.

Lower-Division Courses

1. Introduction to Psychology. F,W,S

Introduces prospective majors to the scientific study of behavior and mental processes and also provides an overview for non-majors. Emphasizes social, cognitive, developmental, and personality psychology and their interrelations. (General Education Code(s): PE-H, IS.) (F) *T. Seymour*, (W) *The Staff*

2. Introduction to Psychological Statistics. W,S

An introduction to elementary statistical principles and techniques relevant to psychological research. Topics covered include basic parametric and nonparametric statistics, analysis of variance, and simple factorial designs. This course is prerequisite to course 181. Prerequisite(s): course 1 or 20, and Applied Mathematics and Statistics 3 or Mathematics 3 or 11A or satisfactory placement score on math placement exam or CEEB Advanced Placement Calculus AB exam. Enrollment limited to 165. (General Education Code(s): SR, Q.) *K. Cardilla*

10. Introduction to Developmental Psychology. F,W,S

Psychological development from birth to adolescence, with primary emphasis on infancy and childhood. A broad introduction to the field of developmental psychology. Prerequisite(s): course 1. Enrollment restricted to pre-psychology majors. (W) *M. Callanan*, (FS) *S. Wang*

20. Introduction to Cognitive Psychology. F

Introduces basic concepts in cognitive psychology. Topics include thinking, consciousness, perceiving, language, remembering, reasoning, problem solving, and decision-making. Enrollment limited to 120. *M. Wilson*

40. Introduction to Social Psychology. F

An analysis of contemporary research in social psychology and of what that research can teach us about the world we live in. Problems of conformity, propaganda, prejudice, attraction, and aggression. Focuses on a person's relationship with other people—how he or she influences them and is influenced by them. *A. Pratkanis*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division or graduate students under faculty supervision. (See course 192.) *The Staff*

60. Introduction to Personality Psychology. W,S

An overview of major personality theories from Freud to the modern day, and an introduction to contemporary personality research and assessment. Prerequisite(s): course 1. *P. Gjerde*

65. Introduction to Humanistic Psychology. S

Humanistic psychology is seen here as those contemporary aspects of the field which are explicitly directed toward life-enrichment for members of the culture. The course does not attempt a complete survey of these aspects, but rather explores some of them in depth and attempts to begin working toward an overall theory of the humanistic movement. (General Education Code(s): IS.) *R. Quinn*

80A. Psychology and Religion. F

Topics covered include myth and the unconscious, the varieties of religious experience, dualism, women and religion, the role of authority, transpersonal experience, conversion, disaffiliation, self and community. (General Education Code(s): T3-Social Sciences.) *R. Quinn*

Upper-Division Courses

100. Research Methods in Psychology (7 credits). F,W,S

An introduction to research methods used to investigate human psychology. Course emphasizes critical thinking, designing and conducting research, analyzing and interpreting data, and writing a professional research report. (Formerly course 3.) Prerequisite(s): Entry Level Writing and Composition requirements; course 2 or Applied Mathematics and Statistics 5. Enrollment restricted to prepsychology, psychology, and cognitive science majors; minors by permission of instructor. (FS) *F. Crosby*, (W) *N. Wilson*

Developmental

101. Topics in Developmental Psychology.

These topics, offered at different times by different instructors, examine selected topics in developmental psychology. (Formerly course 100.) *The Staff*

102. Adolescent Development: Adolescence into Young Adulthood. S

Focuses on individual and relational development from early adolescence into young adulthood. Emphasis on the mutual influences of family relationships and adolescent development, and on the interface of family, peer group, and school experience in cultural contexts. Prerequisite(s): courses 3 or 100 and course 10. *M. Azmitia*

103. Adult Development and Aging. F

An introduction to cultural, biological, interpersonal, and cognitive processes that influence adult development and aging. We discuss how each of these processes promotes stability and change during adulthood. (Formerly course 109.) Prerequisite(s): courses 3 or 100 and course 10. *M. Azmitia*

104. Development in Infancy. W

Focuses on psychological development in infancy. Presents research on perceptual, cognitive, and social-emotional development during the first two years of life. (Formerly course 101.) Prerequisite(s): courses 3 or 100 and 10. Enrollment restricted to psychology and cognitive science majors. *N. Akhtar*

105. Children's Thinking. S

Cognition in children from infancy through adolescence. Basic and current research on children's understanding of the social and physical world. Focus on major theoretical perspectives: Piaget's constructivist approach, information processing approach, and sociocultural approach. (Formerly course 117.) Prerequisite(s): courses 3 or 100 and 10. *N. Wilson*

106. Social and Emotional Development. W

An examination of contemporary theory and research on social and emotional development from infancy through childhood. Prerequisite(s): courses 3 or 100 and 10. *C. Leaper*

110. Culture and Human Development (6 credits). W

Examines theory, research, and methods of studying the inherent cultural basis of human development and variations and similarities in human lives and activities in different communities worldwide. The approach draws on

ideas and observations from psychology, anthropology, linguistics, sociology, and history. Course includes lab exercises using interview and observation methodologies and presentations of library research. (Formerly course 113.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and one of the following: course 3 or 100; Anthropology 1 or 2; Education 92A, 92B, or 92C; Latin American Studies 1; or Sociology 1. (General Education Code(s): W, E.) *B. Rogoff*

115. Lifespan Developmental Psychopathology. ES

Examines theory and research on developmental psychopathology. Emphasizes the origin and longitudinal course of disordered behavior. Explores the processes underlying continuity and change in patterns of adaptation and age-related changes in manifestations of disorders. Prerequisite(s): courses 3 or 100, 10, and 170. *K. Cardilla*

118. Special Topics in Developmental Psychology.

118A. Children and War. S

Examine development and behavioral ecology of children affected by war. Discuss development of displaced children, abandoned children, orphaned children, children living in protracted conflict, and child soldiers. Review child protection strategies and psychosocial intervention. (Formerly course 118.) Prerequisite(s): courses 3 or 100 and 10. *D. Hoffman*

118B. Children in Extreme Circumstances. W

Reviews child survival in life-threatening contexts. Examines the lives of street children, institutionalized children, orphans, children in extreme poverty, enslaved children, war-affected children, abandoned children, and children whose parents have HIV/AIDS and other life-threatening illnesses. Prerequisite(s): courses 3 or 100 and 10. Enrollment limited to 60. *D. Hoffman*

118C. Children's Understanding of the Human Mind. *

Reviews recent research on how children come to understand aspects of the human mind, such as desire, belief, goals, and intention. Also discusses the implications of this research on typically and atypically developing children. Prerequisite(s): courses 3 or 100, and 10. Enrollment restricted to psychology majors. Enrollment limited to 60. *S. Wang*

119. Senior Seminars in Developmental Psychology.

119A. Development as a Sociocultural Process. *

Examines theory and research in sociocultural approaches to how people (especially children) learn and develop through participating in activities of their communities with other people. Emphasizes the organization of social interactions and learning opportunities, especially in communities where schooling has not historically been prevalent. Satisfies seminar requirement. Satisfies senior comprehensive requirement. (Formerly course 100L.) Prerequisite(s): satisfaction of Entry Level Writing, Composition requirements; course 1, Anthropology 1 or 2, Education 92A, 92B, or 92C, Latin American and Latino Studies 1, or Sociology 1. Enrollment restricted to seniors or permission of instructor. Enrollment limited to 30. (General Education Code(s): W.) *B. Rogoff*

119B. Cultural Psychology. *

Critically analyzes relations among culture, ethnicity, identity, and the nation-state in a world characterized by globalization, migration, and social change. Exam-

ines the relevance of these features for the development of children and youth through examples from both Western and non-Western "cultures." Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology and anthropology majors. Enrollment limited to 30. (General Education Code(s): E.) *P. Gjerde*

119D. Cultural Perspectives on Adolescent Development. W

Examines cultural influences on adolescence from the perspective of current interdisciplinary theory and research, focusing on identity, changes from early adolescence to adulthood, linkages from family to community experiences, gender, immigration, biculturalism, and implications for social policy. Includes research practicum. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors or permission of instructor. Enrollment limited to 30. *C. Cooper*

119E. The World of Babies. F

Focuses on how infants learn about intuitive physics, naive psychology, and shared culture. Also discusses possible ways to facilitate this learning. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and course 3 or 100. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *S. Wang*

119F. Language Development. F

An introduction to language development in children. Explores current theory and research in language development; focuses on the preschool years. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and course 3 or 100. Enrollment restricted to senior psychology and cognitive science majors. Enrollment limited to 30. *N. Akhtar*

119G. Development of Thought and Language. *

Explores the dynamic interface between thought and language throughout development. Focuses on early expression and understanding of meaning in infants and young children and on analysis of everyday conversations and activities of children as a window on developing understandings of the world. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements. Enrollment restricted to senior psychology and cognitive science majors. Enrollment limited to 30. (General Education Code(s): W.) *M. Callanan*

119H. Developmental Psychology Research and "Real World" Problems. S

Explores ways that research in developmental psychology can be used to address "real-world" problems facing children. With an analytical focus on evidence and generalizability, we will investigate research-policy connections in topics of popular interest (e.g., child custody, poverty). Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 3 or 100. Enrollment restricted to senior psychology majors. Enrollment limited to 30. (General Education Code(s): W.) *M. Callanan*

119I. Special Topics in Narrative Development. *

Examines a special topic of current interest in developmental psychology centering on features of develop-

ment that unfold during free-flowing discourse, e.g., interviews, conversations, and reminiscences. Topics may include the development of self-narratives, personal memories, family stories, attachment, identity, or achievement. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors. Course 60 recommended. Enrollment limited to 30. *A. Thorne*

119M. Identity Development in Social and Cultural Contexts. F

Senior seminar that focuses on identity development in adolescence and young adulthood. Discusses theory and research on the development of personal and social identities and the sociocultural contexts in which these personal and social identities are negotiated. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements and course 3 or 100; course 102 strongly recommended. Enrollment restricted to senior psychology majors or by permission of instructor. Enrollment limited to 30. (General Education Code(s): W.) *M. Azmitia*

Cognitive

120. Visual and Spatial Cognition. W

Focuses on visual and spatial representation as elements of human cognition. Topics include imagery, visual attention, mental models, spatial language, the body schema, near-body space, and brain organization for representing space. Prerequisite(s): course 3 or 100; course 20 or any upper-division cognitive course is highly recommended. *M. Wilson*

120D. Deafness and Sign Language. S

Explores what we can learn about human cognition by studying sensory loss and language in a different sensory modality. Topics include brain organization, sensory compensation, working memory, visual cognition, and psycholinguistics. Course 20 strongly recommended. Satisfies seminar requirement. Satisfies senior comprehensive requirement. (Formerly 139A.) Prerequisite(s): course 20 or an upper-division cognitive course strongly recommended. Enrollment restricted to senior psychology and cognitive science majors and minors. Enrollment limited to 30. *M. Wilson*

121. Perception. S

Basic perceptual psychology, emphasizing the relationships between perception and cognition. Topics include shape, color, and depth; hearing, taste, smell, and touch; and perceiving faces, voices, and language. Prerequisite(s): course 3 or 100 or Biology 70. *M. Wilson*

123. Behavioral Neuroscience. W

An examination of the physiological mechanisms of psychological processes, including sensory systems, motor systems, control systems, and memory and learning. Principles of nervous system organization are discussed at each level. Prerequisite(s): course 3 or 100 or Biology 70 and one course in statistics (course 2 or Applied Mathematics and Statistics 5 or 7). *B. Bridgeman*

124. Psychology of Reading. S

Focuses on the cognitive processes that underlie reading in adults. Additional topics include different writing systems, learning to read, and reading deficits. Recommended for upper-division students. Prerequisite(s): course 3 or 100. *A. Kawamoto*

125. The Psychology of Language. F

A study of human communication as a function of psychological, linguistic, and social factors. Topics covered include language comprehension and production, lan-

guage and reasoning, and language as a social activity. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, and course 3 or 100. (General Education Code(s): W.) *N. Wilson*

126. Aging and the Human Brain. F

How does the brain change as we age? Course covers new developments in research on cognitive neuroscience and aging, with a focus on the consequences for memory, emotion, and decision-making. Prerequisite(s): course 3 or 100, and 20, 121, 123, 129 or Biology 70. *Q. Liu*

127. Computer Mediated Communication. *

Provides an introduction to perception and cognition as it relates to how people communicate with each other using computers and the Internet. Focuses on cognitive/perceptual aspects of communication. Prerequisite(s): course 3 or 100 or 20 or consent of instructor. Course 20 highly recommended. Enrollment limited to 40. *A. Kawamoto*

128. Human Factors. *

Human factors psychology studies human-machine interaction and computer usability, and involves diverse topics including displays and controls; human error; decision-making; psycholinguistics; and the role of fatigue, environmental stressors, and social/team factors that directly impact human performance. Prerequisite(s): course 3 or 100. *The Staff*

129. Human Learning and Memory. F

Examines basic theories, models, methods, and research findings in human memory. Both traditional and non-traditional topics are covered. Prerequisite(s): course 3 or 100. *J. Crowson*

130. Deception, Brain, and Behavior. *

Focuses on behavioral and brain manifestations of deception. Topics include developmental changes that allow us to understand and to use deception, physical implications of lying expressed in the face, voice, posture, and brain activity. Also covers mechanical or behavioral techniques used in deceptive behavior, whether in the form of overt behavior or brain activity. Prerequisite(s): course 3 or 100; course 20 or any upper-division cognitive course strongly recommended. *T. Seymour*

131. Human-Computer Interaction. W

Theory and hands-on practice to understand what makes user interfaces usable and accessible to diverse individuals. Covers human senses and memory and their design implications, requirement solicitation, user-centered design and prototyping techniques, and expert and user evaluations. Interdisciplinary course for social science and engineering majors. Students cannot receive credit for this course and Computer Engineering 231 or Psychology 223 or Digital Arts and New Media 231. (Also offered as Computer Engineering 131. Students cannot receive credit for both courses.) Prerequisite(s): course 3 or 100 or Computer Science 12B. *The Staff*

135. Feelings and Emotions. *

Focuses on contemporary research in the psychology of human emotions. Special attention given to work in cognitive science, including psychology, linguistics, philosophy, and anthropology, on how emotions are central to understanding human action and mental life. Prerequisite(s): course 3 or 100, or major standing in linguistics, philosophy or anthropology. *R. Gibbs*

137. Mind, Body, and World. *

Psychologists primarily view the mind as being separate from the body, and the body as being separate from the external world. This course questions this widely held position and explores the way that minds arise from individuals' bodily interactions with others and the world

around them. Particular attention is paid to the role of human embodiment in language use and everyday cognition. Prerequisite(s): course 3 or 100, or major standing in linguistics, philosophy or anthropology. *R. Gibbs*

139. Senior Seminars in Cognitive Psychology. F,W,S

139B. Consciousness. *

Provides a psychological study of human consciousness. Aim is to explore the following questions: What is consciousness? Where does consciousness come from? What functions does consciousness have in everyday cognition? How do we best scientifically study consciousness? These issues are examined from the perspective of contemporary research in cognitive science. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology, philosophy, anthropology, linguistics, and cognitive science majors. Enrollment limited to 30. *R. Gibbs*

139C. The Psychology of Lying and Deception. *

Discusses why and how people lie. Using scientific articles, movies, and our everyday lives as source material, explores the nature of lying; then focuses on various approaches to behavioral and mechanical "lie detection." Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to psychology and cognitive science majors. Enrollment limited to 30. *T. Seymour*

139D. Modeling Human Performance. W

Hands-on experience using computational modeling to understand human cognitive-task performance by comparing simulated and human data. Satisfies senior seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to junior and senior psychology, computer science, and computer engineering majors, or by permission of instructor. Prerequisite(s): at least one of the following: course 121 or 123 or 128 or 129; or Computer Science 5C or 5J or 11 or 12A or 13H or 130 or 140. Enrollment restricted to cognitive science majors. Enrollment limited to 30. *T. Seymour*

139E. Psychology and Evolutionary Theory. S

Human psychology is examined from the viewpoint of evolutionary theory, including perspectives from ethnology, anthropology, and neuropsychology. Upper-division students from diverse backgrounds are encouraged to enroll. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to junior and senior psychology, anthropology, biology, philosophy, sociology, cognitive science, and feminist studies majors or permission of instructor. Enrollment limited to 30. *B. Bridgeman*

139G. Conversations. *

Explores how conversations work and how speakers accomplish their goals in an interaction. Topics include conversational structure, turn-taking, variation in language use, and the functions of discourse markers (words like "um," "uh," and "you know"). Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and course 3 or 100. Enrollment restricted to senior psychology and cognitive science majors. Enrollment limited to 30. *J. Fox Tree*

139H. Weird Science. *

Explores the relationship between science and pseudoscience from a cognitive psychological perspective, including discussion of collection and selection of data,

statistical assessment of data, cognitive illusions, memory distortions, reasoning, and decision-making. Also highlights the dissemination of scientific knowledge. Satisfies seminar requirement. Satisfies comprehensive requirement. (Formerly course 134.) Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and course 3 or 100. Enrollment restricted to senior psychology and cognitive science majors. Enrollment limited to 30. *J. Fox Tree*

Social

140. Topics in Social Psychology.

140A. Women's Lives in Context: Community Practicum (2 credits). *

Provides link between course 140G and community organizations that work with women. Students complete internships with relevant agencies and participate in seminar meetings. Concurrent enrollment in course 140G required. Enrollment limited to 20. *H. Bullock*

140B. African American Psychology. W

Incorporates historical and conceptual foundations; issues of social psychology; individual and developmental processes; and adjustment and clinical issues. Readings expose students to attributes of African American culture that have an impact on the psychology of African Americans as well as methodological issues relevant to key psychological topics. Prerequisite(s): course 3 or 100 or declaration of major in one of the following programs: feminist studies, sociology, community studies, or politics. Enrollment limited to 60. (General Education Code(s): E.) *A. White*

140G. Women's Lives in Context. W

Examines gender as a psychological and social factor that influences women's experiences in different contexts. Cuts across other areas of psychology by taking a women-centered approach. Emphasis also placed on understanding how intersections between gender, race and ethnicity, sexual orientation, socioeconomic status, etc., impact women's psychological well-being. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and course 3 or 100, or sociology 103B, or feminist studies 100, or community studies 100. Enrollment restricted to junior and senior psychology, feminist studies, sociology, and community studies majors. (General Education Code(s): W.) *S. Grabe*

140L. Women's Bodies and Psychological Well-Being. *

Examines how women's bodily experiences (e.g., sexual objectification, violence, menarche, sexual health) are uniquely tied to their subordinate status and impacts their psychological well-being. Theories of gender inequality will address how social control directed at women's bodies through power relations imbedded in societal institutions contributes to women's marginalized status. Prerequisite(s): courses 3 or 100. Enrollment limited to 60. *S. Grabe*

140Q. Social Psychology of Sex and Gender. F

Considers individual, interpersonal, and cultural influences on gender similarities and differences in thinking, motivation, and behavior. Emphasizes factors related to power and status inequalities between women and men. Prerequisite(s): courses 3 or 100 and course 40. *C. Leaper*

140T. Psychology of Trauma. S

Overview of psychological theory and research on trauma and traumatic stress, including responses to childhood trauma (especially sexual abuse), combat, and natural disasters. Variety of theoretical frame-

works presented, including developmental, cognitive, neuropsychological, clinical, and social/contextual. Prerequisite(s): course 3 or 100 or permission of instructor. *E. Zurbruggen*

142. Psychology of Oppression and Liberation. W Provides theoretical frameworks for understanding interlocking systems of oppression from the perspective of "the oppressed" as well as "the oppressor" nationally and internationally. Goes beyond mainstream (traditional) psychology and emphasizes critical psychological perspectives that include micro- and macro-level theories of oppression; importance of ideology in oppressive systems; and theories of social change and liberation across contexts. Prerequisite(s): course 3 or 100 or declaration of major in one of the following programs: feminist studies, sociology, community studies, or politics. Enrollment limited to 120. (General Education Code(s): E.) *A. White*

143. Intergroup Relations. F Introduces the study of conflict and intergroup relations. Examines historical and cultural foundations of group psychology and social psychological theory and research on conflict between groups, cultures, and nations. Surveys work on multiculturalism, race relations, and global political conflict. Applies social psychological theories to cases of intergroup conflict. Prerequisite(s): course 3 or 100, or major standing in politics, community studies or anthropology, or by permission of instructor. Enrollment limited to 120. (General Education Code(s): E.) *M. Sinha*

145. Social Influence. W An advanced course for upper-division undergraduates interested in the study of the persuasion process. The course investigates common influence tactics and how those tactics are used in various settings. Prerequisite(s): course 3 or 100. *A. Pratkanis*

145D. Social Psychology of Autocracy and Democracy. S Humans are the only animal capable of living in both authoritarian and democratic regimes. Course explores the nature of these forms of social relationships with a goal of promoting democracy. Topics include: obedience to authority, conformity, self-justification, propaganda, power, and conflict resolution. (Formerly course 159G.) Prerequisite(s): course 3 or 100. Enrollment restricted to senior psychology majors. *A. Pratkanis*

146. The Social Context. S A systematic analysis of the social and contextual determinants of human behavior, with special attention given to concepts of situational control, social comparison, role and attribution theories, as well as the macrodeterminants of behavior: cultural, historical, and sociopolitical context. Prerequisite(s): courses 3 or 100 and course 40; or Sociology 136. *M. Sinha*

147A. Psychology and Law. W Current and future relationships between law and psychology, paying special attention to gaps between legal fictions and psychological realities in the legal system. Topics include an introduction to social science and law, the nature of legal and criminal responsibility, the relationship between the social and legal concepts of discrimination, and the nature of legal punishment. (Also offered as Legal Studies 147A. Students cannot receive credit for both courses.) Prerequisite(s): courses 3 or 100; and course 40 is highly recommended prior to taking this course. Enrollment restricted to psychology, pre-psychology, and legal studies majors. *The Staff*

147B. Psychology and Law. * Continuing discussion of current and future relationships between law and psychology and to contrasting psycho-

logical realities with legal fictions. Special attention is given to the criminal justice system including crime causation, the psychology of policing and interrogation, plea bargaining, jury selection and decision making, eyewitness identification, and the psychology of imprisonment. (Also offered as Legal Studies 147B. Students cannot receive credit for both courses.) Prerequisite(s): course 147A. *C. Haney*

149. Community Psychology: Transforming Communities. F Introduction to community psychology, a discipline that blends social psychology, sociology, and anthropology. Class topics include levels of analysis, ecologies, prevention, intervention, feminism, empowerment, sense of community, coalition building, and social justice and action. Prerequisite(s): course 3 or 100. Enrollment restricted to juniors and seniors. *R. Langhout*

150. Social Psychology of Flimflam. F Why do we believe strange things? This course investigates such flimflams as beliefs in the Loch Ness Monster, quack health care, and racial superiority to illustrate the underlying social psychological principles that lead us to adopt weird attitudes. (Formerly course 159I.) Prerequisite(s): course 3 or 100. (General Education Code(s): SL.) *A. Pratkanis*

153. The Psychology of Poverty and Social Class. * Examines how social class shapes attitudes, beliefs, and behaviors. Emphasis is placed on structural barriers and their impact on the well-being of low-income groups. Strategies for reducing classist discrimination and improving interclass relations are discussed. Prerequisite: course 3 or 100, or major standing in anthropology, community studies, economics, legal studies, politics, sociology, or feminist studies. *H. Bullock*

153A. Psychology of Poverty and Social Class Community Practicum (2 credits). * Provides a link between course 153 and community organizations with an antipoverty mission. Students complete internships with nonprofit agencies and participate in seminar meetings. Prerequisite(s): concurrent enrollment in course 153. Enrollment limited to 20. *H. Bullock*

157. Chicana Feminism. * Students are introduced to the writings of Chicana feminists to identify the gender issues that produce conflict and cooperation in their communities. The course also makes linkages to gender issues in other U.S. communities of color and Latin America. (Also offered as Feminist Studies 151A. Students cannot receive credit for both courses.) Prerequisite(s): course 3 or 100 or Feminist Studies 1. (General Education Code(s): E.) *A. Hurtado*

158. Latinos in the Media. * Introduces portrayals of Latinos in the U.S. media including magazines, film, and television. Covers the most recent social psychological research on media representations and implications for identity. Prerequisite(s): course 3 or 100 or Latin American and Latino Studies 1. (General Education Code(s): E.) *A. Hurtado*

159. Senior Seminars in Social Psychology. F,W,S
159A. Lesbian, Gay, Bisexual, and Transgender Psychology. * Considers the experience of lesbian, gay, bisexual, and transgender individuals from a psychological perspective. Review theory and research on sexual orientation; sexual-identity development; and same-sex sexual desire and behavior. Considers contemporary policy issues, such as same-sex marriage and health issues, such as HIV for their implications for psychological well-

being. Satisfies seminar requirements. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *P. Hammack*

159B. Research Seminar in Crime and Media. * Empirically examines several aspects of the criminal justice system (in particular, jury decision making and media effects on juror fairness and impartiality). In addition to extensive reading, students participate in research projects. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): courses 147A and 147B; or Legal Studies 147A and 147B; or concurrent enrollment in course 147B or Legal Studies 147B. Enrollment restricted to senior psychology and legal studies majors. Enrollment limited to 30. *C. Haney*

159C. Social Issues Research. * Reviews contemporary social issues research. Emphasizes understanding how researchers study social problems and how theory and research can contribute to social change. Examines intersections of psychology and social policy. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *H. Bullock*

159D. Psychology of Sexual Aggression. W An overview of psychological theory and research related to sexual aggression, focusing on both perpetration and victimization. Includes a discussion of the social construction of masculinity and femininity, media representations of sexual violence, and alternative (non-aggressive) visions of sexuality. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology or feminist studies majors or permission of instructor. Enrollment limited to 30. *E. Zurbruggen*

159E. Peace Psychology. F Is war inevitable? What is peace? Is it more than the absence of violence? Explore how psychology—the study of human behavior—can help to decrease violence and enhance cooperation at multiple levels including the personal, interpersonal, community, and international arenas. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *A. White*

159F. Culture and Identity. * Considers the relationship between culture and identity in the "local" context of multiculturalism in America and the "global" context of conflict and identity politics. Examines concept of "culture," "ethnicity," "race," and "identity" in social science literature. Considers issues of power, social justice, and identity pluralism in both domestic and international contexts. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *P. Hammack*

159H. Community-Based Interventions. W Topics include: what makes a successful intervention; what happens before the formal intervention begins; the ethics involved with interventions; different methods for assessing interventions; and different praxis models. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements and course 3 or 100. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *R. Langhout*

159J. Social Psychology of Social Justice. *

Why do some situations seem fair and others unfair? Are all people concerned with justice or are some scoundrels? This course looks at the principles of distributive, procedural, and retributive justice and at real world applications of theories. Satisfies seminar requirement. Satisfies senior comprehensive requirement. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *F. Crosby*

159K. Advanced Topics in Chicana Feminism. *

Course is a continuation of course 151A which introduces students to the writings of Chicana feminists to identify the gender issues that cause conflict and cooperation in their communities. The seminar format allows students an opportunity for extensive discussion. (Also offered as Feminist Studies 151B. Students cannot receive credit for both courses.) Satisfies senior requirements. Satisfies senior comprehensive requirement. Prerequisite(s): courses 1, 40, or 157 or Feminist Studies 1, 100, or 151A, or consent of instructor. Enrollment restricted to juniors and seniors. Enrollment limited to 30. *A. Hurtado*

159M. Transnational Feminism. *

Reviews and discusses scholarship that takes into account women's role in development and how access to resources impacts the structures that perpetuate gender inequalities. Uses a transnational gendered lens to evaluate the impacts of globalization on women's well-being and ways alternative development can alter structural inequities and transform the conditions in which women can confront aspects of their subordination, thereby impacting their psychological well-being. Satisfies senior seminar and senior comprehensive requirements. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *S. Grabe*

159P. Social-Community Psychology in Practice. S

This service-learning course requires time in the classroom and the field. Students gain a deep understanding of social justice paradigms, community-based collaborative research, ethics, field-based research, reflexivity, and socio-cultural development modes. Courses 149 and 182 are recommended prior to taking this course. Satisfies senior comprehensive requirement. Admission by application and interview only. Enrollment limited to 15. *R. Langhout*

159T. Small Groups. *

Course strives toward three goals of varying specificity: knowledge of the psychological literature on small groups, aspects of group functioning, and what theorists have found in group studies; effectiveness in group settings; and behavior in group settings. Students required to set aside one weekend for lab work. Satisfies the seminar requirement. Satisfies the senior comprehensive requirement. Prerequisite(s): course 40. Enrollment limited to senior psychology majors. Enrollment limited to 30. *F. Crosby*

Personality**163. Freud. ***

The development of Freud's concept of mind. Extensive reading tracing the origins and development of Freud's theories and concepts (e.g., abreaction, psychic energy, defense, wish-fulfillment, unconscious fantasy, dreams, symptoms, transference, cure, sexuality) and emphasizing the underlying model of the mind and mental functioning. (Also offered as Philosophy 139. Students cannot receive credit for both courses.) Prerequisite(s): Philosophy 100A or 100B or 100C. Offered in alternate academic years. *J. Neu*

165. Systems of Psychotherapy. W

A review of methods of psychotherapy, with attention to the underlying assumptions about personality, health, and disease. Prerequisite(s): course 3 or 100; course 60 or 170 recommended. *V. Tonay*

166. Personality Assessment. S

How do we really know a person? Course provides hands-on experience with assessing such individual differences as intimacy motivation, dominance, paranoia, and well-being. Students construct their own personality test and learn to critique the kinds of self-report, observational, and interview techniques that are used in organizational and counseling contexts. Prerequisite(s): course 3 or 100; course 60 highly recommended as preparation. *V. Tonay*

167. Clinical Psychology. W

Serves as an in-depth introduction to the field of clinical psychology. Covers issues of clinical assessment, interviewing, testing, and a range of therapeutic modalities. Prerequisite(s): courses 3 or 100, and 60 or 65; course 170 is recommended as preparation. *R. Quinn*

169. Community Mental Health. F

Examines theory and research on outreach and prevention for application with various populations in community settings (e.g., victims of violence, immigrants, severely mentally ill); presents characteristics of successful agencies and agency development. Surveys interventions currently used in community mental health. Prerequisite(s): course 3 or 100. Courses 60 and 170 recommended. *V. Tonay*

170. Abnormal Psychology. F,W,S

Survey of theory and research on the nature of behavioral disorders. Covers psychological, biological, developmental, and socio-cultural approaches. Prerequisite(s): course 3 or 100; course 60 highly recommended as preparation. (F) *K. Cardilla*, (FWS) *D. Hoffman*

171. Childhood Psychopathology. F

A critical and intensive exploration of a wide variety of specific disorders within their biological, developmental, and social contexts. Concepts of psychopathology in childhood, major and minor diagnostic systems, and a variety of theories of etiology are explored. General intervention strategies and a wide range of specific psychotherapy systems for treatment are closely examined and demonstrated. Prerequisite(s): courses 3 or 100; and courses 10, and 170. *D. Saposnek*

175. Personality, Relationships, and Emotions. S

Explores the nature, origins, and development of human personality as it relates to emotions in the context of close relationships. Prerequisite(s): course 3 or 100. Courses 10 and 60 recommended as preparation. *A. Thorne*

179. Senior Seminars in Personality Psychology.**179A. Theories of Moral Psychology. S**

A seminar course with focus on theories of moral development from the psychoanalytic, social learning, cognitive-developmental, and humanistic perspectives. Students confront and discuss moral dilemmas from the four perspectives, working toward their own individual theories of pro-social behavior. Course satisfies seminar requirement. Satisfies senior comprehensive requirement. Prerequisite(s): essay required on a moral issue or dilemma relevant to the student's life. Enrollment limited to 30. *R. Quinn*

179B. Children and Divorce. S

Explores history and psychology of divorce and the short- and long-term effects of divorce on children. Examines wide range of findings that have drawn diametrically opposed conclusions; delves into social attitudes and legal structures that have impeded and

enhanced divorce transitions for children and parents; investigates future models for divorcing that are child-friendly and consistent with findings from newly emerging longitudinal research on children and divorce. Satisfies seminar and senior comprehensive requirements. Enrollment restricted to senior psychology majors. Enrollment limited to 30. *D. Saposnek*

General, Statistics and Research Methods**181. Psychological Data Analysis. W**

Intermediate statistical methods widely used in psychology (e.g., n-way, ANOVA, ANCOVA, multiple-comparison, repeated-measures, nested-designs, correlational analysis, bivariate regression), corresponding SAS programs, and elements of measurement theory. Prerequisite(s): course 3 or 100. (General Education Code(s): Q.) *The Staff*

182. Advanced Research Methods. *

Designed to equip students with the ability to evaluate, conceive, and carry out psychological research. A variety of techniques (observational, ethnographic, and field) examined and experienced. Students carry out research projects. Prerequisite: course 3 or 100. Enrollment limited to 30. *R. Langhout*

Senior Seminars and Independent Study**190. Senior Seminars.**

Special topics with a format varying each quarter. *The Staff*

191. Teaching College Psychology.

A series designed to provide undergraduates at the upper-division level with an opportunity to participate in planning and teaching college-level psychology. May not be repeated for credit. *The Staff*

191A. Introduction to Teaching Psychology. F,W,S

Students lead discussion groups and provide one-to-one tutoring for courses 1 or 3 or 100. Admission requires essay describing interest in becoming a course assistant, copies of psychology evaluations, and a letter of recommendation from a psychology faculty member; completion of some upper-division psychology courses prior to enrollment in this course. Prerequisite(s): course 3 or 100. Enrollment restricted to psychology majors. (Formerly *Introduction to Psychology*.) Enrollment limited to 20. (F) *T. Seymour*, (S) *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar (course 42) under faculty supervision. Available only to upper-division or graduate students. Students submit petition to sponsoring agency. *The Staff*

193. Field Study. F,W,S

Series designed to provide advanced psychology undergraduates opportunity to apply what they have learned in the classroom to direct experience in a community agency. Students earn academic credit by working as interns at a variety of psychological settings where they are trained and supervised by a professional within the agency. Faculty also supervise the students' academic work by providing guidance and helping them integrate psychological theories with their hands-on intern experience. A two-quarter commitment. Students submit petition to sponsoring agency. Prerequisite(s): courses 3 or 100. Enrollment restricted to junior and senior psychology majors. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

193A. Developmental Field Study. F,W,S

Work in a community-based setting while completing self-directed academic work focused in the developmental area under the guidance of a faculty member. Students submit petition to sponsoring agency; applications due one quarter in advance to the Psychology Field Study Office. Prerequisite(s): courses 3 or 100. Enrollment restricted to junior and senior psychology majors. Enrollment limited to 100. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

193B. Cognitive Field Study. F,W,S

Work in a community-based setting while completing self-directed academic work focused in the cognitive area under guidance of a faculty member. Students submit petition to sponsoring agency; applications due one quarter in advance to the Psychology Field Study Office. Prerequisite(s): courses 3 or 100. Enrollment restricted to junior and senior psychology majors. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

193C. Social Field Study. F,W,S

Work in community-based setting while completing self-directed academic work focused in the social area under guidance of a faculty member. Students submit petition to sponsoring agency; applications due one quarter in advance to the Psychology Field Study Office. Prerequisite(s): courses 3 or 100. Enrollment restricted to junior and senior psychology majors. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

193D. Clinical/Personality Field Study. F,W,S

Work in community-based setting while completing self-directed academic work focused in clinical or personality area under guidance of a faculty member. Students submit petition to sponsoring agency; applications due one quarter in advance to the Psychology Field Study Office. Prerequisite(s): courses 3 or 100. Enrollment restricted to junior and senior psychology majors. May be repeated for credit. (General Education Code(s): PR-S.) *The Staff*

194. Advanced Research in Special Topics.

Provides a means for a small group of students to do research on a particular topic in consultation with a faculty sponsor. *The Staff*

194A. Advanced Developmental Research. F,W,S

Provides students with intensive experience conducting current research in developmental psychology. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194B. Advanced Cognitive Research. F,W,S

Provides students with intensive experience conducting current research in cognitive psychology. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194C. Advanced Social Research. F,W,S

Provides students with intensive experience conducting current research in social psychology. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195A. Senior Thesis. F,W,S

Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. When taken as a multiple-term course extending over two or three quarters, the grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students contemplating a senior thesis should have a superior academic record and be well prepared with a suitable background of previous course work or independent study for performing their proposed research. Students must file a petition with the Psychology Office the quarter in which they would like

to begin the thesis. Senior thesis petitions are available in the Psychology Department Office. Check with office for enrollment conditions. *The Staff*

195B. Senior Thesis. F,W,S

Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. When taken as a multiple-term course extending over two or three quarters, the grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students contemplating a senior thesis should have a superior academic record and be well prepared with a suitable background of previous course work or independent study for performing their proposed research. Students must file a petition with the Psychology Office the quarter in which they would like to begin the thesis. Senior thesis petitions are available in the Psychology Department Office. Check with office for enrollment conditions. *The Staff*

195C. Senior Thesis. F,W,S

Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. When taken as a multiple-term course extending over two or three quarters, the grade and evaluation submitted for the final quarter apply to each of the previous quarters. Students contemplating a senior thesis should have a superior academic record and be well prepared with a suitable background of previous course work or independent study for performing their proposed research. Students must file a petition with the Psychology Office the quarter in which they would like to begin the thesis. Senior thesis petitions are available in the Psychology Department Office. Check with office for enrollment conditions. *The Staff*

198. Independent Field Study. F,W,S

Provides psychology majors with the opportunity to apply what has been learned in the classroom to direct experience in a community agency outside the local community. Students earn academic credit by working as interns at a variety of psychological settings, where they are trained and supervised by a professional on site. Faculty also supervise the students' field study, providing guidance and help integrating psychological theories with their hands-on experience. Two-quarter commitment required. Admission requires completion of lower-division psychology major requirements; students submit petition to sponsoring agency. Applications are due one quarter in advance to the Psychology Field Study Office. Enrollment restricted to junior and senior psychology majors. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual directed study for upper-division undergraduates. Students must file a petition with the Psychology Office the quarter in which they would like to take the tutorial. Petitions may be obtained in the Psychology Department Office. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Specialized study with individual faculty as psychology peer advisors. May not be applied toward major requirements. Students submit petition to sponsoring agency. Application and interview required during the previous quarter. Enrollment restricted to junior and senior psychology majors. May be repeated for credit. *The Staff*

199G. Tutorial (3 credits). F,W,S

Specialized study with individual faculty. May not be applied toward major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**204. Quantitative Data Analysis. F**

Intermediate statistical methods widely used in psychology (e.g., n-way, ANOVA, ANCOVA, multiple-comparisons, repeated-measures, nested-designs, correlational analyses, bivariate regression), corresponding SAS programs, and elements of measurement theory. Enrollment restricted to graduate students. Enrollment limited to 20. *R. Langhout*

210. The Experimental Method in Social Psychology. *

Explores the philosophy and practice of the experimental method in social psychology. Enrollment restricted to graduate students. *E. Zurbriggen*

211A. Proseminar: Social Justice and the Individual. F

Provides an introduction to social psychology, focusing on various individual-level social justice topics, including the self, social comparison, individual and collective identity, social historical and social structural determinants of behavior and various policy and social change-related issues. Enrollment restricted to psychology graduate students; undergraduates planning graduate work in social psychology may enroll with permission of instructor. Enrollment limited to 20. *E. Zurbriggen*

211B. Social Justice, Society, and Policy. W

Provides an introduction to social psychology, focusing on empirical and theoretical developments related to social justice and group and intergroup dynamics. Topics include: prejudice and discrimination, power, collective action, and psychology's relationship to social policy. (Formerly *Proseminar: Groups in Society*.) Enrollment restricted to psychology graduate students. Undergraduates planning graduate work in social psychology may enroll with permission of instructor. Enrollment limited to 20. *C. Haney*

213. Special Topics in Social Psychology. *

Focuses on particular issues of theoretical and practical importance in social psychology. Topics vary from year to year and often concentrate on issues of social justice, social identity, intergroup relations, and social policy. Enrollment restricted to graduate students. May be repeated for credit. (FWS) *The Staff*

214A. Multivariate Techniques for Psychology. W

Provides introduction to multiple regression (MR) and multivariate analysis of variance (MANOVA) as data analytic methods. Both methodological and statistical aspects of multivariate data analysis discussed. Practical problems in estimating and testing regression and ANOVA models addressed. Gain experience in carrying out and interpreting analyses using SPSS. Prerequisite(s): course 204. Enrollment limited to graduate students. Enrollment limited to 20. *The Staff*

214B. Advanced Multivariate Techniques for Psychology. *

Provides introduction to factor analysis and structural equation modeling (SEM). Develop skills in defining, estimating, testing, and critiquing models. Topics include rationale of SEM, model identification, goodness of fit, and estimation. Learn how to use relevant software packages (SPSS, LISREL, EQS, and/or AMOS) to conduct exploratory and confirmatory factor analyses, path analyses, and full ("hybrid") analyses with latent variables. Prerequisite(s): course 214A. *E. Zurbriggen*

215. Production and Comprehension of Spontaneous Speech. *

Seminar on the use of collateral signals as backchannels,

discourse markers, and enquoting devices, including discussion of historical origins, cross-linguistic borrowing and second-language learning, children's acquisition, and the use of signals as markers of culture and identity. Enrollment restricted to psychology graduate students. *J. Fox Tree*

220. Special Topics in Human Memory. *

Topics announced when offered. Seminars involve discussion and critical evaluation of current, historical, and interdisciplinary readings relevant to topic. Emphasis on development of research ideas. Enrollment restricted to graduate students. Enrollment limited to 12. *The Staff*

221. Visual Perception. *

Seminar to study human perception, its methodology, and driving issues as illustrated by selected research topics (e.g., adaptation to unusual sensory environments). Where possible, parallels with other areas of psychology are drawn. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Bridgeman*

222. Topics in Lexical Organization. F

The recognition of words is a critical step in natural language processing. Discusses a range of contemporary issues related to the representation of a word and the access of this information from the perspective of psychology, linguistics, and artificial intelligence. Enrollment restricted to psychology graduate students; undergraduates who have completed course 124 may enroll with permission of instructor. Enrollment limited to 10. *A. Kawamoto*

223. Human-Computer Interaction. W

Theory and hands-on practice to understand what makes user interfaces usable and accessible to diverse individuals. Covers human senses and memory and their design implications, requirement solicitation, user-centered design and prototyping techniques, and expert and user evaluations. Individual research project. Interdisciplinary course for art, social science and engineering graduate students. Students cannot receive credit for this course and course 131. (Also offered as Computer Engineering 231 and Digital Arts and New Media 231. Students cannot receive credit for three courses.) Enrollment restricted to graduate students. *S. Kurniawan*

224A. Proseminar: Cognitive I. F

A proseminar reviewing current topics in cognitive psychology, designed to introduce new graduate students to the field. Enrollment restricted to psychology graduate students. Enrollment limited to 10. *B. Bridgeman, A. Kawamoto*

224B. Proseminar: Cognitive II. W

A proseminar reviewing current topics in cognitive psychology, designed to introduce new graduate students to the field. Enrollment restricted to psychology graduate students. Enrollment limited to 10. *T. Seymour, J. Fox Tree*

225A. Introduction to Developmental Research I (3 credits). F,W

Surveys the rationale and techniques of research in developmental psychology. Students build skills in evaluating published research, in translating theoretical ideas into researchable hypotheses, and in selecting appropriate research designs, measurement, and statistical approaches for research problems. Multiple-term course; students receive 6 credits in the second quarter of attendance; the grade and evaluation submitted for the final quarter applies to both quarters. Enrollment restricted to psychology graduate students or with instructor's permission. May be repeated for credit. *C. Cooper*

225B. Introduction to Developmental Research II. S

Focuses on drawing reasonable conclusions from research

findings by focusing on students' first-year research projects and critiques of existing research. Enrollment restricted to psychology graduate students. *S. Wang*

227. Contemporary Issues in Psychology of Language. *

Special topics in thought and language are examined from the perspectives of cognitive science. Particular attention given to embodied experience and higher-order cognition. Enrollment restricted to graduate students. May be repeated for credit. *R. Gibbs*

229. Computer Simulation Models. *

Course analyzes various computer simulation techniques and how they can be used to model perception and cognition. Parallel processing in networks is emphasized. Enrollment restricted to graduate students; undergraduates who have completed course 132 may enroll with permission of instructor. Offered in alternate academic years. *A. Kawamoto*

230. Research in Cognitive Psychology Seminar. F,W,S

Seminar to study, critique, and develop research in perception and cognition, including topics in psychobiology, psycholinguistics, and memory. Enrollment restricted to psychology graduate students. May be repeated for credit. (F) *B. Bridgeman*, (W) *J. Fox Tree*, (S) *T. Seymour*

231. Research in Social Psychology Seminar. F,W,S

Seminar to study, critique, and develop research in social psychology. Enrollment restricted to psychology graduate students. May be repeated for credit. (F) *E. Zurbriggen*, (WS) *S. Grabe*

232. Evolution of Cognition. *

Explores current research on evolution of human cognition, drawing on findings from other species and from the archaeological record. Topics include language, working memory, episodic memory, numerical abilities, and social cognition. Enrollment restricted to graduate students. *The Staff*

235. Infant Development in Contexts. *

Seminar on how contextual factors influence the development in infancy, especially on cognitive domains. Discusses at least four types of contextual factors: cultural, experiential, event, and interpersonal contexts. Enrollment restricted to psychology graduate students. *S. Wang*

236. Paradigms of Culture. *

Integrative seminar on the relationship between individual psychological experience and its social, cultural, and institutional context. Explores various paradigms of "culture" in social science literature, including psychoanalytic theory, culture and personality, cultural psychology, Marxism, symbolic interactionism, poststructuralism, postcolonial theory, narrative, and Vygotsky's sociocultural theory. (Formerly *Person, Culture, Society*.) Enrollment restricted to graduate students. Enrollment limited to 10. *P. Hammack*

242. Research in Developmental Psychology Seminar. F,W,S

Seminar to study, critique, and develop research in developmental psychology. Enrollment restricted to psychology graduate students. May be repeated for credit. (FW) *B. Rogoff*, (S) *M. Azmitia*

244A. Proseminar I: Cognitive and Language Development. F

Explores major theories and research in the fields of cognitive development and language development. Begins

with classic theories, such as Piaget's theory of cognitive development, and proceeds to theories and research on topics of current interest, such as the relation between culture and cognitive and language development. Enrollment restricted to graduate students. *N. Akhtar*

244B. Proseminar II: Social and Personality Development. W

An examination of contemporary theory and research on socioemotional and personality development across the lifespan. (Formerly *Proseminar II: Social, Emotional, and Personality Development*.) Enrollment restricted to graduate students. *C. Leaper*

245. Computational Models of Discourse and Dialogue. S

Focuses on classic and current theories and research topics in the computational modeling of discourse and dialogue, with applications to human-computer dialogue interactions; dialogue interaction in computer games and interactive story systems; and processing of human-to-human conversational and dialogue-like language such as e-mails. Topics vary depending on the current research of the instructor(s) and the interests of the students. Students read theoretical and technical papers from journals and conference proceedings and present class lectures. A research project is required. (Also offered as Linguistics 245. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. Undergraduates may enroll with permission of instructor. May be repeated for credit. *M. Walker*

246. Cultural Diversity in Human Development. S

Focuses on issues of culture and ethnicity in our theoretical and empirical understanding of human development. Particular attention paid to issues of language, culture, and socialization as they relate to social institutions, such as education, that affect children and families. Enrollment restricted to graduate students. Enrollment limited to 20. *C. Cooper*

247. Special Topics in Developmental Psychology. F

Focuses on particular issues of theoretical importance in developmental psychology. Topics vary from year to year. Particular issues in language, culture, cognitive, social, and personality development may be covered. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *B. Rogoff*

248. Survey Methods. F

Practicum to give students hands-on experience with survey methods by conducting their own survey on the topic of their choice. Course requires the survey to be conducted off campus at a local agency or program chosen by student with approval of instructor. Enrollment restricted to graduate students. Enrollment limited to 10. *C. Haney*

249. Field Methodologies and Social Ethnography. *

Designed to train graduate students in applied field methods. Emphasis is on gaining knowledge and experience with actual field methods, by conducting social ethnography in the community. Field research in community placements required. Enrollment restricted to graduate students. Enrollment limited to 10. Offered in alternate academic years. *C. Haney*

250. Prejudice and Social Relations. *

Examines the ways in which the various branches of psychology have approached the issue of prejudice. Attention paid to the assumptions underlying each approach and their relation to core psychological ideas such as the self and emotion. Enrollment restricted to graduate students. *The Staff*

251. Feminist Theory and Social Psychology. *

Course bridges feminist theory and social psychological research to explore connections between theory covered and empirical studies on various topics in social psychology. Seminar format allows students opportunity for extensive discussion. (Also offered as Feminist Studies 251. Students cannot receive credit for both courses.) Enrollment restricted to graduate students. *A. Hurtado*

252. Special Topics in Cognitive Psychology. *

Focuses on particular issues in cognitive psychology. Topics vary from year to year. Particular issues in language, memory, perception, attention, judgment and decision making, problem solving, reasoning, emotion, cognitive modeling, cognitive neuroscience, and cognition and aging covered. Enrollment restricted to graduate students. May be repeated for credit. *M. Wilson*

253. Theory and Research in Intergroup Relations. *

Examines, compares, and contrasts a variety of theories in intergroup relations while examining relevant empirical research. The relevance of both theory and research findings to contemporary social issues is explored. Enrollment restricted to psychology graduate students; undergraduates considering graduate work in social psychology are encouraged to enroll with permission of instructor. Enrollment limited to 12. Offered in alternate academic years. *The Staff*

254. Psychology of Gender. *

Course reviews recent theory, research, and applications in the psychology of gender. Developmental, social-psychological, cultural, and feminist approaches are emphasized. Enrollment restricted to graduate students. *C. Leaper*

256. Psychology of Social Class and Economic Justice. *

Course examines the social psychological antecedents, correlates, and consequences of economic inequality in contemporary U.S. society. The impact of social class on attitudes, beliefs, and behaviors is assessed. Strategies for reducing classist discrimination and improving interclass relations are discussed. Enrollment restricted to graduate students. Enrollment limited to 10. *H. Bullock*

261. Participatory Action Research. S

Participatory Action Research (PAR) is a theoretical standpoint and collaborative methodology that is designed to ensure that those affected by the research project have a voice in that project. Topics include philosophies of science; defining and evaluating PAR; ethics; and reflexivity. Enrollment restricted to graduate students. Enrollment limited to 10. *R. Langhout*

264. Transnational Feminism, Development, and Psychology. S

A transnational feminist lens examines international development as linked to broader ideologies that transform gender relations and enhance women's empowerment. A social-psychology framework brings theoretical and practical import to the issues and examines how research can contribute to social justice and women's human rights. Enrollment restricted to graduate psychology students, or by permission of instructor. *S. Grabe*

290. Proseminar.

Various topics to be offered throughout the year.

290B. Advanced Developmental Research and Writing (2 credits). F,W,S

Tailored to graduate students' interests among topics involving research and scholarship in sociocultural approaches to development, methods for research design, data collection, coding, and analysis, and preparing and reviewing grant proposals and journal manuscripts. Multiple-term course; students receive 6 credits in the

third quarter of attendance; the performance evaluation and grade submitted for the final quarter applies to all three quarters. Enrollment restricted to graduate students. May be repeated for credit. *B. Rogoff*

290C. Professional Development (3 credits). F,W

Designed to aid advanced psychology graduate students with development of competence in professional activities (e.g., preparing a vita, making job and conference presentations, submitting and reviewing manuscripts and grant proposals, professional communication, career decisions). Multiple-term course; students receive 6 credits in the second quarter of attendance; the grade and evaluation submitted for the final quarter applies to the previous quarter. Enrollment restricted to advanced psychology graduate students. May be repeated for credit. *B. Rogoff*

290E. Grant Writing for Psychologists. W

Discusses how to write and put together a grant proposal for psychological research, culminating in a completed proposal. For psychology graduate students at all levels of their careers, applying to predissertation, dissertation, summer, or postdoctoral funding sources. Enrollment restricted to psychology graduate students. *J. Fox Tree*

293. Field Study. F,W,S

Student-designed and student-conducted research carried out in field settings. *The Staff*

297. Independent Study. F,W,S

Independent study and research under faculty supervision. *The Staff*

299. Thesis Research. F,W,S

The Staff

Queer and Sexuality Studies

Feminist Studies
315 Humanities 1
(831)459-2461
fmst@ucsc.edu
<http://queer.ucsc.edu>

Program Description

Scholarship pertaining to the critical study of gender and sexuality can be found across a broad range of departments at UCSC. This presence is manifested in a diverse faculty, in course offerings, and in research programs. Courses with queer content can be found in American studies, anthropology, community studies, feminist studies, film and digital media, history, history of consciousness, legal studies, literature, sociology and theater arts.

For more specialization, departments such as Community Studies, Feminist Studies, and Literature have sufficient flexibility to allow students to design a course of study within those majors to explore these interests. For students who prefer to take a more self-directed approach, there is the option of designing an individual major.

Research activities are sponsored by the Queer Theory research cluster (a part of the Center for Cultural Studies), the Queer and Sexuality Studies Working Group, and many campus departments and student organizations.

The Lionel Cantú GLBTI Resource Center serves as a clearinghouse for queer activities on the UCSC campus. Each quarter, the center prepares a list of all course offerings with queer content. Information is available at <http://queer.ucsc.edu> or via e-mail at queer@ucsc.edu.

More information may be obtained from members of the faculty working group: Anjali Arondekar (Feminist Studies), Carla Freccero (Literature, Feminist Studies, History of Consciousness), Irene Gustafson (Film and Digital Media), Marcia Ochoa (Community Studies), B. Ruby Rich (Community Studies), Gabriela Sandoval (Sociology). Additional faculty contacts: Julie Bettie (Sociology), Benjamin Carson (Music), Sheila Crane (History of Art and Visual Culture), Jody Greene (Literature, Feminist Studies), Herbert Lee (Applied Mathematics and Statistics), Peter Limbrick (Film and Digital Media), Catherine S. Ramirez (American Studies), Jenny Reardon (Sociology), Lisa Rofel (Anthropology), Danny Scheie (Theater Arts), Daniel Selden (Literature), Elizabeth Stephens (Art).

Please contact Anjali Arondekar in the department of Feminist Studies in the Humanities Division (arondek@ucsc.edu) for information about course offerings and resources.

Religious Studies

Religious studies is not a separate program at UCSC, but students interested in the study of religion can select a degree plan from several majors and complement the requirements from a broad array of courses that focus on religion. Majors particularly appropriate for the study of religion at UCSC include the following: anthropology, history, history of art and visual culture, literature, and philosophy. Two departments, the Department of History of Art and Visual Culture and the Department of Philosophy, offer specific concentrations within their majors for students interested in the study of religion. The Department of History of Art and Visual Culture offers a concentration in religion and visual culture, while the Department of Philosophy offers a concentration in religious thought.

Students interested in the study of religion may build an independent program of study by fulfilling the requirements of one of the majors listed above and, under the guidance of a member of the faculty, use elective courses to develop a concentration of study appropriate to their interests and needs. One of the following faculty should be contacted to discuss a course of study in religion at UCSC: Murray Baumgarten (literature), Raoul Birnbaum (history of art and visual culture), Gildas Hamel (history), Susan Harding (anthropology), Ralph Quinn (psychology), Triloki N. Pandey (anthropology), Cynthia Polecristi (history), and Marilyn Westerkamp (history).

Students seeking information on an individual major in religious studies should contact their college academic preceptor.

Russian

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Lecturer

WILLIAM NICKELL

Leo Tolstoy, Russian cultural history, 1920s and 1930s Soviet Russia, Russian Soviet film, Russian language and pedagogy

Program Description

Russian language, beginning and intermediate level language courses are offered. Students may also select an individual major in Russian studies.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Lower-Division Courses

1. Instruction in the Russian Language. F

Aural comprehension, speaking, reading, and writing. Recitation and laboratory. Elementary sequence (1-2-3) begins in the fall quarter only. *The Staff*

2. Instruction in the Russian Language. W

Aural comprehension, speaking, reading, and writing. Recitation and laboratory. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. Prerequisite(s): course 1, or by permission of instructor. *The Staff*

3. Instruction in the Russian Language. S

Aural comprehension, speaking, reading, and writing. Recitation and laboratory. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. Prerequisite(s): course 2, or by permission of instructor. *The Staff*

4. Intermediate Russian. F

Second-year courses designed to improve functional competence in speaking, listening, reading, and writing by activating basic grammar covered in introductory courses. Grammatical explanations and exercises supplemented with short readings and films. Prerequisite(s): course 3; or permission of instructor. (General Education Code(s): CC, IH.) *The Staff*

5. Intermediate Russian. W

Second-year courses designed to improve functional competence in speaking, listening, reading, and writing by activating basic grammar covered in introductory courses. Grammatical explanations and exercises supplemented with short readings and films. Prerequisite(s): course 4; or permission of instructor. (General Education Code(s): CC, IH.) *The Staff*

6. Intermediate Russian. S

Second-year courses designed to improve functional competence in speaking, listening, reading, and writing by activating basic grammar covered in introductory courses. Grammatical explanations and exercises supplemented with short readings and films. Prerequisite(s): course 5; or permission of instructor. (General Education Code(s): CC, IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*
99F. Tutorial (2 credits). F,W,S
Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. Enrollment limited to 10. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Science Communication

Kresge Annex A
(831) 459-4475
<http://scicom.ucsc.edu>

Faculty and Professional Interests

PETER ALDHOUS, Lecturer in Science Writing
Science journalism, feature writing, magazine editing, investigative and policy reporting

GLENDA G. CHUI, Lecturer in Science Writing
Science journalism, newswriting, magazine editing

MARC A. DESJARDINS, Lecturer in Science Writing
Newspaper reporting and editing

ROBERT W. IRION, Senior Lecturer in Science Writing, Program Director
Science journalism, newswriting, feature writing, and editing

MARTHA MENDOZA, Lecturer in Science Writing
Newswriting, investigative and policy reporting

KENNETH McLAUGHLIN, Lecturer in Science Writing
Science journalism, newspaper reporting and writing

MARY K. MILLER, Lecturer in Science Writing
Science journalism, web media, videography, educational and museum outreach

PAUL R. ROGERS, Lecturer in Science Writing
Newswriting, environmental reporting

EVELYN J. STRAUSS, Lecturer in Science Writing
Science and health journalism, science advocacy, essay and profile writing

Program Description

The Science Communication Program is a graduate certificate program composed of one track: science writing. Students combine a background in science with a desire to communicate science to the general public. The program focuses on the theory and practice of conceiving, reporting, writing, and editing articles on scientific, medical, environmental, and technological subjects for newspapers, magazines, and special publications

directed at general readers. The program in science writing offers intensive training in news, features, multimedia storytelling, essays, and investigative reporting. Graduates receive a certificate in science writing.

Graduate Certificate in Science Writing

The program accepts 10 students per year. Enrollment in science writing classes is strictly limited to students enrolled in the program. The program consists of one academic year of full-time study, beginning in fall quarter, followed by a full-time internship lasting a minimum of 10 weeks. *Science Notes*, the UCSC online science magazine, is produced annually by the graduate students. Please see the current issue and an archive of past issues on our web site, <http://scicom.ucsc.edu/>.

All students are required to complete at least two part-time internships in parallel with the six required graduate courses taken during the academic year. Internships are supervised by mentors on site, as well as by the program director. The interns earn academic credit for these field-study courses. The curriculum includes writing seminar courses in five distinct areas (news, features, multimedia, essays, and investigative reporting), as well as writing and editing workshops. Six courses from this curriculum, plus two course-equivalent internships, constitute the eight courses required for the graduate certificate. In addition to the academic year coursework, a full-time 10-week (minimum) internship, or an equivalent approved by the program director, is required.

Admission to the Science Writing Graduate Program

Students who have an intimate acquaintance with the theory and practice of science, an aptitude for writing, and a strong desire to communicate science to the general public are ideal candidates for the program. At least a bachelor's degree in science is required for admission. Other admission requirements are: full-time research experience of at least six months duration; official Graduate Record Exam (GRE) General Test scores; and official GRE Subject Test score in one of the following fields: biochemistry, cell and molecular biology, biology, chemistry, computer science, mathematics, or physics. Applicants with a doctor of philosophy (Ph.D.) degree in one of these subjects are granted a waiver of the GRE Subject Test. Applications and instructions can be found online through the UCSC Graduate Division web site at <http://graddiv.ucsc.edu>.

Further Information

Details about the science writing graduate certificate program may be obtained from the Science Communication Program office, the web site, or by sending e-mail to scicom@ucsc.edu.

Upper-Division Courses

160. Introduction to Science Writing. S

A rigorous examination and practice of the skills involved in writing articles about science, health, technology, and the environment for the general public. Covers the essential elements of news writing and explanatory journalism, including developing a story idea, interviewing scientists, fact checking, composition, and editing of multiple drafts about scientific research. (Also offered as Biology: Ecology and Evolutionary Biology 188. Students cannot receive credit for both courses.) Prerequisite(s): satisfaction of the Entry Level Writing and C1, C2 requirements. Enrollment restricted to junior and senior physical and biologi-

cal sciences majors. Enrollment limited to 18. (General Education Code(s): W.) *R. Irion*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. *The Staff*

Graduate Courses

201A. Reporting and Writing Science News. F

A survey of the conventions of newspaper journalism and the special application of those conventions to scientific and technological subjects. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. *K. McLaughlin*

201B. The Science Feature. W

A survey of selected feature articles in the current national science magazines, with attention to strategy, level of complexity, explanation technique, and style. Writing assignments include a publishable feature article. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. *R. Irion*

201C. The Science Essay. W

A survey of science and nature essayists. Purpose, content, form, and style are considered. Writing assignments include original essays on current issues in science, technology, and society. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. *E. Strauss*

201D. Policy and Investigative Reporting. S

Rigorous examination of techniques for reporting topics where science and technology meet public policy and society. Covers essential skills of investigative reporting, including obtaining documents through Public Records Act requests, using online reporting resources, and writing about ethical and legal issues. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. *P. Aldhous, M. Mendoza*

201E. Multimedia Science News. S

Introduces web-media tools for reporting science stories and enhancing coverage for broad audiences, including video packages, narrated slideshows, podcasts, blogs, and still photography. Laboratory sections address skills for handling equipment and online editing. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. *M. Miller, R. Irion*

202. Writing and Editing Workshop. F

Theory and practice of writing and editing articles on scientific, medical, environmental, and technological subjects for newspapers, magazines, and special publications directed at non-technical readers. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. May be repeated for credit. *M. DesJardins, R. Irion*

297. Independent Study. F,W,S

A media internship is completed with faculty tutorial assistance, to satisfy a need for the student when a regular course is not available. Enrollment restricted to graduate students formally accepted into the writing track of the Science Communication Program. May be repeated for credit. *The Staff*

Social Documentation

235 Oakes Academic Building
(831) 459-4706
<http://communitystudies.ucsc.edu>

Faculty and Professional Interests

Professor

DAVID BRUNDAGE

American working-class and immigration history, history of U.S. social movements, Irish history and politics

WILLIAM H. FRIEDLAND, Emeritus

B. RUBY RICH

Documentary film and video, post-9/11 culture, new queer cinema, feminist film history, Latin American and Latin/a cinema, U.S. independent film and video, the essay film, the politics of film festival proliferation and the marketing of foreign films in the U.S.

NANCY STOLLER, Emerita

RENEE TAJIMA-PEÑA

Documentary film and video focusing on Asian American and immigrant communities, media, and social change

DAVID T. WELLMAN, Emeritus

DEBORAH A. WOO, Emerita

Associate Professor

JULIE GUTHMAN

Sustainable agriculture and alternative food movements, international political economy of food and agriculture, politics of obesity, political ecology, race and food, critical human geography

PAUL ORTIZ

African American history, U.S. social and political history, social documentary, oral history, subaltern studies and theories of resistance, U.S. South, Latino studies, social movements, working-class history; history of farm labor, African diaspora

MARY BETH PUDUP

Regional studies, economic justice, public policy, historical geography of the U.S.

Assistant Professor

JOHN JOTA LEAÑOS

Social documentation, social art practice, community arts, documentary animation, Chicano/a art practice and cultural studies, media and cultural studies, subaltern studies, photography, installation art, public art and intervention

MARCIA OCHOA

Gender and sexuality, race and ethnicity, Latino/a studies, media and cultural studies, ethnography of media, feminism, queer theory, geography, multimedia production, graphic design, colonialism and modernity, Latin American studies—Colombia and Venezuela

Lecturer

ANDREA STEINER

Health policy, critical public-health studies, gerontology (aging), ageism, women's health, critical analysis of civically engaged education

Professor

JULIANNE BURTON-CARVAJAL (Literature)

Twentieth- and 21st-century Latin(o) American visual media, particularly film; melodrama as a transnational form; gender and authorship; history, cultures, and representations of California, particularly the Central Coast

ELI E. HOLLANDER (Film and Digital Media)

Film and video directing; ethnographic documentary directory, editing, cinematography, and videography; digital image generation; screenwriting

CHARLES L. LORD (Film and Digital Media)

Film and video directing and editing, video theory and history, video installation, screenwriting, documentary production

MARGARET MORSE (Film and Digital Media)

Digital and electronic media theory and criticism, media art, media history, technology and culture, film history and theory, German cinema, documentary, science fiction, and silent comedy

Associate Professor

DAVID HENRY ANTHONY III (History)

African and African American history, art, music, literature, and cinema; eastern and southern Africa; African languages; Indian Ocean world; African and African American linkages; Islamic civilization; African diaspora studies; world history

SHARON DANIEL (Film and Digital Media)

Community-based public art in information and communications environments, social and political aspects of information technology, community networks, participatory culture, digital inclusion, Net art, human-computer interface design

JENNIFER GONZALEZ (History of Art and Visual Culture)

Contemporary theories of visual culture, semiotics, critical museum studies, photography, public and activist art in the U.S.

LOURDES MARTINEZ-ECHAZABAL (Literature)

Latin American and Caribbean literatures; Afro-Latin American literatures, cultures, and societies; found/[n]ational narratives; Brazilian literature; literatures of Cuba and the Cuban diaspora; critical race theory

ERIC PORTER (American Studies)

Black cultural and intellectual history; U.S. cultural history and cultural studies; comparative ethnic studies; popular music and jazz studies; race, science, and technology

WARREN SACK (Film and Digital Media)

Software design and media theory

LEWIS WAITS (Art)

Photography

Assistant Professor

MIRIAM GREENBERG (SOCIOLOGY)

Media studies, cultural studies, globalization, political and cultural economies of global cities, video production, and ethnography

IRENE GUSTAFSON (Film and Digital Media)

Producing across the boundaries between "theory" and "practice," non-fiction, gender and queer studies, production design

FELICITY SCHAEFFER-GRABIEL (Feminist Studies)

Transnational feminism, migration, Latin American/Latino studies, Chicano/a studies, Internet, technology and the body, sexuality, gender and globalization

GUSTAVO VAZQUEZ (Film and Digital Media)

Film and video production, directing drama, documentary and experimental cross-cultural experiences in film, film curator



Lecturer

DON ADAMS (UC Extension, Santa Cruz)
Director, Arts and Humanities Program

Program Description

This is a crucial time for the documentary, as traditional sources of journalistic investigation and reporting are dwindling, untested opinions dominate the Internet, veracity is under constant attack, and audiences increasingly must search hard to find reliable perspectives on the world. It is at this moment that the Social Documentation (SOC DOC) program has come into being to train the next generation of documentarians in scholarly and creative approaches to experience, representation, and argument. Founded in 2005, the SOC DOC program at UCSC taps faculty across the campus to provide students with access to expertise and to cross traditional disciplinary lines in an effort to ground master of arts (M.A.) students in the deepest understanding of subject as well as medium. SOC DOC has emerged as an exciting new center of gravity for this innovative new discipline. Our students have earned grants and awards for their thesis documentaries, produced around the globe, in film/video, photography, digital media, and a range of genres. We don't just tell a story; our students go beyond the story to place individuals in context and struggles in history, deepening the public's understanding of the societies in which we live and with whom we connect.

The UCSC Social Documentation program is a two-year, full-time, graduate-level program leading to an M.A. degree. The program offers students a chance to develop expertise in the understanding and production of social documentaries in various mediums, including film/video, audio, photography, and new digital media. Students learn how to translate various academic interpretations of social life into effective, accessible, and professional quality products.

Upon completion of the program, master of arts degree holders will be qualified to enter documentary-related professions such as documentary directing, producing, or editing. Degree holders may work within industries such as public television, public radio, or the documentary film business, as independent producers and artists, or for archival centers or museums. Degree holders may also choose to pursue a doctor of philosophy (Ph.D.) degree in a related field in the arts, humanities, or social sciences.

The program is designed to provide opportunities for the graduate student who is actively committed to social justice to work on a full-time basis beyond the boundaries of the university. Master of arts candidates build a curriculum around a required set of core courses that offer a foundation in the theory and practice of social documentary, elective courses in their substantive area of interest, and the creation of a two-year documentary project that is the final requirement of the degree. Courses and faculty expertise are related to social justice, and include both broad structural and social changes and community-based organizing.

Objectives

The Social Documentation program aims to train its graduates in critical thinking and the use of visual, audio, electronic, and print media, as well as historic presentations and ethnographies, dedicated to the documentation of underrepresented areas of community life. The curriculum concentrates on the analysis of social problems, the creation of a critical approach in the collection and presentation of documentary material, and

on the role of effective documentary in social change. For the master's degree, students produce documents of their own: documentaries in film or video; oral histories; audio productions; photographic essays; extensive oral histories or written ethnographies; historic exhibitions for museum or public display; Internet, DVD or CD-ROM projects; and/or digital archives.

Special features of the program include its focus on the study of "ordinary life" and its emphasis on training students to produce original social analysis in broadly representational forms. The course of study includes training in the techniques of appropriate media and systems of representation. The unique emphasis of the Social Documentation program, however, is the acquisition of a level of academic rigor in the chosen subject of focus, an insistence on social scientific methodologies, a reliance on an ethical process of production that takes its subjects into full account, and a commitment to research in the development of material for extra-academic uses and audiences. Broadcast and theatrical media have increasingly recognized the importance of ancillary distribution through partnerships with pertinent communities of interest, just as the Internet is increasingly utilized for added depth and community interaction on issues. The Social Documentation program aims to prepare documentarians for newly evolving social media landscapes. At the same time, students receive training in the basic theories of social documentation with the aim of applying these theories to the analysis, prioritization, and solution of social problems.

Graduates are expected to generate work that will have an impact on the world outside the academy and to develop an understanding of documentary practices and traditions, as well as social codes that can form a foundation for future work in their targeted subject area and arena of practice. The master's project, which constitutes the culmination of the two years of study, will be given a public exhibition or reading, and be the springboard for continuing work after graduation.

Requirements

The Social Documentation program has a required core curriculum around which students develop a plan of study. Each student has two advisers, one for technical guidance and the other for topical expertise, who will be involved in designing each student's study and project plans. Full-time enrollment is required.

A total of 72 credits are required to complete the master's degree in social documentation, comprising a combination of seminars on social documentary and social science research designed specifically for the social documentation graduate students, other courses on campus selected by students individually on the basis of relevance to the proposed project, and courses focused on conceptualizing, executing, and completing the students' social documentary master's projects. There are eight required core courses.

Required courses for the first year are as follows:

- 200 *Approaches to Social Documentary*
- 202 *Practice of Social Documentary*
- 208 *Social Science Research and Social Representation*
- 270 *Project Planning*

Required courses for the second year:

- 204 *Ways of Seeing and Hearing*
- 294A *Production, Analysis, Editing*
- 294B *Production, Analysis, Editing*
- 294C *Production, Analysis, Editing*

In addition to these mandatory courses, an additional 32 credits must be secured through electives as identified on an individual basis, offered by Community Studies or other departments, or through independent study classes as approved by faculty advisers.

To satisfy requirements for the master of arts degree, a student must complete the first year of required courses and electives. By the end of the first year, before summer quarter begins, students will have written a proposal for their documentary project, which will be the basis for a required oral qualifying examination conducted by at least two community studies faculty. This proposal will include a description of the subject to be documented, a treatment or narrative outline, a work plan including budget and timeline, and a preliminary annotated bibliography and filmography/videography of related works. Approval of the written proposal and satisfactory completion of the qualifying examination is a prerequisite for advancement to further coursework or fieldwork on the master's project. The successful qualifying examination proposal should address the following questions:

- What is the story to be told with the documentary project?
- What is the social analysis that will guide, inform, and underwrite the story?
- How will that analysis be represented in the documentary?
- What kinds of evidence will be generated to persuade the audience that the analysis is accurate?
- How will evidence be used either visually or orally?
- How will the documentary use social analysis to make the personal political: how will it move from analysis to critique?

The second year is largely focused on the final documentary project required for completion of the master's degree. This project must reflect original research and creative activity while demonstrating a command of related previous work by others. With an understanding of budgetary, equipment, and time limitations, students' electronic, digital, photographic, or written projects should reflect a level of quality appropriate for publication, exhibition, or broadcast (including digital/web-cast).

Typically, the expectation in each medium is as follows:

Documentary Film/Video. One 20-30 minute documentary suitable for television broadcast and public exhibition.

Documentary Photography. One on-campus showing and one major off-campus showing; 10-15 page text accompanying pictorial exhibition.

Audio Documentary/Sound Recording. One 20-30 minute documentary suitable for radio broadcast or museum/public installation.

Historic Presentation/Public History. One on-campus presentation or exhibit and one major off-campus presentation/exhibit of "museum quality."

Oral History/Ethnography. One 75-100 page document.

Internet/Digital Presentation or Archive. To be worked out with program chair, given the evolving nature of this field.

The final examination consists of the public presentation of the project.

In addition, every project must be accompanied by a written essay describing its relationship to its field and documents its research via field notes, bibliographies, archival searches, filmographies, and videographies. These materials will be filed in digital form and archived for future reference and access.

Goals for Social Documentation Graduates

The Social Documentation program prepares graduates with critical skills and professional tools well suited to careers in the evolving fields of documentary media in the private and public sectors, for collaboration on community-based projects, for a range of activities geared to the analysis and documentation of sociopolitical issues, and for work with private and public organizations in need of media expertise and analysis. It is expected that students will make careers in the non-profit fields evolving to link social justice organizations with media outlets, as well as in a range of public campaigns and initiatives. They will also be well equipped to function as independent documentarians working on behalf of social change within the expanding sectors of media production and representational intervention.

Also, given the emphasis on the histories of the social documentary and on developing methods suitable for contemporary challenges, many graduates are likely to enter the field of education on a part- or full-time basis. The Social Documentation program's teaching assistant (TA) training program and opportunities provide graduates with the preparation necessary to exercise such options.

Graduate Courses

200. Approaches to Social Documentation. F

Comprehensive review and analysis of documentary strategies aimed at societal critique and social change, evaluating changes in argument, evidence, and process over development of the discipline. (Also offered as Digital Arts and New Media 205. Students cannot receive credit for both courses.) A concurrent media lab is required. Enrollment restricted to social documentation graduate students. Enrollment limited to 15. *B. Rich*

202. Practice of Social Documentary. F

Introduction to social documentary genres including video, photography, new media and other mediums, which addresses social scientific research and methodology in the context of these processes. (Also offered as Digital Arts and New Media 206. Students cannot receive credit for both courses.) A concurrent media lab is required. Enrollment restricted to social documentation graduate students. Enrollment limited to 15. *R. Tajima*

204. Ways of Seeing and Hearing. F

Graduate-level advanced seminar explores ways that seeing, hearing, and knowing are influenced by culture, power, race, and other factors. Readings emphasize how documentary subjects are constituted and known, addressing questions of epistemology, social constructivism, objectivity, and method. (Also offered as Digital Arts and New Media 204. Students cannot receive credit for both courses.) Enrollment restricted to social documentation and digital arts new media graduate students. *M. Ochoa*

208. Social Science Research and Social Representation. W

Designed to acquaint students with how social science research represents social reality and how social documentarians represent social reality. Designed to encourage comparison among different modes of social science research and between social science and different modes of social documentation representations of social life.

Enrollment restricted to social documentation graduate students. Enrollment limited to 15. *M. Ochoa*

220. Oral History. *

Introduction to the theory and practice of oral history. Seminar participants read foundational texts in oral history, historical memory, public history, and social documentary. Students conduct two oral-history interviews; write synthesis essays; and complete a seminar paper. Concurrent enrollment in course 291 required. Enrollment restricted to graduate students. Enrollment limited to 15. *P. Ortiz*

270. Project Planning for the Social Documentary. S

Workshop seminar in project planning focusing on the form and content of the documentary project; research and preproduction; technical, financial, and logistical plans; and coordination with subjects and resources. Enrollment restricted to social documentation graduate students. Enrollment limited to 15. *R. Tajima*

280. Video Production of the Social Documentary. W

Intensive directing and producing course that covers conceptualization, research, treatment and proposal writing, interview technique, camera, editing, production, and distribution. (Also offered as Digital Arts and New Media 207. Students cannot receive credit for both courses.) A concurrent media lab is required. Enrollment restricted to social documentation graduate students. Open to qualified undergraduates with permission of instructor. Enrollment limited to 15. *R. Tajima*

290. Special Topics in Social Documentation. F

Designed to provide supplemental instruction on specific topical and/or technical matters related to social documentation. Topics include technical standards and innovations within the field of social documentation, documentary subjects, location production, and/or the work of individual professional documentarians. (Also offered as Digital Arts and New Media 208. Students cannot receive credit for both courses.) Enrollment restricted to social documentation graduate students. Enrollment limited to 15. May be repeated for credit. *The Staff*

291. Media Laboratory for Social Documentation (2 credits). F,W,S

Individual training in a social documentation medium under the guidance of a faculty supervisor. Course is intended to be taken concurrently with social documentation courses requiring a laboratory course. Enrollment restricted to social documentation and digital arts and new media graduate students. Enrollment limited to 10. May be repeated for credit. *The Staff*

292. Special Topics (2 credits). F,W,S

Provides supplemental instruction on specific topical and/or technical matters related to social documentation. Topics include technical standards, artistic strategies, and innovations within the field of social documentation, documentary subjects, and/or work of individual professional documentarians. Enrollment restricted to graduate students. Enrollment limited to 15. May be repeated for credit. *R. Tajima*

294A. Production/Analysis/Editing. F

Workshop seminar oriented toward actual fieldwork, production, and preparation for editing of the thesis project in the student's chosen genre. Techniques of collection and recording, analysis, preparation, and editing taught. Enrollment restricted to social documentation graduate students. Enrollment limited to 15. *J. Leanos*

294B. Production/Analysis/Editing. W

Workshop seminar oriented toward the editing and creative assemblage of the thesis project in the student's chosen genre. Techniques of preparation, exhibition, and editing taught. Enrollment restricted to social documentation graduate students. Enrollment limited to 15. *B. Rich*

294C. Production/Analysis/Editing. S

Social documentation students in the final phase of completing their master's thesis receive guidance in shaping their projects, receive feedback, and are taught key elements of structure and narrative at a time when the demand for clarity and social documentation exposition is crucial. Prerequisite(s): courses 294A and 294B. Enrollment restricted to social documentation graduate students. *The Staff*

295. Project Completion. F,W,S

Individualized study for second-year graduate students working on and completing their final projects. Limited to students enrolled in the social documentation program during their final quarter of study. May be repeated for credit. *The Staff*

297. Independent Study. F,W,S

Study either related to a course being taken or a totally independent study. Enrollment restricted to graduate students. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Social Sciences

Faculty and Professional Interests

460 Humanities and Social Sciences Building
(831) 459-3212
<http://socialsciences.ucsc.edu>

ROBERT L. MEISTER, Professor of Social Sciences and Political Thought

Political and moral philosophy, political jurisprudence, political economy, political theology, institutional analysis, critical human rights theory, and constitutional law

Program Description

The Division of Social Sciences focuses on the study of human relationships and society. As global economic and political changes transform the world around us, social scientists help us meet the challenges and opportunities of the 21st century.

Our nine departments offer more than 40 undergraduate and graduate degree programs, including many that are interdisciplinary collaborations. Our faculty members conduct leading-edge research in their fields, frequently working with students in research clusters linking departments to our research centers. We also offer extensive opportunities for experiential learning through field studies.

Our research, teaching, and state-of-the-art facilities provide students with a comprehensive and rigorous education that prepares them for productive careers and further academic pursuits. For more information on the division, see our web site at: <http://socialsciences.ucsc.edu>.

Lower-Division Courses

194A. UCDC Internship Research Seminar. F,W,S

Weekly seminar that focuses on the production of a major research paper or equivalent scholarly undertaking connected to an internship in Washington, D.C., government, non-profit, or private institution. Seminar stresses institutional analysis, the development of bibliographic expertise in the use of Washington-based resources, and participant-observer skills. Required for participants in the UCDC program. Required for and enrollment restricted to students participating in the UCDC Program. (Formerly UCDC Internship and Internship Seminar.) Enrollment limited to 22. *The Staff*

Upper-Division Courses

194B. UCDC Internship Seminar (7 credits). F,W,S

A 30- to 36-hour-per-week internship in a Washington, D.C., government, non-profit, or private institution. Required for and enrollment restricted to UCDC program participants. (Formerly *UCDC Internship and Internship Seminar*.) Enrollment limited to 22. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

A program of directed study arranged with a Social Sciences Division faculty member. Enrollment restricted to participants in the UCDC program. *The Staff*

199F. Tutorial (2 credits). F,W,S

A program of directed study arranged with participating faculty. Class time is proportionally less than a 5-credit course. Enrollment restricted to participants in the UCDC program. *The Staff*

Sociology

226 College Eight
(831) 459-4306
<http://sociology.ucsc.edu>

Faculty and Professional Interests

Professor

DANE ARCHER, Emeritus

JOHN BROWN CHILDS, Emeritus

BEN CROW

International development, sociology of water and markets, global inequality, South Asia and East Africa, political economy, and green enterprise

E. MELANIE DUPUIS

Economic sociology, sociology of consumption, sociology of development, political sociology, sociology of the environment, technological change, historical sociology, social theory, food and social change

WILLIAM H. FRIEDLAND, Emeritus

HIROSHI FUKURAI

Global jury systems; deliberative democracy and lay participation in law; wrongful conviction and acquittal; advanced quantitative methods; survey and research

WALTER L. GOLDFRANK, Emeritus

HERMAN S. GRAY

Cultural studies, media and television studies, black cultural politics, social theory

PAUL M. LUBECK

Political sociology; political economy of development, globalization, labor and work; logics of methodology; religion and social movements; Islamic society and identities; information and networks

DENNIS C. McELRATH, Emeritus

MARCIA MILLMAN

Social psychology, the family, sociology of emotions, field research methods, sociology of medicine

JAMES R. O'CONNOR, Emeritus

CRAIG REINARMAN

Political sociology; law, crime, and social justice; drugs and society

PAMELA ANN ROBY, Emerita

DANA Y. Takagi

Social inequality and identity, research methods, race relations, nationalism and social movements

ANDREW SZASZ

Environmental sociology (environmental movements, policy, environmental justice); theory

CANDACE WEST

Language and social interaction, sex and gender, conversation analysis, microanalysis and medicine, animals and society

Associate Professor

JULIE BETTIE

Cultural studies and popular culture; race/ethnicity, class, and cultural politics; gender, sexuality, and cultural politics; critical ethnography, autoethnography, and visual ethnography

MIRIAM GREENBERG

Urban sociology, media studies, cultural studies, political economy, and globalization

STEVEN MCKAY

Work; technology and labor markets; globalization and social change; race, ethnicity and migration; political sociology; ethnography/qualitative methods

JENNIFER E. REARDON

Issues of social identity as influenced by the new sciences of genetics and genomics; intersection of the sociology of science and knowledge and the sociology of race, gender, and class

HELEN SHAPIRO

Political economy, Latin American economic history and development (with an emphasis on Brazil), industrial policy, the auto industry, the state and transnational corporations

Assistant Professor

DEBORAH GOULD

Political emotion; social movements and contentious politics; classic and contemporary social theory; sexualities; lesbian/gay/queer studies; feminist and queer theory

GABRIELA SANDOVAL

Race and ethnic studies, Latino and Chicano studies, stratification, urban and political sociology, and voting behavior

Lecturer

FRANCESCA GUERRA

Comparative-historical sociology, race and ethnicity, social justice, poverty, law, crime, deviance, asylum and prison architecture, religious non-profits, history of eugenics, disability studies, mass media, oral history, and qualitative and quantitative research methods

WENDY MARTYNA

Social psychology, death and dying, gender, social change, family and youth



Professor

BARBARA L. EPSTEIN (History of Consciousness)

Social movements and theories of social movements, 20th-century U.S. politics and culture, Marxism and related theories of social change

NANCY STOLLER, Emerita (Community Studies)

MARK TRAUGOTT (History)

Social and economic history, 19th-century France, French revolutions, European working class, historical methods, workers' autobiographies

DAVID WELLMAN (Community Studies)

Working-class culture, American ethnic and racial diversity, social documentary studies, critical race theory, interrogations of whiteness, and qualitative research methods

Associate Professor

JULIE GUTHMAN (Community Studies)

Sustainable agriculture and alternative food movements, international political economy of food and agriculture, politics of obesity, political ecology, race and food, critical human geography

Assistant Professor

SHANNON GLEESON (Latin American and Latino Studies)

Migrant populations, the effects of documentation status, labor rights, civic engagement, inequality and stratification, political sociology, law and society, mixed methods and comparative approaches

Program Description

Sociology is the study of social interactions among individuals and social groups. More specifically, sociologists

examine the cultural, ideological, economic and political contexts of human action including the processes whereby social institutions are created, maintained, and transformed.

Sociology was born as an intellectual response to the democratic and industrial revolutions that ushered in the modern era. As such, it considers how society is organized in relationship to a vision of a just, free, and equal society—a vision that may require fundamental social change. Developing an understanding of both social change and social justice as part of the sociological tradition is one of the teaching goals of sociologists at UCSC. In the process, we expect to develop in students an appreciation for the craft of social science: disciplined inquiry, observation, and research as part of informed global citizenship.

Sociology faculty members are engaged in research on a wide range of topics, such as medicine and technology; labor studies; the intersection of class, race, gender and sexualities; environmental sociology; sociology of emotion and affect; queer studies; the cultural politics of sex work; globalization and international development; black cultural politics; Latino and Chicano studies; the politicization of religion; drugs in society; global inequality, crime, and deviance; international law; legal institutions; sustainability; popular culture and cultural studies; media studies; urban studies; political economy; critical ethnography; discourse and conversational analysis; identities and identity changes; and social movements. Sociology faculty use a number of approaches and methods, including ethnography, comparative and historical analysis, conversational and discourse analysis, qualitative interviews, and survey research.

Because of the interdisciplinary emphasis among sociology faculty, undergraduates find the department amenable for double majors and minors, and non-majors find many sociology courses of interest. In recent years, students have conducted independent studies and written senior theses on a variety of subjects including the social construction of gender, emerging professions in health care, utopian communities, human development in Costa Rica, mass communication, the social effects of war, family violence, sustainable development in Bolivia, sanitation in Kenya and Haiti, street children in India, African soccer players in Europe, gay and lesbian families, Latino educational success, and cross-cultural family welfare policies.

The sociology major at UCSC is a rigorous program of study that retains enough flexibility to accommodate students with diverse career goals and plans. It ensures that all students are trained in the main theoretical and methodological traditions of sociology, yet permits considerable variation in students' own areas of specialization. The major provides the necessary intellectual foundation for students who are considering graduate studies in sociology and related social sciences. It also can be used as preparation for careers in fields as diverse as law, social work, management, environmental planning, public service, education, health services, journalism, and counseling. Finally, the sociology major can provide a general liberal education for undergraduates interested in the study of contemporary society and social problems.

Global Information and Social Enterprise Studies (GISES) is an innovative service learning program developed in collaboration with the Global Information Internship Program (GIIP). It aspires to create a new generation of well-trained advocates for social justice and sustainable development who use the tools of information technology and social enterprise to solve global problems. Practically, student projects engage with local and global organizations to democratize globalization, deepen social justice, reduce poverty, support digital

education, and advance the transition to a sustainable world. By combining the spirit of social entrepreneurship with innovative information technologies, GISES students reduce the digital divide by strengthening the informational, communication and organizational capacity of schools, community organizations, and non-governmental organizations (NGOs). The GISES program provides an excellent foundation for students pursuing careers in non-profit management, social advocacy, and education. Depending on a student's major, there are two ways to enter the GISES program. If a student is a sociology major and wishes to participate in GISES, she or he should declare the intensive sociology major. A student who majors in any field other than sociology should declare GISES as a minor.

Admission into the General Sociology Major, Intensive Sociology Major, Combined LALS Major, Sociology Minor, or GISES Minor

The Sociology Department offers three undergraduate majors: 1) a general sociology major; 2) an intensive sociology major; and 3) a combined major with Latin American and Latino studies. Additionally, there are two minors, one in sociology and one in GISES.

Students must take three courses prior to petitioning for entry to the general sociology major: Sociology 1, *Introduction to Sociology*, Sociology 10, *Issues and Problems in American Society*, and Sociology 15, *World Society*. Students with a grade point average (GPA) of 3.0 or above for these three courses will be allowed to declare the sociology major.

Students must take six courses prior to petitioning for entry to the intensive sociology major: Sociology 1 *Introduction to Sociology*, Sociology 10, *Issues and Problems in American Society*; Sociology 15, *World Society*; Sociology 30A, *Introduction to Global Information and Social Enterprise Studies*; Sociology 30B, *Designing ICT Projects for Social Enterprises*; and Sociology 30C, *Project Implementation and Grant Writing for Social Entrepreneurs*. To be considered for admission to the intensive major, students are required to obtain a GPA of 3.0 or above in these courses and submit a self-evaluation including a one- to two-page project plan with their declaration of the intensive major. The project plan will summarize their performance in Sociology 30A, 30B and 30C, including a description of their technology skills (e.g. web design or database applications), an assessment of their completed projects and a rough draft proposal describing their capstone project for Sociology 196G.

Students must take two of the following three courses, Sociology 1, 10 or 15, prior to petitioning for entry to the sociology/Latin American and Latino studies major. Students with a GPA of 3.0 or above for these two courses will be allowed to declare the combined major. (If a student takes all three courses, calculation of the GPA will be based on the two highest grades.)

Students must take one of the following three courses, Sociology 1, 10, or 15 prior to petitioning for entry to the sociology minor. Students who receive a grade of B or higher in this course will be allowed to declare the sociology minor. (If a student takes more than one of these three courses, admission to the minor will be based on the highest grade in the courses taken.)

Students must take four courses prior to petitioning for entry to the GISES minor: Sociology 15, *World Society*; Sociology 30A, *Introduction to Global Information and Social Enterprise Studies*; Sociology 30B, *Designing ICT Projects for Social Enterprises*; and

Sociology 30C, *Project Implementation and Grant Writing for Social Entrepreneurs*. To be considered for admission to the GISES minor, students are required to obtain a GPA of 3.0 or above in these courses and submit a self-evaluation including a one- to two-page project plan with their declaration of the minor. The project plan will summarize their performance in Sociology 30A, 30B and 30C, including a description of their technology skills (e.g. web design or database applications), an assessment of their completed projects and a rough draft proposal describing their capstone project for Sociology 196G.

Equivalent courses may be taken at other universities or at community colleges.

Students should take Sociology 1, 10, 15, 30A, 30B, and 30C for letter grades. For courses taken on a pass-no pass basis, the department will use the narrative evaluation in its assessment of eligibility for the major.

Courses for which the grade of W is given are not counted in the computation of the GPA. The department will evaluate grades for repeated courses following the university's grading policy for repeated courses.

Students may petition for admission to the major by filling out the campus's Declaration of Major form, and by supplying evidence of their performance in the required lower-division courses.

Transfer students who cannot complete Sociology 1, 10, and 15 before university policy requires them to declare a major will be allowed to declare if they have taken at least two of the three courses (or their equivalent) listed above (at UCSC, at another university, or at a community college) with an overall GPA of 3.0. Transfer students allowed to declare under this rule are expected to complete all three courses with an overall minimum GPA of 3.0. Transfer students will be subject to disqualification from the major if they subsequently do not achieve an overall 3.0 GPA in courses 1, 10, and 15 or their equivalent.

Appeal of Negative Decisions

Students must submit appeals of negative decisions to the Sociology Department in writing within 30 days of notification of denial of entrance into the major. Letters of appeal should describe any extenuating circumstances that might have affected the student's record.

Requirements for the General Sociology Major

For more details, students may consult the sociology handbook, available online at <http://sociology.ucsc.edu>, or at the department office, 226 College Eight.

Sociology majors are required to take a total of 13 courses (three prescribed lower-division courses in preparation for the major, four prescribed upper-division core courses, and six upper-division electives). In addition, they must successfully complete the comprehensive requirement prior to graduation.

Lower-division preparation. All sociology majors are required to take the following three courses or their equivalents.

- 1, *Introduction to Sociology*
- 10, *Issues and Problems in American Society*
- 15, *World Society*

Upper-division core courses. The following four sociology courses are required as the foundation of theoretical and methodological training in the discipline. Students are encouraged to take these courses early in their academic career.

- 103A, *Statistical Methods*
- 103B, *The Logic and Methods of Social Inquiry*

105A, *Classical Sociological Theory*

105B, *Contemporary Sociological Theory*

Upper-division advanced coursework. Six additional upper-division sociology courses are required. The Sociology Department offers upper-division electives that reflect a wide range of ideas within the discipline and the diversified research interests of the faculty. Refer to the *Sociology Department Undergraduate Handbook* or the *Sociology Undergraduate Adviser* for a list of recommended courses within a specific specialization.

- Comprehensive requirement. Prior to graduation, all sociology majors are required to complete one of the following comprehensive requirements.
- Senior thesis. The prerequisite for the senior thesis is course 103B. Students who would like to write a senior thesis must submit to their preferred faculty thesis sponsor a proposal that includes a one- to three-page abstract and draft research plan or design, a brief bibliography, and evaluations from relevant courses. The proposal must be submitted by the second week of the quarter, four quarters before graduation. Students unsuccessful in obtaining a thesis sponsor through these means may submit their proposals to the department's undergraduate education committee (UEC) by the fourth week of spring quarter. UEC members will review the merits of these proposals and assign the ones they approve to faculty members who have not yet agreed to serve as thesis advisers for the following year. Students will be notified of the outcome of the UEC's deliberations by the end of spring quarter.
- Capstone course. Sociology 196A, *Capstone: The Sociologist as Public Intellectual*. Upper-division lecture course that explores public sociology and integrates current research with theoretical strands in sociology.

In exceptional cases, students unable to take the senior capstone course may be allowed to substitute a portfolio of work. This substitution must be approved in advance, by the department chair. The portfolio option consists of: 1) portfolio of materials from (at least) three upper-division sociology courses; 2) a synthetic essay; 3) a paper consisting of new research by the student on some contemporary social or political issue, analyzed using the theoretical and empirical materials from those three courses. See the department for additional information.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The goals of the Sociology Department's disciplinary communication are to teach students to think critically by designing, evaluating, and analyzing existing or proposed research studies to create knowledge through synthesizing and integrating information from a variety of sources pertaining to a complex social problem, and to develop and apply evidence-based writing skills. Course 103B, *The Logic and Methods of Social Inquiry*, satisfies the Disciplinary Communication Requirement for students in programs administered by the Sociology Department. Combined majors with Latin American and Latino Studies should refer to the Latin American and Latino Studies Department for their Disciplinary Communication requirement.

Sociology Major Planner One

The following is a recommended academic plan for students to begin the sociology major.

| Plan One | | | |
|------------|-----------|------------------------|-----------|
| Year | Fall | Winter | Spring |
| 1st (frsh) | SOCY 1 | SOCY 15 | SOCY 10 |
| 2nd (soph) | SOCY 105A | SOCY 103A SOCY 105B | SOCY 103B |

Sociology Major Planner Two

The following is a recommended academic plan for transfer students entering the sociology major as juniors. It is assumed that course 1 and course 10 equivalencies were completed at the previous college.

Students Beginning in Fall Quarter

| Plan Two | | | |
|----------|----------------------|------------------------|-----------|
| Year | Fall | Winter | Spring |
| 3rd (jr) | SOCY 15 SOCY 105A | SOCY 103A SOCY 105B | SOCY 103B |

Students Beginning in Winter Quarter

| Plan Two | | | |
|----------|-----------|----------------------|-----------|
| Year | Fall | Winter | Spring |
| 3rd (jr) | | SOCY 15 SOCY 103A | SOCY 103B |
| 4th (sr) | SOCY 105A | SOCY 105B | |

All majors must complete the remaining six upper-division courses in their junior and senior years.

Requirements for the Intensive Sociology Major

The intensive major is an option for students wishing to major in sociology and focus in the area of Global Information and Social Enterprise Studies (GISES). The global information and enterprise studies intensive sociology major is sponsored and administered by the Department of Sociology. This major is designed for highly motivated, self-directed and enterprising students who have demonstrated the capacity to design and complete an honors-quality project for a civil society group. Students are required to take a total of 18 courses (six prescribed lower-division courses in preparation for the major, four prescribed upper-division core courses, seven upper-division electives, and a project practicum course). In addition, they must successfully complete the comprehensive requirement prior to graduation.

Lower-division preparation. Students must take the following six courses or their equivalents.

- 1, *Introduction to Sociology*
- 10, *Issues and Problems in American Society*
- 15, *World Society*
- 30A, *Introduction to Global Information and Social Enterprise Studies*
- 30B, *Designing ICT Projects for Social Enterprises*
- 30C, *Project Implementation and Grant Writing for Social Entrepreneurs*

Upper-division core courses. The following four sociology courses are required as the foundation of theoretical and methodological training in the discipline. Students are encouraged to take these courses early in their academic career.

103A, *Statistical Methods*

103B, *The Logic and Methods of Social Inquiry*

105A, *Classical Sociological Theory*

105B, *Contemporary Sociological Theory*

Upper-division advanced coursework. Seven additional upper-division courses are required. The student's choice of electives must be approved either by the student's project adviser or by the director of GISES at the time of submitting the major declaration.

Project practicum. Students must enroll in Sociology 196G Project Practicum and complete their GISES capstone project. Contact the Sociology Department undergraduate adviser for more detailed guidelines regarding the GISES capstone project.

Disciplinary Communication (DC) Requirement. All students are required to satisfy the Disciplinary Communications Requirement in their major. The goals of the Sociology Department's disciplinary communication are to teach students to think critically by designing, evaluating, and analyzing existing or proposed research studies; to create knowledge through synthesizing and integrating information from a variety of sources pertaining to a complex social problem; and to develop and apply evidence-based writing skills. Course 103B, *The Logic and Methods of Social Inquiry*, satisfies the Disciplinary Communication Requirement for students in sociology programs.

Comprehensive requirement. Prior to graduation, students are required to complete one of the following comprehensive requirements.

- Senior thesis. The prerequisite for the senior thesis is course 103B. Students who would like to write a senior thesis must submit to their preferred faculty thesis sponsor a proposal that includes a one- to three-page abstract and draft research plan or design, a brief bibliography, and evaluations from relevant courses. The proposal must be submitted by the second week of the quarter, four quarters before graduation. Students unsuccessful in obtaining a thesis sponsor through these means may submit their proposals to the department's undergraduate education committee (UEC) by the fourth week of spring quarter. UEC members will review the merits of these proposals and assign the ones they approve to faculty members who have not yet agreed to serve as thesis advisers for the following year. Students will be notified of the outcome of the UEC's deliberations by the end of spring quarter.
- Capstone course. Sociology 196A, *Capstone: The Sociologist as Public Intellectual*. Upper-division lecture course that explores public sociology and integrates current research with theoretical strands in sociology.

In exceptional cases, students unable to take the senior capstone course may be allowed to substitute a portfolio of work. This substitution must be approved in advance by the department chair. The portfolio option consists of: 1) portfolio of materials from (at least) three upper-division sociology courses; 2) a synthetic essay; 3) a paper consisting of new research by the student on some contemporary social or political issue, analyzed using the theoretical and empirical materials from those three courses. See the department for additional information.

Requirements for the Combined Major in Sociology and Latin American and Latino Studies

Students may choose to declare a combined major in sociology and Latin American and Latino studies. The requirements (listed below) should be examined carefully before choosing the combined major option. Both departments must approve a study plan before the major can be declared. Once the lower-division sociology courses have been completed, students may petition to declare the combined major. Each department determines major and thesis honors separately.

Language Study

Students must demonstrate proficiency in Spanish or Portuguese equivalent to the completion of Spanish 6 or 56 or Spanish for Spanish Speakers 63 or Portuguese 65A-B.

Sociology/Latin American and Latino Studies

Students are required to take a total of 14 courses and to satisfy a senior comprehensive requirement. There are three lower-division course requirements, two from the Sociology Department and one from the Latin American and Latino Studies Department. The lower-division LALS courses must be LALS 1 or 80; transfer students may petition to replace LALS 1 or 80 with an appropriate course from another institution. Upper-division requirements include seven core courses: LALS 100, 100A, 100B; Sociology 103A, 103B, 105A, and 105B; and four additional elective courses, two from sociology and two from Latin American and Latino studies. At least one of the Latin American and Latino studies upper-division courses must be taught in Spanish or Portuguese***, and at least one course in the sociology/Latin American and Latino studies combined major must be on Chicano/a-Latino/a issues. Up to three relevant courses taken through study abroad programs from which credits are transferable to UCSC may be credited toward the major when the content is deemed appropriate by the faculty advisers of both sociology and Latin American and Latino studies. Students can satisfy the comprehensive requirement in one of three ways: 1) writing a senior thesis; 2) passing an appropriate LALS *Senior Seminar* (194 series); or 3) completing the sociology course option of two additional sociology upper-division courses in *Inequality and Social Change*. If the thesis option is selected, it should be planned in consultation with an adviser from each department, completed under the supervision of a faculty member from either department, and read and approved by both advisers; one adviser is sufficient if this faculty member belongs to both departments.

***Upper-division courses in Portuguese are currently not taught at UCSC and must be taken elsewhere.

Honors in the Major

The Sociology Department awards honors in the major based on the student's cumulative GPA for all courses taken to satisfy the program's major requirements. Students with a GPA of 3.75 or above will be considered for honors in the major. Students with a GPA of 3.9 or above will be considered for highest honors in the major. No more than approximately 15 percent of graduating class will be considered for honors or highest honors in the major.

Requirements for the Sociology Minor

Students minoring in sociology are required to take seven courses: one of courses 1, 10, or 15; at least two of courses 103B, 105A, and 105B; and at least four other upper-division sociology courses. Students must provide evidence of completion of the lower-division requirement, courses 1, 10, or 15 with a grade of B or better, prior to declaring the sociology minor.

Requirements for the GISES Minor

Students minoring in GISES are required to take nine courses (four prescribed lower-division courses in preparation for the minor, four upper-division electives, and a project practicum course). The four lower-division requirements are courses 15, 30A, 30B and 30C. The student's choice of four upper-division electives must be approved either by the student's project adviser or by the director of GISES at the time the minor is declared. Students must take Sociology 196G, *Project Practicum*, and complete their GISES capstone project. See description for the project practicum under Requirements for the Intensive Major.

Disqualification Policy

Students who receive a D, F, NP, or W twice in any of the upper-division core courses (courses 103A, 103B, 105A, and 105B) will be disqualified from the major or minor. Students, their college, and the Office of the Registrar will be notified by the department no later than the first day of instruction of the quarter following the disqualifying failure. Students who feel there were extenuating circumstances surrounding their failure of a course for the second time may appeal their disqualification by submitting a letter to the chair of the sociology undergraduate education committee. The appeal must be filed no later than 15 days after the disqualification notification was mailed, or the 10th day of classes in the quarter of the disqualification, whichever is later. For further information regarding the disqualification process, contact the Sociology Department.

UC Education Abroad Program Students

Academic year programs. Students must declare the major and pass the three lower-division preparatory course requirements (1, 10, and 15) and three of the upper-division core courses (103B, 105A, 105B) prior to study abroad. It is recommended that the students have the courses intended to be taken abroad reviewed and approved by the Sociology Department prior to departure. Up to three approved courses may be used toward the sociology major.

Semester programs. Fall semester: students must declare the major and pass the three lower-division preparatory course requirements (courses 1, 10, and 15) and one upper-division core course (105A) prior to fall semester study abroad. Spring semester: students must declare the major and pass the three lower-division course requirements (courses 1, 10, and 15) and two upper-division core courses (103B and 105B) prior to spring semester study abroad.

Up to three relevant courses taken through study abroad programs from which credits are transferable to UCSC may be used toward satisfaction of the major requirements when the content is deemed appropriate and approved by the Sociology Department.

Transfer Students

Junior transfer students expressing an interest in sociology on their UCSC application for admission are admitted as proposed sociology majors. This status is

considered undeclared. Transfer students must meet with the sociology undergraduate adviser when they arrive on campus to determine their status and begin the actual declaration of major process, which must be completed by the end of the second quarter of the junior year for transfer students.

Declaring sociology early in the academic career will give a student priority for sociology course enrollment in subsequent quarters.

Graduate Program

The graduate program in sociology at UCSC distinguishes itself by its interdisciplinary nature. The program is designed to educate students in sociological theory and methods and in the disciplines major substantive areas while simultaneously exposing students to other arenas of intellectual inquiry that will aid them as they pursue their research questions and interests. After completing a group of required courses, students work closely with individual faculty members in designing their own course of study. The program leads to a doctor of philosophy (Ph.D.) degree in sociology. A master of arts (M.A.) degree may be taken *en route* to the doctorate, but a master's program *per se* is not available.

The core curriculum is divided into two parts, 1) basic grounding in sociological theory and methods, and 2) exposure to research in three areas of concentration: a) globalization, political economy, and environment; b) inequality and identity; and c) culture, knowledge, and power. To prepare students to conduct their own research projects, the department trains student in multiple methods—comparative and historical analysis, quantitative techniques, field research, and interpretive methods.

The sociology graduate program is intended to lead to both academic and nonacademic careers, and the interests of the faculty reflect this twofold objective. Faculty specialties include comparative and historical sociology; construction of deviance; criminal justice; cultural sociology; development; economy and society; education; emotions/affect; environmental sociology; globalization; language and social linguistics; law and society; Marxist sociology; mass communication; medical sociology; policy analysis; political economy; qualitative methodology; race, class, gender, sexuality; science and technology studies; social inequality; social movements; sociology of drugs; sociology of knowledge; and visual sociology.

Graduate students are supported through teaching assistantships, teaching fellowships, research fellowships and other grant/fellowship opportunities. A number of faculty receive research grants that support graduate student research assistantships, most recently, for example, the National Science Foundation Science and Justice Fellowships.

When asked what they most appreciate about the sociology graduate program, most students cite the students' and faculty's activism and commitment to social change in combination with their dedication to teaching, scholarly research, and understanding of the social forces of our society. The Sociology Department's colloquium series enhances scholarship, practice, and collegial networks. The diversity in age, ethnicity, and work experience of the student body creates a vibrant atmosphere for learning.

Many of the faculty in the Sociology Department have affiliations with other departments and programs on campus, and the graduate program consequently encourages interdisciplinary work. Seminars in the anthropology, environmental studies, history, history of consciousness, politics, psychology, and feminist studies programs are open to sociology students. Graduate

students in sociology may obtain a parenthetical notation on the sociology Ph.D. diploma indicating that they have specialized in feminist studies, Latin American and Latino studies, environmental studies, philosophy, or education. Students must meet requirements spelled out by the relevant department and their committee members. Students also participate in research projects under the auspices of seven interdisciplinary social science research centers: the Science and Justice Working Group; the Center for Agroecology and Sustainable Food Systems; the Center for Global, International, and Regional Studies; the Center for Justice, Tolerance, and Community; the Chicano/Latino Research Center; the Center for Research on Educational Diversity and Excellence; and the Santa Cruz Center for International Economics. Research opportunities also are available in the areas of environmental studies, feminist studies, and lesbian/gay/queer studies.

Many of our graduate students present papers at professional conferences and publish articles during the course of their graduate studies. The sociology master's paper is designed to prepare students to write for professional journals. Ongoing faculty seminars focusing on concrete research topics and problems are available for advanced graduate students working on papers and dissertations in related areas.

The sociology program provides graduate students with many teaching opportunities so they can practice the skills required for good teaching—the ability to articulate ideas, to organize and present materials in logical sequence, and to listen attentively and discern someone else's comprehension. Graduate students serve as teaching assistants for at least three quarters in the department's core classes of the undergraduate curriculum.

The Sociology Department at UCSC is intellectually innovative, both in its interdisciplinary approach and in its commitment to inquiry that is engaged with the world beyond the university.

Required Courses

Students are required to take at least 12 courses as follows.

A three-course core group:

- 201 *The Making of Classical Theory*
- 202 *Contemporary Sociological Theory*
- 203 *Sociological Methods*

Two methods courses:

- 204 *Methods of Quantitative Analysis*

and one of the following seven courses:

- 205 *Field Research Methods*
- 206 *Comparative Historical Methods*
- 209 *Analysis of Cultural Forms*
- 241 *Cross-National and Cross-Cultural Research*
- 242 *Feminist Research Seminar*
- Psychology 248 *Survey Methods*; or Sociology 282 *Social Policy Research*

Three area foundation courses:

- 220 *Global Transformation: Macrosociological Perspectives*
- 240 *Inequality and Identity*
- 260 *Culture, Knowledge, Power*

At least one writing course (208 or 250)

A minimum of three elective graduate seminars, at least one from Sociology (excluding Sociology 250 and Sociology 293).

Students with no background in statistics are strongly advised to take an undergraduate course in statistical methods before enrolling in *Methods of Quantitative Analysis*, but can be admitted with permission of the instructor.

Progress Toward the Ph.D.

- Beginning at least by the end of the first year, students initiate work on their master's paper.
- Completion of the master's paper is expected by the end of the second year.
- Students are expected to take an oral qualifying examination by the end of the third year, but no later than the end of the fourth year.
- Graduate students prepare field statements in two distinct areas of sociology and, in addition, prepare a detailed course outline and a grant proposal in one or the other of these areas.
- The qualifying examination is an oral examination and based on the student's field statements.
- After passing the qualifying examination, a student is advanced to candidacy and begins work on the dissertation with the aid of a three-person dissertation committee.

Details of the policies for admission to the graduate program, the requirements for the Ph.D. degree, and information on financial support opportunities are available from the Department of Sociology. For more information, refer to the Graduate Studies section of the catalog.

Lower-Division Courses

1. Introduction to Sociology. F,S

A systematic study of social groups ranging in size from small to social institutions to entire societies. Organized around the themes of social interaction, social inequality, and social change. Fulfills lower-division major requirement. (General Education Code(s): IS.) *C. Reinerman, F. Guerra*

10. Issues and Problems in American Society. W,S

Exploration of nature, structure, and functionings of American society. Explores the following: social institutions and economic structure; the successes, failures, and intractabilities of institutions; general and distinctive features of American society; specific problems such as race, sex, and other inequalities; urban-rural differences. Fulfills lower-division major requirement. (General Education Code(s): IS.) *D. Gould, J. Reardon*

15. World Society. F,W

Introduction to comparative and historical sociology. Focuses on the global integration of human society. Examines social changes such as industrialization, globalization, colonial rule, and the rise of Islamic fundamentalism. Uses social theory (including ideas from Marx, Weber, and Adam Smith) to explore the making of institutions like the nation-state, the World Trade Organization, the World Bank, and the International Monetary Fund. Fulfills lower-division major requirement. (General Education Code(s): CC, IS, E.) *P. Lubeck, S. McKay*

20. Key Issues in Race and Ethnic Analysis. *

Provides a solid conceptual foundation for undergraduates interested in pursuing the study of race and ethnic issues in advanced upper-level classes. (General Education Code(s): IS, E.) *The Staff*

30A. Introduction to Global Information and Social Enterprise Studies (3 credits). F

Teaches how to use social-enterprise methodologies to transfer information-communication technologies (ICT) to community and non-governmental organizations. Concepts include: globalization, info-exclusion, social justice, information revolution, global civil-society networks, social entrepreneurship, "open source" resources, web design, databases, networking. Requires organizational assessment. Enrollment limited to 50. *P. Lubeck*

30B. Designing ICT Projects for Social Enterprise (3 credits). W

Covers designing "doable" ICT-based projects to support the goals of community and NGOs. Topics include: social entrepreneurship/enterprise case studies; step-by-step project design; integrating social and technical solutions; project management. Technical topics include: Internet resources; advanced web/database design; computer networks/maintenance. Enrollment limited to 50. *P. Lubeck*

30C. Project Implementation and Grant Writing for Social Entrepreneurs (3 credits). S

Covers conversion of ICT project into a fundable grant proposal for social justice, integration of social activism, entrepreneurship and justice, and implementation of project. Topics include: funders, proposal design, field methods, project assessment, innovative ICT applications, action research methods. Enrollment limited to 50. *P. Lubeck*

33. Designing Community Information Technology Centers. *

Examines theory and practice of designing and constructing community information technology centers for the U.S.A. and developing world through hands-on projects. Covers topics in social design, networking, open-source software, computer management, computing policy, VoIP, Wi-Fi, power sources, and project management. Courses 30A or 30B or 30C recommended as preparation. Enrollment limited to 25. *P. Lubeck*

35. Information Methods: IT Design and Application for Social Change. *

Information technology (IT) is an essential tool for community organizations. When, how, and with what success IT is used, however, is not a simple problem. This seminar works through core design processes and helps develop "information plans" for successful technology application in community organizations. Priority given to Global Information Internship Program participants. Enrollment limited to 30. *The Staff*

42. Student-Directed Seminar. F,W,S

Seminars on selected topics taught at various times by upper-division students under faculty supervision. (See course 192.) Consult the *Schedule of Classes* for specific offerings. *The Staff*

80E. The Sociology of Love. *

Investigation of love from a sociological perspective, including the following: (1) how the experience of love is constructed/shaped by the individual, social structure, conventions, ideology; (2) functions of love for the individual/society; (3) how love varies by gender/social class; (4) mythologies of love. Emphasis on romantic heterosexual love and its historical development in Western culture. (General Education Code(s): T3-Social Sciences.) *The Staff*

80V. Understanding Agile Web Development for Social Justice. *

Focuses on development of web applications using agile methodologies and fundamentals of web programming and/or web UI design. Topics include: free/open-source

software movement, social computing, and practices of digital justice. Focus is on ruby language, design principles, storyboarding, source control, testing, and documentation. May be repeated for credit. (General Education Code(s): T7-Natural Sciences or Social Sciences.) *P. Lubeck*

80Z. Youth and Crime. *

Addresses foundations of development of our juvenile justice system and its adaptation (or failure to adapt) to changing youth crime and socioeconomic patterns at beginning of the millennium, with special emphasis on California. (General Education Code(s): T3-Social Sciences.) *The Staff*

93. Field Study. F,W,S

Ordinarily call numbers for this course will not be issued after the first week of instruction. Students submit petition to sponsoring agency. *The Staff*

99. Tutorial. F,W,S

Ordinarily call numbers for this course will not be issued after the first week of instruction. Students submit petition to sponsoring agency. *The Staff*

Upper-Division Courses

103A. Statistical Methods (7 credits). W

Fundamental concepts in statistics. Introduction to measuring causation. Learn to use computer to analyze data efficiently. Emphasis on practical applications. Enrollment restricted to sociology, proposed sociology, and combined sociology majors. (General Education Code(s): SR, Q.) *F. Guerra*

103B. The Logic and Methods of Social Inquiry (7 credits). S

The first part of the course focuses on basic ethical, political, and logical issues in social scientific inquiry. The second part develops a wide range of skills and methods appropriate to actual research. Course 103A, Statistical Methods, is strongly recommended. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; enrollment restricted to sociology and sociology combined majors, minors and proposed majors. (General Education Code(s): W, Q.) *G. Sandoval*

105A. Classical Sociological Theory. F

This intensive survey course examines the intellectual origins of the sociological tradition, focusing on changing conceptions of social order, social change, and the trends observed in the development of Western civilization in the modern era. Readings are all taken from original texts and include many of the classical works in social theory with special emphasis on the ideas of Marx, Weber, and Durkheim which constitute the core of the discipline. Required for sociology majors planning on studying abroad (EAP). Enrollment restricted to juniors and seniors in sociology, proposed sociology, the combined Latin American and Latino studies/sociology, and the proposed combined Latin American and Latino studies/sociology majors and sociology minors. *M. Greenberg*

105B. Contemporary Sociological Theory. W

Surveys major theoretical perspectives currently available in the discipline including functionalism, symbolic interactionism, ethnomethodology, conflict theory, critical theory, neo-Marxism, feminist theory. Enrollment restricted to juniors and seniors in sociology, proposed sociology, the combined Latin American and Latino studies/sociology, and the proposed combined Latin American and Latino studies/sociology majors and sociology minors. *A. Szasz*

110. Violence in the Family. *

Examines child abuse and neglect, wife abuse, and sexual abuse in the family, using gender as a lens through

which to understand domestic violence. Using a variety of sources, the course undertakes to understand the social, political, and cultural forces that contribute to abuse and to consider solutions. *The Staff*

111. Family and Society. F

Focuses on the interaction between family and society by considering the historical and social influences on family life and by examining how the family unit affects the social world. Readings draw on theory, history, and ethnographic materials. *W. Martyna*

112. Economic Sociology. *

Introduction to economic sociology using field visits to key sites of production and consumption to investigate sociological ideas about the modern economy. *B. Crow*

113. Political Sociology. *

An intensive examination of major substantive monographs representing pluralist, elite, and class theories of the state in industrialized capitalist democracies. *The Staff*

114. Sports and Society. *

Explores the interconnections between sports and society using sociological theories and methods. Topics include class, race, and gender; mass media and popular culture; political economy; education and socialization; leisure patterns (participants and spectators); globalization and cross-national comparisons. *The Staff*

115. Sustainability and Social Change. *

A hands-on, integrated-learning workshop where students are trained to pursue collaborative design projects, and carry out a design project in which they use these skills. Students read sociological analyses of particular case studies of collaboration in innovation and design, illustrating particular social science approaches to collaboration and sustainable design. Enrollment by permission of instructor. (Formerly *Collaborative Design for Sustainable Technology Lab.*) Enrollment limited to 30. *E. Du Puis*

116. Communication, Media, and Culture. F

Examines media institutions, communication technologies, and their related cultural expressions. Focuses on specific ways the media—including media studies and criticism—operates as social and cultural factor. Contemporary theory or equivalent in related fields recommended. (Formerly *Communication and Mass Media.*) Enrollment restricted to upper-division students. *H. Gray*

117. California Youth in Transition. *

Explores modern California youth as a transitional generation whose trends signal a "new sociology" in the interplay of race, immigration, class, gender, and age. Examines the myths/realities of youth crime, violence, suicide, drug abuse, school failure, and other social issues. Course 1 or course 10 recommended but not required. *The Staff*

118. Popular Music, Social Practices, and Cultural Politics. *

Considers the role of popular music as a site of contemporary social practices and cultural politics. Examines the institutional organization and production of popular music, its cultural meanings, and its social uses by different communities and social formations. Also examines popular music as a vehicle through which major cultural and political debates about identity, sexuality, community, and politics are staged and performed. Prerequisite(s): course 105A or 105B. Enrollment restricted to juniors and seniors. *The Staff*

119. Sociology of Knowledge. *

Focus includes the following three areas: historical examination of sociological theories of knowledge with reference to Durkheim, Weber, Mannheim, and others; examination of black and feminist perspectives within sociology;

examination of whether and how "outside" observers can analytically grasp the inner workings of other cultures. Prerequisite(s): course 103B or 105A or 105B. *The Staff*

120. Gender, Sexuality, and Cultural Politics. W

Focuses on the role feminist discourses play in cultural politics emphasizing sex, sexuality, and sex work as related to gender, race, and class. Examines the relationship between academic and popular feminisms. Interrogates post-feminism, third-wave feminism, and generational differences in feminisms. (Formerly *Feminisms and Cultural Politics.*) Prerequisite(s): course 129 recommended. Enrollment restricted to juniors and seniors. *J. Bettie*

121. Sociology of Health and Medicine. *

Analysis of the current health care "crises" and exploration of the social relationships and formal organizations which constitute the medical institution. Study of the political, economic, and cultural factors which affect the recognition, distribution, and response to illness. *J. Reardon*

121B. Comparative Health-Care Systems and Policies. *

Critical examination of the American health-care system, its history, and the interests it serves; and an analysis of the health-care systems of comparable nations. *The Staff*

122. The Sociology of Law. W

Explores the social forces that shape legal outcomes and the ways law, in turn, influences social life. Traces the history and political economy of American law; the relation between law and social change; how this relation is shaped by capitalism and democracy; and how class, race, and gender are expressed in welfare and regulatory law. (Also offered as Legal Studies 122. Students cannot receive credit for both courses.) *C. Reinerman*

123. Law, Crime, and Social Justice. *

Blends the latest research in criminology with that from social stratification, inequality, and social welfare policy with the objective of exploring the relationship between levels of general social justice and specific patterns of crime and punishment. The focus is primarily on the U.S. although many other industrialized democracies are compared. An introductory course in sociology is recommended as preparation. (Also offered as Legal Studies 123. Students cannot receive credit for both courses.) *The Staff*

124. Visual Sociology. *

Learn to critically consume documentary, ethnographic film, photojournalism, and the genre of realism as these methods are increasingly used to describe the social world. Addresses theoretical, methodological, practical, and ethical issues of creating visual media. Optional media lab teaches students how to create visual products as well. (Formerly *Visual Ethnography*) Prerequisite(s): Enrollment restricted to juniors and seniors. *J. Bettie*

124L. Visual Sociology Media Lab (2 credits). *

Teaches the basics of digital narrative/storytelling, basic use of digital video cameras, digital video editing in iMovie and/or Final Cut Pro, and use of microphones and sound. Students use these skills to aid in creation of their final course project. (Formerly *Visual Ethnography Media Lab.*) Concurrent enrollment in course 124 is required. Enrollment restricted to juniors and seniors. *J. Bettie*

125. Society and Nature. F

A healthy society requires a stable and sustainable relationship between society and nature. Covering past, present, and future, the course covers environmental history of the U.S., the variety and extent of environmental problems today, and explores their likely development in our lifetimes. (General Education Code(s): PE-E.) *A. Szasz*

126. Sociology of Sex. S

Explores social and cultural aspects of human sexuality and reproduction, including how and why meanings and behaviors are contested. Analyzes sexuality and reproduction as forms of social and political control as well as cultural expression and self-determination. Enrollment restricted to upper-division students. Enrollment limited to 90. *J. Bettie*

127. Drugs in Society. S

Explores the history of the use and abuse of consciousness-altering substances like alcohol and other drugs. Social-psychological theories of addiction are reviewed in tandem with political-economic analyses to identify the social conditions under which the cultural practices involved in drug use come to be defined as public problems. An introductory sociology course is recommended prior to taking this course. (Also offered as Legal Studies 127. Students cannot receive credit for both courses.) *C. Reinerman*

128. Law and Politics in Contemporary Japan and East Asian Societies. *

Introduction to contemporary analysis of Japan's race relations, ethnic conflicts, and a government's failure to restore remedial justice for war victims in Japan, Asia, and the U.S. Specific issues include comfort women, national or state narratives on Hiroshima, forced labor during World War II, and Haydon legislation that allows war victims to sue Japanese government and corporations in California. (Also offered as Legal Studies 126. Students cannot receive credit for both courses.) Enrollment limited to 30. *H. Fukurai*

128I. Race and Justice. F

An introduction to comparative and historical analyses of the relations between race and criminal justice in the U.S. Emphasis on examinations of structural mechanisms that help maintain and perpetuate racial inequality in law, criminal justice, and jury trials. (Formerly *Race and Criminal Justice*) (Also offered as Legal Studies 128I. Students cannot receive credit for both courses.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 120. *H. Fukurai*

128J. The World Jury on Trial. *

Adoption of the jury and its varied forms in different nations provides ideal opportunities to examine differences between systems of popular legal participation. Course considers reasons why the right to jury trial is currently established in Japan or Asian societies, but abandoned or severely curtailed in others. American jury contrasted with other forms of lay participation in the legal process. (Also offered as Legal Studies 128J. Students cannot receive credit for both courses.) Enrollment restricted to sophomores, juniors, and seniors. Enrollment limited to 30. *H. Fukurai*

128M. International Law and Global Justice. S

Examines war crimes, crimes against humanity, and the evolution and role of the International Criminal Court (ICC). Examines the evolution of the concept of international law, the rationale for its birth and existence, roots of international conflicts and genocides, possible remedies available to victims, mechanisms for the creation and enforcement of international legal order, as well as the role of colonialism, migration, poverty, race/ethnic conflicts, gender, and international corporations in creating and maintaining conflicts and wars. (Also offered as Legal Studies 128M. Students cannot receive credit for both courses.) Enrollment restricted to juniors and seniors. Enrollment limited to 30. *H. Fukurai*

129. Popular Culture and Cultural Studies. W

Examines the hidden politics of popular pleasure, studying

the workings of domination and transgression in popular culture and everyday life. Explores not only media representations but cultural practices as well. Examines both cultural production and consumption. Considers how hegemonic discourses render the politics of resistance invisible. (Formerly *Popular Culture*.) Enrollment restricted to juniors and seniors. *J. Bettie*

130. Sociology of Food. *

Following food from mouth to dirt, explores the politics, economy, and culture of eating, feeding, buying, selling, and growing food. Topics cover both the political economy of the food system as well as how body and nature are contested categories at either "end" of this system. *E. Du Puis*

131. Media, Marketing, and Culture. *

Explores relationship between modern forms of cultural production and the economy and society in which they emerge. Course reads, screens, and discusses variety of the cultural texts: from the historical and theoretical to the commercial, popular, and counter-cultural. (Formerly *Culture, Economy, and Power*.) Enrollment restricted to juniors and seniors. *M. Greenberg*

132. Sociology of Science and Technology. *

Reviews social and cultural perspectives on science and technology, including functionalist, Marxist, Kuhnian, social constructionist, ethnographic, interactionist, anthropological, historical, feminist, and cultural studies perspectives. Topics include sociology of knowledge, science as a social problem, lab studies, representations, practice, controversies, and biomedical knowledge and work. Prerequisite(s): course 103B, 105A, or 105B. Enrollment limited to 20. *The Staff*

133. Currents in African American Cultural Politics. S

Takes as its subject, the dialogues, debates, conceptions, and strategies of self representation produced by blacks in the U.S. and Atlantic world in the twentieth and twenty-first centuries. These issues are examined through the insights of feminist theory, cultural studies, media studies, sociology, and African American studies. Enrollment restricted to juniors and seniors. (General Education Code(s): E.) *H. Gray*

134. Television and the Nation. W

The role of American network television in the production of the post-war American national imagination is our focus. Our approach will explore issues of media power, especially television's industrial apparatus, its network structure, its strategies of representation in relationship to the construction of the image of the nation, and the meaning of citizens, consumers, and audiences. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors. (General Education Code(s): W.) *H. Gray*

135. Nonverbal Communication. *

Explores varieties of nonverbal communication: facial expressions, tones of voice, personal space and proxemics, gestures, and paralanguage. Readings are drawn from sociology, psychology, and anthropology. Includes films, videotapes, photographs, and audiotapes. *The Staff*

136. Social Psychology. W

Major theories and concepts in sociological study of social psychology. Topics include identity and social interaction, deviance, sociology of emotions, social narratives, and the social construction of reality. (General Education Code(s): PE-H.) *M. Millman*

137. Deviance and Conformity. W

Why certain social acts are considered threatening and

how individuals or groups become stigmatized. Sociological analysis of the institutions and processes of social control and the experience of becoming deviant and living with a stigmatized identity. Introductory course in sociology recommended. (General Education Code(s): PE-H.) *F. Guerra*

140. Social Psychology of Power. *

This course uses historical, sociological, and social psychological materials to introduce students to issues concerning class and power, religion and power, minorities and power, women and power, the rise of the New Right, and the successes and failures of the Left. Prerequisite(s): course 1, 10, or 15 or Psychology 40. Enrollment restricted to juniors and seniors. *G. Dombhoff*

141. Group Process. *

The study of group development and interpersonal behavior based primarily on observation of the class discussion group. Readings are drawn from psychology and fiction as well as from sociology. Offered in alternate academic years. Enrollment restricted to senior sociology majors. Enrollment limited to 18. *M. Millman*

142. Language and Social Interaction. W

Concerns the routine and taken-for-granted activities that make up our interactions with one another, consisting in large part—but not exclusively—of verbal exchanges. Emphasis on the socially situated character of communication, whether intimacy between two people or dominance of a group. An introductory sociology course is recommended prior to taking this course. Enrollment restricted to sophomores, juniors, and seniors. *W. Martyna*

143. Conversation Analysis. *

A working seminar, involving the analysis of actual conversations. Covers fundamental ethical, conceptual, and methodological issues that arise in the collection of conversational data, as well as the skills and techniques of conversation analysis. Given our operating assumption, that talk is a primary means of constructing social identities, there is a heavy thematic emphasis on gender, status, and power in conversation. Prerequisite(s): course 142 or Psychology 80E. Enrollment restricted to juniors and seniors. Enrollment limited to 20. *C. West*

144. Sociology of Women. W

Analysis of the social significance and social production of gender. Some consideration of how sex differences have developed. Major emphasis on the impact of gender as a categorical imperative in the present social context. In this context, the course is also about sexual segregation, sexual inequality, and the dynamics of interpersonal power. Enrollment restricted to juniors and seniors. An introductory sociology course is recommended. *C. West*

145. Sociology of Men. S

Examines conflicting views on the development and state of modern masculinity as adaptation, transitional phase, or pathology. Did men lose the "gender war"? Do boys need rescuing? What are common and divergent social experiences of men within race, class, gender, culture, era? An introductory sociology course recommended. *W. Martyna*

146. Sociology of Violence, War, and Peace. *

Explores key issues, theories, and topics in the study of violence, war, and peace. Addresses aspects of aggression, personal violence, political violence, and war. In addition, various strategies for the prevention of violence and war are examined. *The Staff*

148. Sociology of Learning. *

Examines learning and achievement from class, race, and gender perspectives; provides tools for improving learning and achieving goals; explores interplay between past and

present social forces affecting learning and achievement. Class has dyads rather than sections. Enrollment restricted to juniors and seniors. *The Staff*

149. Sex and Gender. *

Modern analyses of sexuality and gender show personal life closely linked to large-scale social structures: power relations, economic processes, structures of emotion. Explores these links, examining questions of bodily difference, femininity and masculinity, structures of inequality, the state in sexual politics, and the global re-making of gender in modern history. Recommended as background: any lower-division sociology course. *The Staff*

150. Sociology of Death and Dying. S

Explores contemporary, historical, cross-cultural and interdisciplinary perspectives on the social psychology of death and dying. Cultural norms and institutional contexts are studied, along with the individual experience, and the ways in which our perspectives on death and dying influence our experiences of life and living. Enrollment restricted to juniors and seniors. *W. Martyna*

151. Research Seminar on Human Communication. *

Focuses on advanced topics in verbal and nonverbal communication. Members of this research seminar select a specific area of human communication (e.g., "gestures," "facial expressions," "the voice," etc.). Students assemble an annotated bibliography, drawing on literatures in many social science disciplines, and write scripts that demonstrate complex communication issues. Finally, students use audio and video equipment to illustrate these scripts. Prerequisite(s): course 135. Enrollment limited to 25. *The Staff*

152. Body and Society. F

Critically examines the place of the human body in contemporary society. Focuses on the social and cultural construction of bodies, including how they are gendered, racialized, sexualized, politicized, represented, colonized, contained, controlled, and inscribed. Discusses relationship between embodiment, lived experiences, and social action. Focuses on body politics in Western society and culture, especially the United States. An introductory sociology course is recommended prior to taking this course. Enrollment restricted to juniors and seniors. Enrollment limited to 50. *F. Guerra, The Staff*

153. Sociology of Emotions. F

Examines sociological approaches to the understanding of emotions and the application of these approaches to work, learning, interpersonal relationships, health and illness, sports, and other aspects of everyday life. Enrollment restricted to juniors and seniors. *M. Millman*

154. Cross-National and Cross-Cultural Research. *

Examines a variety of theoretical, methodological, and substantive approaches to cross-national and cross-cultural research. Focuses on the importance and variety of cross-national and cross-cultural studies. Prerequisite(s): course 103B. Enrollment limited to 20. *The Staff*

155. Political Consciousness. *

Explores the relationship between consciousness, ideology, and political behaviors from voting to rebellion. Special attention is given to the lived experience and the identity interests that complicate the nexus of class position and political ideology. An introductory sociology course is recommended as preparation. *G. Dombhoff*

156. U.S. Latina/o Identities: Centers and Margins. F

Explores historical and contemporary constructions of Latina/o identities and experiences in U.S. Particular

emphasis placed on transcultural social contexts, racial formations, and intersections with other identities including sexuality and gender. Enrollment restricted to juniors and seniors. Enrollment limited to 50. (General Education Code(s): ER, E.) *G. Sandoval*

157. Sexualities and Society. *

Explores controversies in the sociology of sexuality. Focuses on tensions and disagreements that characterize debates over sex and society, and attempts to identify political and theoretical issues at stake in these debates. Enrollment limited to 30. *D. Gould*

163. Global Corporations and National States. *

Examines the nature and development of the capitalist world system since 1945. Emphasis is on the power of multinational corporations as managers of the world system and the response of states: role of multilateral agencies such as the World Bank, International Monetary Fund, United Nations. *H. Shapiro*

165. World Systems Perspective. *

Seminar on the intellectual origins and contemporary exponents of the world-systems perspective in the social sciences: Marx, Braudel, Polanyi, Arrighi, Wallerstein. Prerequisite(s): courses 105A and 105B or permission of instructor. *The Staff*

166. Economics for Non-Economists. *

Fosters economic literacy among students who are not economics majors but are interested in the political and social ramifications of economic change. Emphasizes economic institutions and policy and is taught by case-study method, which requires active student participation. Enrollment restricted to juniors and seniors. Enrollment limited to 40. *H. Shapiro*

167. Development and Underdevelopment. S

Examines contemporary debates about development in the Third World: alternative meanings of development, recent work on the impact of colonial rule, how some economies have industrialized, ideas about agrarian change, and recent research on paths out of poverty. Students work in pairs to examine a development in one country since World War II. *B. Crow*

168. Social Justice. *

What is social justice? People answer this question differently, depending upon their sociological perspective. Using a combination of political philosophy and sociological studies, explore five perspectives on social justice within the Western sociological tradition: utilitarianism, Marxism, liberal egalitarianism, communitarianism, and pluralism. Students pick a topic and learn to articulate different visions of socially just change based on these perspectives. Prerequisite(s): course 105A. Enrollment limited to 60. *E. Du Puis*

169. Social Inequality. F

A survey of theories and systems of social stratification focusing on such phenomena as race, class, power, and prestige. Enrollment restricted to juniors and seniors. (General Education Code(s): E.) *D. Takagi*

170. Ethnic and Status Groups. *

Examines the enduring and changing status of ethnic and other visible minority groups in the United States, e.g., Latinos, Asian Americans, African Americans, and immigrants, with comparative materials drawn from other societies. An introductory course in ethnicity and race is recommended as preparation. Satisfies American History and Institutions Requirement. (General Education Code(s): E.) *The Staff*

171. Exploring Global Inequality. F

Seminar focusing on readings of key texts and recent research papers on several dimensions of global inequality

(material, health, gender, cultural, migration) to find innovative ways of understanding the connections among different dimensions of inequality and of visualizing inequality in digital media. Students prepare visual presentations on contemporary social inequalities suitable for an online (for example, <http://ucatlus.ucsc.edu/>) or print atlas. Enrollment restricted to seniors. Enrollment limited to 30. *B. Crow*

172. Sociology of Social Movements. *

Analyzes access to clean water, both in the American West and global South. Reviews water quality, pivotal role of water in settlement and society, history and contemporary inequalities, water supplies, international conflict over water, climate change, and human use of water. Enrollment restricted to juniors and seniors. Enrollment limited to 60. (General Education Code(s): PE-H.) *D. Gould*

173. Water. *

Analyzes access to clean water, both in the American West and global South. Reviews water quality, pivotal role of water in settlement and society, history and contemporary inequalities, water supplies, international conflict over water, climate change, and human use of water. Enrollment restricted to juniors and seniors. Enrollment limited to 60. (General Education Code(s): PE-E.) *A. Szasz, B. Crow*

174. Twenty-First-Century African American Social Structure. *

A sociological overview of African American society in the 21st century. The changing patterns of social/cultural organization, class structure, and modes of political action are analyzed. This analysis is located within the framework of migration, urbanization, and social struggle among black Americans. Prerequisite(s): course 10 or 20. (General Education Code(s): E.) *The Staff*

175. Social History of Asian Americans. *

Provides a general introduction to the history of Chinese, Japanese, Filipinos, Koreans, and Southeast Asians, within the context of American history. Examines the diverse processes of immigration, the formation of communities, work, and family relations of Asians and Asian Americans. Looks at how social, political, and economic changes in the larger U.S. society have affected the lives of Asians in America. Offered in alternate academic years. Enrollment restricted to juniors and seniors. Satisfies American History and Institutions Requirement. (General Education Code(s): E.) *The Staff*

176. Women and Work. *

Examines the history of women and work; women's current conditions of work and political, economic, and social factors affecting these conditions; means by which women may shape working conditions including contributing leadership, developing policies, building unity, and creating alliances. Enrollment restricted to juniors and seniors. *The Staff*

176A. Work and Society. F

Addresses how work is organized and shapes life changes. Covers: the history of paid work; the impact of technology; race/class/gender at work; professional and service work; work and family; collective responses to work; and challenges of work in a globalizing economy. Enrollment restricted to juniors and seniors. *S. McKay*

177. Urban Sociology. S

Historical and contemporary examination of urban life including community, race, geography, urban and suburban cultures and lifestyles, stratification, housing, crime, economic and environmental issues, demographic changes, and global urbanization. Enrollment restricted to junior and senior sociology majors. Enrollment limited to 60. *G. Sandoval*

177A. Latinos/as and the American Global City. F
Examines roles of emerging Latino/a majorities in urban centers across the U.S. Explores the "Latinization" of U.S. cities and various factors affecting the life chances of Latinos/as including, but not limited to, immigration, segregation, social movements, and other forms of political participation. Enrollment restricted to juniors and seniors. Enrollment limited to 40. *G. Sandoval*

177G. Global Cities. *
Explores how "global cities" have facilitated increasing integration of the diverse cultures and economies of the world. Using historical, sociological, and comparative methods, analyzes how these spaces both enable and constrain transnational flows of capital, labor, information, and culture. Enrollment restricted to juniors and seniors. *M. Greenberg*

178. Sociology of Social Problems. S
Views "problems" in society not as given but as social constructs. Examines the ways in which conditions in society become identified and defined as problems and consequences that follow from such a process. *D. Takagi*

179. Nature, Poverty, and Progress: Dilemmas of Development and Environment. W
Concerns about environmental change, including global warming, threats to the ozone layer, and industrial pollution, raise questions about Third World development. Simple views of the relation between society and nature, such as blaming population growth, industrialization, or poor people, seem to preclude higher living standards. Uses debates and case studies to explore more subtle and optimistic views of social-natural relations. *B. Crow*

179L. Nature, Poverty, and Progress Laboratory. *
For enrollees in course 179, this optional lab provides opportunity to research ideas and produce a rough business plan for green enterprise of choice. Examples include compostable packaging, gray water systems, sustainable manufacturing, solar-powered submarines, green consulting, and other enterprises. Concurrent enrollment in course 179 required. Enrollment limited to 20. *B. Crow*

180. Social Movements of the 1960s. F
Examines the roots, development, and political outcomes of black civil rights organizations during the Sixties. Explores social and structural forces, mobilization of black communities, strategies and tactics used, nature of the relationships between various civil rights organizations, unity and disunity among organizations, leadership gains, and impact on race relations in the U.S. Enrollment restricted to junior and senior sociology and combined sociology/Latin American and Latino studies majors. Enrollment limited to 45. *D. Gould*

181. A Sociology of Place: The California Coast. *
Examines the California coast, including important social, political, cultural, and environmental aspects of this most important place. Lectures, readings, discussion, and class assignments examine the history, development, and future of the California coast. Enrollment restricted to juniors and seniors. Enrollment limited to 45. *The Staff*

184. Hunger and Famines. *
Why do famines happen? Why are some hungry and some over-fed? Recent advances in the understanding of food crises and chronic undernutrition are the focus of this course. *B. Crow*

185. Environmental Inequality. S
Modern society not only assaults nature, it does so in ways that reproduce existing social inequalities. Reviews research on disproportionate exposure to risks and hazards, especially along dimensions of class and race, and examines the

environmental justice movement. Enrollment restricted to junior and senior sociology and environmental studies students. Course 125 recommended as preparation. Enrollment limited to 42. (General Education Code(s): PE-E.) *A. Szasz*

186. Globalization, Information, and Social Change. *
Reviews theories of globalization, the information revolution, world inequality, and the value of information networks for upgrading capacity of NGOs and community groups to promote progressive social change. Requires research project/grant proposal using Internet resources. *P. Lubeck*

187. Feminist Theory. W
Examination of shifts in 20th- and 21st-century feminist theory and epistemology. Considers various deconstructive challenges to second wave feminism based on the politics of race, ethnicity, nation, sexuality, and class. Focus changes regularly. Prerequisite(s): course 105B, and either course 144 or 149 or Feminist Studies 1 or 100. Enrollment limited to 35. *D. Gould*

188. Religion and Social Change. *
Uses historical-comparative method to explore role of religion in global and local social movements. Case studies include historical analysis of the civil rights movement, Islamic movements, liberation theology, and millenarian movements. Topics vary annually. Recommended for social science and history majors. (General Education Code(s): E.) *P. Lubeck*

188A. Social Change in the Global Economy. S
Explores local dimensions of globalization, focusing on experiencing more global divisions of labor in both industrialized and developing countries. Themes include: economic integration and dislocation; new forms of governance; globalizing consumption and culture; gender; and popular resistance. Enrollment restricted to juniors and seniors. (General Education Code(s): CC.) *S. McKay*

188G. Global Islam: Politics, Movements, Discourses. *
Historical sociology of Muslim political and cultural movements as a global phenomena. Topics include: survey of Muslim globalization processes, Muslim political theory, Shari'a, Sufi networks, economic institutions, Islamic nationalism contemporary social movements, Muslim response to imperialism, Islamic revival, Muslim civil society, and the role of women in contemporary Muslim politics. *P. Lubeck*

190. Proseminar.
The Staff

191. Sociology Teaching Practicum. F,W,S
Under the supervision of the instructor, the student works with a group of students in a lower-division course, leading discussions, explaining material, reading and marking submissions, consulting individually and/or in other ways assisting in the teaching of a course. Interview and selection by professor required. Prerequisite(s): Senior standing and excellent performance in core courses in the major. Enrollment restricted to senior sociology majors. *The Staff*

192. Directed Student Teaching. F,W,S
Teaching of a lower-division seminar under faculty supervision. (See course 42.) Students submit petition to sponsoring agency. *The Staff*

193. Field Study. F,W,S
Provides for (department-sponsored) individual field study in the vicinity of the campus under the direct supervision of a faculty sponsor (as opposed to course 198 where faculty supervision is by correspondence). Up to three such

courses may be taken for credit in any one quarter. Ordinarily call numbers for this course will not be issued after the first week of instruction. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193F. Field Study (2 credits). F,W,S
Provides for department-sponsored individual field study in the vicinity of campus under the direct supervision of a faculty sponsor. May not be counted toward major requirements. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S
Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194F. Group Tutorial (2 credits). F,W,S
Small group study of a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

195A. Senior Thesis. F,W,S
Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. The senior thesis satisfies the comprehensive requirement. Course is for independent thesis research and writing. Courses may be taken consecutively or concurrently. Prerequisite(s): course 103B. Students submit petition to sponsoring agency. *The Staff*

195B. Senior Thesis. F,W,S
Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. The senior thesis satisfies the comprehensive requirement. Course is for independent thesis research and writing. Courses may be taken consecutively or concurrently. Prerequisite(s): course 103B. Students submit petition to sponsoring agency. *The Staff*

195C. Senior Thesis. F,W,S
Preparation of a senior thesis over one, two, or three quarters, beginning in any quarter. The senior thesis satisfies the comprehensive requirement. Course is for independent thesis research and writing. Courses may be taken consecutively or concurrently. Completion of course 195C (completion of the thesis) satisfies the W general education requirement. Prerequisite(s): course 103B and satisfaction of the Entry Level Writing and Composition requirements. Students submit petition to sponsoring agency. May be repeated for credit. (General Education Code(s): W.) *The Staff*

196A. Capstone: The Sociologist as Public Intellectual (3 credits). S
Students hear a selected group of faculty discuss their current research and how that research furthers public understanding and discussion of some vital contemporary social issue. Enrollment restricted to junior and senior sociology majors. *A. Szasz*

196G. Project Practicum: Global Information and Social Enterprise. F,W,S
Project summary and evaluation are required for completion of minor in global information and social enterprise studies (GISES). Projects require approval in advance by director of GISES. Completed projects must be uploaded electronically on the web site or archive of the global information internship program. Prerequisite(s): courses 30A, 30B, and 30C. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S
Provides for (department-sponsored) individual study program off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Up to three such courses may be taken for credit in any one quarter. Ordinarily call numbers for this course will not be

issued after the first week of instruction. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Advanced directed reading and research. Petitions may be obtained from the Sociology Department Office. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses

201. The Making of Classical Theory. F

Examines the establishment of "theory" in the discipline of sociology. Introduces students to close readings and analysis of a core selection of social theory. Problematises the construction, maintenance, and reproduction of a theoretical canon in sociology. Enrollment restricted to graduate students in sociology and by permission number. Enrollment limited to 20. *D. Gould*

202. Contemporary Sociological Theory. W

Intensive survey of major tendencies in modern social thought, including functionalism, symbolic interactionism, ethnomethodology, critical theory, structuralism, phenomenology, neo-Marxism, and feminist theory. Enrollment restricted to graduate students in sociology and by permission number. *A. Szasz*

203. Sociological Methods. F

Approaches methods as a series of conscious and strategic choices for doing various kinds of research. Introduces students to the epistemological questions of method in social sciences; to key issues in "technique," particularly control, reliability, and validity; and to good examples of social research. Enrollment restricted to graduate students in sociology and by permission number. *C. West*

204. Methods of Quantitative Analysis. W

Students are provided with intuitive explanation of fundamental concepts in statistics and learn how to use statistics to answer sociological questions. Experience and guidance in using computers to efficiently analyze data are provided. Enrollment restricted to graduate students in sociology and by permission number. Enrollment limited to 20. *D. Takagi*

205. Field Research Methods. *

Gives students first-hand experience doing fieldwork with an emphasis on participant observation and some interviewing. Students submit weekly field notes and a final project analysis. At seminar meetings, field experiences and relevant literature are examined. Enrollment restricted to graduate students in sociology and by permission number. Enrollment limited to 10. Offered in alternate academic years. *The Staff*

206. Comparative Historical Methods. W

Overview of research strategies and methods used in historical and social sciences. Students read works exemplifying a variety of analytical approaches. Written assignments cultivate critical skills, weighing of tradeoffs inherent in all methodological choices, and elaboration of hypothetical research designs. Enrollment restricted to graduate students. Enrollment limited to 20. *P. Lubeck*

208. Writing Practicum. *

Writing intensive course designed to facilitate the completion of the master's thesis, oral field statement, or the dissertation in sociology. The seminar is convened by a faculty member in conjunction with students and their adviser or appropriate committee chair. Students are expected to produce and present drafts of work completed in the seminar. Enrollment restricted to sociology graduate students and by permission number. Enrollment limited

to 12. *The Staff*

209. The Analysis of Cultural Forms. S

Examines material and symbolic forms such as media products, cultural artifacts, language, nonverbal communication and social practices using discourse, textual, content, interpretive, and conversation analyses as well as ethnography and different channels of communication. Theoretically, relies on cultural studies, communication studies, cultural sociology, film studies, and ethnomethodology. Enrollment restricted to sociology graduate students. *J. Bettie*

220. Global Transformation: Macrosociological Perspectives. S

Classical concepts and contemporary approaches in macrosociology, the study of large-scale, long term social change. Readings drawn primarily from the Marxian and Weberian traditions (new institutionalism, varieties of neo-Marxism, environmental history, state centrism) as they focus on agrarian and industrial structures and commodity chains; household, village, and neighborhood organization; social movements and revolutions; culture, ideology, and consciousness; policy analysis; comparative urban, national, and civilizational development. Enrollment restricted to graduate students in sociology. Enrollment limited to 15. *B. Crow*

222. Political Sociology. *

A survey of major works and themes in the relationship of politics and society, with primary emphasis on the compatibilities and contradictions of pluralist, elite, and class perspectives on the state. Enrollment restricted to graduate students. *E. Du Puis*

223. Sociology of the Environment. *

Advanced treatment of the dominant ideas of nature and the environment in the West and their relationship to the development of Western capitalism. Leading Western theories of environmental crisis and their relation with ideologies of environmentalism and environmental movements. Enrollment restricted to graduate students. Enrollment limited to 20. May be repeated for credit. *E. Du Puis*

224. Globalization: Theories and Social Movements. *

Examines the structures, processes, and movements associated with globalization processes. Reviews political economy theories, cultural theories systems, state industrial policies, and popular responses to globalization. Also assesses contribution of resistance movements informed by class, ethno-nationalism, religion, or gender. Enrollment restricted to graduate students. Enrollment limited to 25. Offered in alternate academic years. May be repeated for credit. *P. Lubeck*

225. Political Economy for Sociologists. *

Examines rudiments of historical materialism in light of advances in cultural and ecological Marxism. Basic categories of Marxist political economy. Thematic focus on the "first" and "second" contradictions of capitalism in world economy today. Enrollment restricted to graduate students. Enrollment limited to 15. *B. Crow*

227. Learning from Environmental Historians. *

Looks at several major themes in the sociology of the environment and asks how the works of environmental history address those themes. Includes reflections on how history as a method interrogates social questions. Possible themes include: sustainability; social justice; universalism vs. particularity; city and country; and social movements. Enrollment restricted to graduate students. Enrollment limited to 8. *E. Du Puis*

229. Work and Labor Markets in the New Economy. W

Focuses on the interaction of work restructuring and existing race/class/gender inequalities. Themes include: the labor process and theories of consent; labor market segmentation; job and occupational segregation; information technologies, flexible work, and post-industrialism; flexible employment relations; and low-wage service and labor markets. Enrollment restricted to graduate students. *S. McKay*

230. Theory and Method in the Sociology of Marx. *

Examines theoretical and methodological implications of Marxist theory for empirical social research. Analyzes how historians and social scientists apply Marxist method in explaining society, social change, globalization, culture, and late capitalism. Goal is to assist students to employ Marxist theory and method creatively in their research projects. Enrollment restricted to graduate students. Enrollment limited to 12. *P. Lubeck*

240. Inequality and Identity. *

Explores recent theoretical and empirical studies of race, class, gender, and sexuality with an emphasis on the production of identities and their relationship to processes and structures of power in a postcolonial context. Enrollment restricted to graduate students in sociology. *D. Takagi*

241. Cross-National and Cross-Cultural Research. S

Seminar examining theoretical and methodological issues in doing cross-national and cross-cultural research. In addition to a consideration of different research paradigms and approaches, representative works from each comparative tradition are examined. Enrollment restricted to graduate students. Enrollment limited to 15. *C. Reinerman*

242. Feminist Research Seminar. F

Provides scholarly support to students doing feminist research. Examines issues concerning conceptualization of feminism and feminist research. Explores relation of feminist research to intersections of gender, class, and race; to the self; to power; and to transformative social praxis. Students present and are given assistance with their work, as well as listen to, read, and assist with the work of others. Enrollment restricted to graduate students. Enrollment limited to 10. *P. Roby*

244. Race and Ethnicity. *

A critical survey of the theoretical issues of persistence and change, public policy, and recent empirical studies in the field of race and ethnic relations. Readings introduce comparative race relations and a historical background of major theoretical paradigms in the field which purport to explain race and ethnic relations in general and race relations in America specifically. Enrollment restricted to graduate students. Enrollment limited to 15. Offered in alternate academic years. *The Staff*

245. Feminist Theory. *

Examination of shifts in 20th- and 21st-century feminist theory and epistemology. Explores the decentering of universalist feminist theories and asks what constitutes feminist theory after gender has been decentered. Considers various deconstructive challenges to second-wave feminist theory based on the politics of race, ethnicity, nation, sexuality, and class. Focus changes regularly. Enrollment restricted to sociology graduate students. Enrollment limited to 12. *J. Bettie*

246. Class, Culture, and Movement. *

Analyzes impact of ethnicity, gender, and religion on the class situation of laboring people in a globalized economy by intensive reading and critique of classic studies,

explaining how social movements reflect combinations of social relations and cultural practices. Enrollment restricted to graduate students. Enrollment limited to 15. *C. Reinerman*

247. Race and Class. *

Introduces the student to the recent literature on race and class. Covers several different theoretical perspectives including internal colonialism, labor market segmentation theories, racial formation, and neo-gramscian cultural analyses. In addition to study of theory, also compares theoretical perspectives to the historical experience of minority groups, in particular, blacks, Hispanics, and Asians. Enrollment restricted to sociology graduate students. *The Staff*

249. Feminisms and Cultural Politics. *

Focuses on the role feminist discourses play in contemporary cultural politics with the main focus on the politics of sex, sexuality, and sex work. Begins with considerations of (mis)representations of feminisms in popular cultures; considers the relationship between academic and popular feminisms; and interrogates the meaning of terms post-feminism and third-wave feminism. Enrollment restricted to graduate students. *J. Bettie*

250. Course Design and Grant-Writing Seminar. S

A professional training seminar devoted to the philosophical, conceptual, and practical issues of course design, pedagogy, and grant writing. Topics covered: institutional contexts; curriculum (including syllabi, course content, assignments, evaluation); pedagogy; teaching as work/labor process; grant writing; budgets. Enrollment restricted to sociology graduate students. Enrollment limited to 15. *D. Takagi*

252. Symbolic Interactionism and Sociology of Emotions. *

Examines classic and contemporary theories and concepts that play a major role in sociological studies of identity, symbolic and social interaction, and the sociology of emotions. Examines how cultural forms, rules, and rituals define, structure, and mediate emotions and how identities are situated within social institutions. Enrollment restricted to graduate students. Enrollment limited to 10. *M. Millman*

253. Race, Crime, and Justice. *

An introduction to comparative and historical analyses of relations between race and the criminal justice system. Specific topics include defining race/ethnicity, sentencing disparities, jury nullification, jury selection and decisions, prosecutorial misconduct, government's charging and investigative discretions, and other racially biased law enforcement practices and criminal court processes. Also covers a number of highly publicized trials that involved unmistakable elements of race and racism such as Chin, King, Simpson, and Unabomber cases. Students are also exposed to World Wide Web (Internet) to learn how to do research in the field of criminal justice. Enrollment restricted to graduate students. Enrollment limited to 15. *H. Fukurai*

255. Engaging Cultural Studies. *

Examines feminist and ethnic studies production, appropriation, and transformation of cultural studies theories and methodologies. Considers the utility of various theoretical apparatuses and methodological strategies employed in the interdisciplinary site that combines feminist, ethnic, and cultural studies. Enrollment restricted to graduate students. Enrollment limited to 15. *J. Bettie*

256. Urban Sociology. *

Introduction to core writings and key theoretical paradigms in urban sociology. Examines the history and contempo-

rary conditions of cities in the U.S. and the urban experience. Urbanization, suburbanization, community, social inequality, urban politics, relationship between the built environment and human behavior. Enrollment restricted to graduate students. *G. Sandoval*

257. Colonialism, International Law, and Global Justice. *

Examines colonialism, war crimes, crimes against humanity, and legal remedies, and the role of the International Criminal Court (ICC); traces the history of colonial expansionism, starting from the Roman Empire to the present American imperial dominance in global politics. Enrollment restricted to graduate students. Enrollment limited to 15. *H. Fukurai*

258. Global Lay Justice Systems and Direct Democracy. S

Introduces historical analysis of lay justice participation. Examines global exploration of the use of lay judge institutions in citizen's movements and the assumption that juries are a derivative institution of democratic ideals. Focuses on corporate media creation of anti-jury sentiment. Enrollment restricted to graduate students. Enrollment limited to 10. *H. Fukurai*

260. Culture, Knowledge, Power. W

An introduction to theoretical approaches and exemplary studies of culture, knowledge, and power which critically interrogate the relationship between cultural formations and the production, circulation, and meaning of knowledges, materials, artifacts, and symbolic forms. Explores the concrete ways that power is organized and operates through different forms and sites, how it interpolates with other forms of power, and examines knowledges and culture as specific forms of power and sites of political struggle. Enrollment restricted to sociology graduate students. Enrollment limited to 15. *M. Greenberg*

261. Sociology of Knowledge. *

Explores three main issues: the social determination of knowledge, including natural science; the character of intellectual labor and intellectuals as a social group; the role of organized knowledge and "knowledge industries" in contemporary social change. Texts examined include class-based theories (Lukacs, Mannheim, Gramsci), feminist standpoint analysis (Smith, Harding, etc.), and theories of postmodern culture (Lyotard, Harvey, etc.). Enrollment restricted to graduate students. Enrollment limited to 20. *The Staff*

262. Cultural Practice and Everyday Life. *

Examines contemporary debates about the role of mass produced expressive symbols in modern industrial societies, and the circumstances of cultural production for its impact on the creation, organization, and use of cultural artifacts. Concern with the use and experience of popular symbols for the ways that their use involves the creation of meanings and the role of such meanings in the social organization of society. Enrollment restricted to graduate students. Enrollment limited to 10. *H. Gray*

263. Cultural Politics of Difference. S

Considers the cultural turn and the turn to difference in understanding relations of power and struggles over representation in studies of race, media, and culture. Examines national identity, difference, subjectivity, and authenticity, especially as they bear on quests to create new identifications, alignments, and efforts to protect existing identities. Enrollment restricted to graduate students. Enrollment limited to 10. *H. Gray*

264. Science, Technology, and Medicine. *

Explores social and cultural perspectives on science, technology, and medicine. Analyzes theoretical approaches

that open up "black boxes" of scientific and biomedical knowledge, including the politics of bodies, objects, and health/illness. Links are made to medical sociology. Enrollment restricted to graduate students. *J. Reardon*

268A. Science and Justice: Experiments in Collaboration. S

Considers the practical and epistemological necessity of collaborative research in the development of new sciences and technologies that are attentive to questions of ethics and justice. Enrollment by permission of instructor. Enrollment restricted to graduate students. (Also offered as Feminist Studies 268A and Biomolecular Engineering 268A. Students cannot receive credit for three courses.) Enrollment limited to 10. *J. Reardon, K. Barad*

268B. Science and Justice Research Seminar. F

Provides in-depth instruction in conducting collaborative interdisciplinary research. Students produce a final research project that explores how this training might generate research that is more responsive to the links between questions of knowledge and questions of justice. Prerequisite(s): course 268A. Enrollment by permission of instructor. Enrollment restricted to graduate students. (Also offered as Biomolecular Engineering 268B and Feminist Studies 268B. Students cannot receive credit for three courses.) Enrollment limited to 10. *J. Reardon, K. Barad*

282. Social Policy Research. *

Policy research. Covers a variety of theoretical perspectives found in policy studies. Surveys various methodological approaches used in policy research. Theories and methods linked to research agendas on the various phases of the policy life cycle. Students are required to design a research proposal. Enrollment restricted to graduate students. Enrollment limited to 10. Offered in alternate academic years. *E. Du Puis*

290. Advanced Topics in Sociological Analysis. F

The topics to be analyzed each year vary with the instructor but focus upon a specific research area. Enrollment restricted to graduate students by consent of the instructor. *M. Millman*

293. Going on the Job Market. *

A seminar devoted to the practical problems of securing a job as a professional sociologist. Topics covered: researching colleges, universities, and public and private organizations that employ sociologists; designing a curriculum vitae; writing an application letter; preparing a "job talk;" handling questions during the interview process; the etiquette of visiting (and its aftermath); finding out about them; and the terms of employment: what is negotiable and what is not. Enrollment restricted to graduate students. *C. West*

294. Writing for Social Scientists. *

Seminar on the genres of social science writing, and the problems of starting and finishing a publishable thesis, book, or article. For advanced graduate students working on the composition of their dissertations and journal articles. Enrollment restricted to graduate students. Enrollment limited to 10. *M. Millman*

297. Independent Study. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

299. Thesis Research. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Spanish and Spanish for Spanish Speakers

Language Program
218 Cowell College
(831) 459-2054
<http://language.ucsc.edu>

Faculty and Professional Interests

Professor

JORGE ALADRO FONT (Literature)

Spanish mysticism, theory and historical developments of imagery in the Middle Ages to the baroque period, Renaissance and baroque Hispanic literature, Italian ideas in the Spanish Renaissance, Cervantes

JULIANNE BURTON-CARVAJAL (Literature)

Twentieth- and 21st-century Latin(o) American visual media, particularly film; melodrama as a transnational form; gender and authorship; history, cultures, and representations of California, particularly the Central Coast

NORMA KLAHN (Literature)

Latin American literary and cultural studies (specialization: Mexico), Chicano/Latino literature and culture from a cross-border perspective, modernity/postmodernity, poetics and politics, genre theory (novel, poetry, autobiography), contemporary critical theories (i.e., border, ethnic, feminist, transnational/global)

Associate Professor

LOURDES MARTÍNEZ-ECHAZÁBAL (Literature)

Latin American and Caribbean literatures; Afro-Latin American literatures, cultures, and societies; found[n]ational narratives; Brazilian literature; literatures of Cuba and the Cuban diaspora; critical race theory

JUAN POBLETE (Literature)

Latin(o) American literatures; transnational/global cultures (literature, radio, film); Latin(o) American cultural studies; 19th-century studies; the history of reading practices

Assistant Professor

EVE ZYKIK

Spanish linguistics, second language acquisition, cognitive linguistics, language pedagogy and curriculum design

Senior Lecturer

MARIA VICTORIA GONZÁLEZ-PAGANI

Language teaching methodology; Spanish syntax; computer-assisted foreign language learning; Latin American cultural studies, especially women's contributions

Lecturer

IGNACIO AZNAR, Emeritus

BRENDA BARCELÓ

Medical and professional Spanish, language instruction technology, Latin American culture, Latin dance expressions, Spanish/English/Spanish translation and interpretation, Hispanic linguistics, Romance languages

CARLOS CALIERNO

Bilingualism and intercultural communication; Latin American culture; history of the conquest, music, art, and cinematography

VERÓNICA FELIU

Latin American literature of the 20th century; Chilean feminisms, politics, and culture; Latin American cultural studies; Spanish learning for both non-native and heritage speakers

MARÍA MORRIS

Language learning styles and strategies, culture and technology in language training

MARTA NAVARRO

Latin American literature, Mexican/Chicano culture, Latina/Chicana issues

ARIEL PÉREZ

Language acquisition and teaching methodology, computer-assisted language learning, teaching language for proficiency, oral proficiency assessment; Latin American current affairs

ALVARO ROMERO-MARCO

Spanish literature of the 19th- and 20th-centuries; film, cultural studies

Program Description

Students interested in acquiring proficiency in Spanish can enroll in a wide range of Spanish language or Spanish for Spanish speakers (SPSS) courses, from beginning to advanced levels. The language and culture sequences of lower-division courses, Spanish 1-6 and 56 as well as Spanish for Spanish Speakers 61-63, upper-division series Spanish 156 courses, and Spanish for Spanish Speakers 125, are aimed at enabling students to gain proficiency in aural comprehension, speaking, reading, and writing as well as cultural competence. Students are strongly encouraged to finish year-long sequences without interruption and, if possible, to study in Spanish-speaking countries. Students who want to do a major that would allow them to take several courses in Spanish may select from among several programs: a major or minor in language studies, a major in literature with an emphasis in Spanish/Latin American/Latino literatures, a major in Latin American and Latino studies, or a major in global economics.

Spanish

Students interested in taking Spanish classes are required to take the placement examination (<http://ic.ucsc.edu/test/>) to enroll in the appropriate level. Students finishing a first year of instruction in Spanish (1-2-3) are encouraged to continue on to second-year (intermediate-level) studies and take Spanish 4, 5, and 6, or Spanish 56, an introduction to Spanish language literature. First-year students also have the option of enrolling in the 1T, 2T, 3T series, which requires continuous enrollment from fall through spring quarters.

Health science majors have priority enrollment in Spanish 5M, *Medical Spanish*, but others may enroll if there is space availability. Students are also encouraged to continue with the third-year Spanish 156 and Spanish for Spanish Speakers 125 series of courses in which a wide variety of topics are covered. For more information on the courses offered in Spanish, please see the course descriptions.

Spanish for Spanish Speakers

Spanish for Spanish speakers (SPSS) has been developed for heritage speakers who, although raised in Spanish-speaking communities or households, are not yet fully proficient in Spanish. SPSS courses take into account the experiences and influences of bilingual and bicultural upbringing.

SPSS students are required to attend laboratory instruction once a week in addition to the regular class meetings. Some lower-division and all upper-division courses can fulfill requirements for several majors or departments, such as American studies, education, global economics, language studies, and Latin American and Latino studies.

Campus Language Laboratories and Placement Exams

Information about these topics can be found under Language Program.

Study Abroad

The Office of International Education (OIE) offers programs ranging from four weeks (Summer Session) in Cuernavaca, Mexico to one quarter or one academic year in Buenos Aires; Argentina, Santiago, Chile; San Jose and Monteverde, Costa Rica; Morelia and Monterrey, Mexico, and Cordoba, Madrid, Alcalá, Barcelona, and Granada, Spain. Generally, students must have completed Spanish 6 or 56 or SPSS 63 by the end of the sophomore year to qualify for a junior year abroad. Courses taken abroad can, with approval of an adviser, be applied to major requirements. For more information, see the OIE web site (<http://oie.ucsc.edu/index.html>). For information on credit applied to a particular major, contact the appropriate department.

Spanish

Lower-Division Courses

1. Instruction in the Spanish Language. F,W,S

Speaking, listening comprehension, reading and writing fundamentals. Taught entirely in Spanish; conversational fluency is encouraged through classroom practice and conversation groups, and is supplemented by language laboratory work. Classes are held three days a week; students complete the conversation group work independently of the classroom sessions. Prerequisite(s): Spanish Placement Examination score of 10. Enrollment limited to 24. *The Staff*

1T. Topic-Oriented Spanish Language Instruction (Special Track). F

Prepares students to understand, speak, and write on topics (geography, nature, society, art, history, etc.) and to provide information about themselves and their surroundings. Emphasis on the development of proficiency in all language skills and the active use of Spanish through task-oriented activities. Multiple-term course; students receive 5 credits per course and receive credit for all three courses upon completion of course 3T. Prerequisite(s): Spanish Placement Examination score of 10. Enrollment limited to 24. *The Staff*

1U. Laboratory to Topic-Oriented Spanish Language Instruction (2 credits). F

Consists of individualized instruction which allows students to work at their own pace developing their oral comprehension, reading comprehension, speaking and writing skills. Provides the supplementary exposure and practice students need in the acquisition of the target language. Multiple-term course; students receive credit for all three courses upon completion of course 3U. Prerequisite(s): interview only; Spanish Placement Examination score of 10. *The Staff*

2. Instruction in the Spanish Language. F,W,S

Speaking, listening comprehension, reading and writing fundamentals. Taught entirely in Spanish; conversational fluency is encouraged through classroom practice and conversation groups, and is supplemented by language laboratory work. Classes are held three days a week; students complete the conversation group work independently of the classroom sessions. Prerequisite(s): course 1 or Spanish Placement Examination score of 20. Enrollment limited to 24. *The Staff*

2T. Topic-Oriented Spanish Language Instruction (Special Track). W

Prepares students to understand, speak, and write on topics (geography, nature, society, art, history, etc.) and to provide information about themselves and their surroundings. Emphasis on the development of proficiency in all language skills and the active use of Spanish through task-oriented activities. Multiple-term course; students receive 5 credits per course and receive credit for all three courses upon completion of course 3T. Prerequisite(s): course 1T. Enrollment limited to 24. *The Staff*

2U. Laboratory to Topic-Oriented Spanish Language Instruction (2 credits). W

Consists of individualized instruction which allows students to work at their own pace developing their oral comprehension, reading comprehension, speaking and writing skills. Provides the supplementary exposure and practice students need in the acquisition of the target language. Multiple-term course; students receive credit for all three courses upon completion of course 3U. Prerequisite(s): interview only; course 1U. *The Staff*

3. Instruction in the Spanish Language. F,W,S

Speaking, listening comprehension, reading and writing fundamentals. Taught entirely in Spanish; conversational fluency is encouraged through classroom practice and conversation groups, and is supplemented by language laboratory work. Classes are held three days a week; students complete the conversation group work independently of the classroom sessions. Prerequisite(s): course 2, 2X, or Spanish Placement Examination score of 30. Enrollment limited to 24. *The Staff*

3T. Topic-Oriented Spanish Language Instruction (Special Track). S

Prepares students to understand, speak, and write on topics (geography, nature, society, art, history, etc.) and to provide information about themselves and their surroundings. Emphasis on the development of proficiency in all language skills and the active use of Spanish through task-oriented activities. Multiple-term course; students receive 5 credits per course and receive credit for all three courses upon completion of course 3T. Prerequisite(s): course 2T. Enrollment limited to 24. *The Staff*

3U. Laboratory to Topic-Oriented Spanish Language Instruction (2 credits). S

Consists of individualized instruction which allows students to work at their own pace developing their oral comprehension, reading comprehension, speaking and writing skills. Provides the supplementary exposure and practice students need in the acquisition of the target language. Multiple-term course; students receive credit for all three courses upon completion of course 3U. Prerequisite(s): interview only; course 2U. *The Staff*

4. Intermediate Spanish. F,W,S

Includes comprehensive grammar review, composition, readings, and discussion. Reading and audiovisual material deal with various sociopolitical and cultural issues in the Spanish speaking world. Classes are conducted in Spanish. Prerequisite(s): course 3, 3T, 3X, or Spanish Placement Examination score of 40. Enrollment limited to 24. (General Education Code(s): CC, IH.) *The Staff*

5. Intermediate Spanish. F,W,S

Includes comprehensive grammar review, composition, readings, and discussion. Reading and audiovisual material deal with various socio-political and cultural issues in the Spanish speaking world. Classes are conducted in Spanish. Prerequisite(s): course 4, 4X, or Spanish Placement Examination score of 50. Enrollment limited to 24. (General Education Code(s): CC, IH.) *The Staff*

5M. Medical Spanish. F,W,S

Students learn vocabulary, expressions, and cultural background to be able to interact with Spanish-speaking patients and doctors. Medical Spanish fulfills language requirement for the health science major of the Biology Department. Prerequisite(s): course 4; or Spanish for Spanish Speakers 61, 62, and 63; or Spanish for Spanish Speakers 125; or Spanish Placement Examination score of 50 or higher. Enrollment restricted to health sciences majors. Enrollment limited to 24. (General Education Code(s): IH.) *The Staff*

6. Intermediate Spanish. F,W,S

Increases oral and written proficiency using authentic reading materials which focus on such topics as social class, ethnicity, education, religion, economic, and political developments in the Spanish-speaking world. Prerequisite(s): course 5, 5M, 5X, or Spanish Placement Examination score of 60. Enrollment limited to 24. (General Education Code(s): CC, IH.) *The Staff*

56. Advanced Readings in Different Genres. S

Includes composition, discussion, and vocabulary building based on the reading of selected short stories, poetry, theater, film, and related cultural material. Conducted in Spanish. Recommended as preparation for upper-division courses. Prerequisite(s): course 5, 5M, 5X, Spanish for Spanish Speakers 62, or Spanish Placement Examination score of 60. (General Education Code(s): IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses**114. Advanced Conversation and Composition. W**

Advanced conversation and composition based on extensive readings in the humanities and social sciences. Students interested in this course who have not taken the prerequisite should meet with the instructor prior to the first class meeting. Prerequisite(s): course 6, 56, Spanish for Spanish Speakers 63, or Spanish Placement Examination score of 70. (General Education Code(s): TA.) *The Staff*

156. Topics in Hispanic Language and Culture.

An analytic study of 20th-century Hispanic language and culture as revealed in print and audio visual media. *The Staff*

156A. The Language of Latin America Cinema. W

Explores Latin American culture through its cinematic art. Students are exposed to and participate in discussion, analysis, and commentary on important social, historical, and political issues presented in the films. Provides a greater understanding of Latin America, and works toward advanced communicative proficiency and comprehension of linguistic variations in countries such as Cuba, Argentina, México, Bolivia, Chile, and others. (Formerly Hispanic Culture Through Film.) Prerequisite(s): course 6, 56, Spanish for Spanish Speakers 63, or Spanish Placement Examination score of 70. (General Education Code(s): CC, E.) *C. Calierno*

156G. Spanish for the Professions. S

Taught in Spanish. Students learn vocabulary and expressions as well as pertinent cultural background to understand, speak, read, and write about business and professional situations in connection with the Latino experience. Legal, educational, medical, and business topics are covered. Prerequisite(s): course 6, 56, Spanish for Spanish Speakers 63, or Spanish Placement Examination score of 70. Enrollment limited to 18. *B. Barcelo*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Spanish for Spanish Speakers**Lower-Division Courses****61. Spanish for Spanish Speakers. F**

This course deals with orthography (syllabification, accentuation, etc.), basic grammatical features, verbal structures, and development of conversation skills and confidence in spoken Spanish. Focus on development of writing skills: description, dialogue, exposition, and commentary on contemporary issues relevant to Spanish speakers of the Americas. Students need to utilize the Self-Placement Guidelines, available in 133 Humanities Building to assure proper placement in this class. (General Education Code(s): CC, IH.) *The Staff*

62. Spanish for Spanish Speakers. W

Comprehensive review of the subjunctive, the passive voice, different uses of "se," and other nuances of the language. Intensive practice in understanding specialized readings, presentation/discussion of major ideas, vocabulary expansion, and writing essays on topics discussed. Prerequisite(s): course 61 or placement exam. Students who have not taken Spanish for Spanish Speakers 61 need to speak with an instructor in the Spanish for Spanish Speakers Program. (General Education Code(s): CC, IH.) *The Staff*

63. Spanish for Spanish Speakers. S

Comprehensive grammar review. Rigorous practice in reading historical, sociopolitical, and literary works pointing out nuances of Spanish. Rigorous experimentation with various writing styles: analytical, argumentative, and creative. Prerequisite(s): course 62 or placement exam. (General Education Code(s): CC, IH.) *The Staff*

94. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Students submit petition to sponsoring agency. Enrollment limited to 10. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Upper-Division Courses

125. Mexico and the Southwest. S

An interdisciplinary survey of the cultural history of the Mexican people in both Mexico and the U.S. Southwest. Topics include literature, art, folklore, oral tradition, music, politics, as well as "everyday" cultural manifestations. Conducted in Spanish. May be counted toward fulfillment of upper-division major requirements for Latin American and Latino studies and language studies. Prerequisite(s): course 6, 56, Spanish for Spanish Speakers 63, or Spanish Placement Examination score of 70. Enrollment limited to 25. (General Education Code(s): CC.) *The Staff*

194. Group Tutorial. F,W,S

Provides a means for a small group of students to study a particular topic in consultation with a faculty sponsor. Enrollment limited to 10. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Stevenson College

College Office
(831) 459-4930
<http://stevenson.ucsc.edu>

For college description and list of faculty, see page 91.

Lower-Division Courses

10. Skills for College and Beyond (2 credits). W,S

Applications of practical skills for effective, meaningful study in the context of a full, busy life. Topics include learning styles, time management, test preparation, and life balance. Specific techniques for efficient reading comprehension, note-taking, memorization, and self-assessment are introduced. Enrollment restricted to college members and by permission of instructor. Enrollment limited to 15. *C. Camblin*

18. Eighteenth Century Kabbalistic Thought and Literature (2 credits). F,S

Emphasis on analyzing (translations of) original text to explore critical areas of kabbalistic thought, including tzimtzum, the sefrot, theodicy, and hermeneutics. *S. Chein*

20. The Harder They Come—The Postcolonial Self in Jamaica (2 credits). *

Examines Jamaica's transition to independence: the history of colonialism, its legacy of violence, and how the subaltern incorporate and rework hegemonic tropes of the gunslinger, gangster, preacher, politician, and policeman in literature, music, and film. Enrollment restricted to Stevenson College members. Enrollment limited to 20. *B. Lunine*

21. Citizens and Nations: Self and Society in the 19th Century (2 credits). *

A reading seminar focusing on a set of key texts. Examines how the political and industrial revolutions of the 19th century fundamentally transformed the relationships between individuals and their respective societies. Enrollment restricted to Stevenson College members. Enrollment

limited to 20. *K. Silver*

22. Self and Society in Classical Social Theory (2 credits). *

Reading seminar focusing on a set of key texts from classical social theory. Explores the transition from traditional to modern societies. Authors addressed may include Locke, Rousseau, de Tocqueville, Marx, Weber, and Durkheim. Enrollment restricted to Stevenson College members. Enrollment limited to 20. *K. Silver*

28. Residential Life Leadership (2 credits). S

Examines the role and facilitates the development of Stevenson College Residential Advisers. Class themes include an exploration of leadership, resource management, and the process of community building within the college. Course evaluation based on paper writing, participation, engagement with course materials, and a small group final project that requires students to create a year-long program model designed to address an issue facing the Stevenson community. Prerequisite(s): Must have been hired as a Stevenson residential adviser or alternate for the following academic year. Enrollment limited to 30. May be repeated for credit. *A. Yang*

30. Thesis Writing and Editing (2 credits). S

Identifies and examines the assumptions, expectations, and formats of writing in students' fields, with the goal of beginning—or continuing—academic research. Prerequisite(s): satisfaction of the Composition requirement. Enrollment restricted to junior and senior college members and by permission of instructor. Enrollment limited to 25. *A. Weaver*

33. Self and Society Examined Through Ethical Dilemmas (2 credits). S

Examines ethical dilemmas in contemporary topics, such as the status of moral principles during warfare; animal rights and the ethics of eating meat; privacy in the age of the Internet; imprisonment and rehabilitation; legal and illegal immigration; same-sex marriage; and health care. *M. Tassio*

35. Everyday Ethics for College Life (2 credits). S

Exploration of and reflection on everyday values and virtues such as integrity, open-mindedness, honesty, and community. Objectives include learning how to think about moral dilemmas and how to begin drafting one's own code of ethics. Enrollment restricted to college members. Enrollment limited to 20. *C. Camblin*

40. The Self Under Moral Siege: Challenges for the Individual in 20th-Century Totalitarian Europe (2 credits). *

Examines how individuals and communities confronted dilemmas when laws, state ideology, and war challenged traditional morality. Themes include: ethics, responsibility, victimhood, moral compromise, retribution, and reconciliation. Enrollment priority given to Stevenson College students. Enrollment limited to 22. *The Staff*

41. Spirituality in a Modern World (2 credits). S

Investigates scientific and pragmatic perspectives on spirituality from William James to Fritjof Capra. Explores spirituality in Western and Eastern traditions from Martin Buber to Pema Chodron. Students analyze, support, and articulate their spiritual positions in a culminating paper. Enrollment restricted to Stevenson College members. Enrollment limited to 20. *C. Camblin*

42. Student-Directed Seminar. F,W,S

Seminars taught by upper-division students under faculty supervision (see course 192). *The Staff*

80A. Introduction to University Discourse: Self and Society. F

Explores rhetorical principles and conventions of university discourse providing intensive practice in analytical writing, critical reading, and speaking. Stevenson's core course considers the roots of modern society using foundational religious texts and major classical and modern philosophical works. Students cannot receive credit for this course and course 80B. Enrollment restricted to first-year college members who have not satisfied the C1 requirement. Enrollment limited to 25. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C1.) *The Staff*

80B. Rhetoric and Inquiry: Self and Society. F

Explores the intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Stevenson's core course investigates the roots of modern society, using foundational religious texts and classical and modern philosophical works. Students cannot receive credit for this course and course 80A. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year college members. Enrollment limited to 25. (General Education Code(s): T5-Humanities and Arts or Social Sciences, C2.) *The Staff*

80F. Self and Society Through Film (2 credits). *

Seminar designed to expand upon the discussions begun in the Stevenson Core Course. Course uses documentary and feature films to investigate and discuss all sides of modern conflicts that bring class back to the Core Course theme. Prerequisite(s): completion of two-quarter core course sequence. Enrollment limited to 25. *The Staff*

80H. Rainbow Theater: An Introduction to Multicultural Theater. F

Introduction to Asian American, Chicano/Latino, and African American plays through reading of major authors, discussion of social and historical context of their work, and development of a production of a one-act play from each cultural group. In-depth examination of key historical context of these three cultural groups. Video presentations followed by class discussion. May be repeated for credit. (General Education Code(s): T4-Humanities and Arts, E.) *D. Williams*

80T. Self and Society for Transfer Students. *

Condensed version of Stevenson's core course for transfer students. Develops analytical writing, critical reading, and effective speaking by considering influential philosophical works while exploring cultural conflicts in modern society. Themes include imperialism, racism, and class conflict. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to college members. Enrollment limited to 25. (General Education Code(s): T5-Humanities and Arts or Social Sciences, W, E.) *The Staff*

81A. Self and Society 2. W

Winter quarter of Stevenson's core course continues development of analytical writing, critical reading, and effective speaking in exploring conflicts inherent in modern society. Investigates themes of colonization, race, gender, class, and cultural conflict. Enrollment restricted to first-year and sophomore college members. Students cannot receive credit for this course and course 81B. Enrollment limited to 25. (General Education Code(s): TA, E.) *The Staff*

81B. Rhetoric and Inquiry: Self and Society 2. W

Explores the intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Winter quarter of Stevenson's core course investigates themes of colonization, race, gender, class,

and cultural conflict. Permission of instructor required; selection for this course based on application submitted. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment restricted to first-year and sophomore college members. Students cannot receive credit for this course and course 81A. Enrollment limited to 25. (General Education Code(s): TA, C2, E.) *The Staff*

Upper-Division Courses

120. Self and Society: Teaching Practicum. W

Each student facilitates one of the discussion sections of Stevenson 81A or attends lectures, and meets with staff for practicum on the teaching process. Prerequisite(s): qualifications as determined by instructor at first class meeting. Enrollment limited to 5. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision (see course 42). Prerequisite(s): upper-division standing and a proposal supported by a faculty member willing to supervise. *The Staff*

193. Field Study. F,W,S

Provides for individual programs of study, sponsored by the college and performed off-campus. This course may be counted for up to three courses of credit in any quarter. Prerequisite(s): approval of student's adviser and the academic preceptor, and, in the case of full-time study, the board of studies supervising the major. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

A program of independent study arranged between a group of students and a faculty instructor. Enrollment restricted to members of Stevenson College. Enrollment limited to 12. *The Staff*

194F. Group Tutorial (2 credits). F,W,S

A program of independent study arranged between a group of students and a faculty instructor. Course designed for members of Stevenson College. Students submit petition to sponsoring agency. Enrollment limited to 10. May be repeated for credit. *The Staff*

198. Independent Field Study. F,W,S

Provides for college-sponsored individual study programs off campus, for which faculty supervision is not in person (e.g., supervision is by correspondence). Up to three such courses may be taken for credit in any one quarter. Prerequisite(s): approval of the student's adviser, certification of adequate preparation, approval by the academic preceptor. May be repeated for credit. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Provides for college-sponsored individual study programs off campus, for which faculty supervision is not in person (e.g., supervision is by correspondence). Up to three such courses may be taken for credit in any one quarter. Students submit petition to sponsoring agency. Requires approval of the student's adviser and academic preceptor. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual projects carried out under the supervision of a Stevenson faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual projects carried out under the supervision of a Stevenson faculty member. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Theater Arts

J106 Theater Arts Center
(831) 459-2974
theater@ucsc.edu
<http://theater.ucsc.edu>

Faculty and Professional Interests

Professor

JAMES H. BIEMAN

Playwriting, theater history and literature, classical and Renaissance drama, Chicano theater, digital media

MICHAEL D. EDWARDS, Adjunct

Acting and directing, dramatic literature, opera, Shakespeare

M. KATHLEEN FOLEY

Asian theater, Southeast Asian studies, performance studies, maskwork, puppetry, multicultural theater

MARK FRANKO

Dance history and theory, choreography, technique, performance studies, theatrical theory in historical and critical perspective

DANNY SCHEIE

Acting, directing, dramatic literature, theater history, Shakespeare, Wagner, gay studies

PAUL WHITWORTH

Acting, directing, dramatic literature (English and Spanish Renaissance), translating dramatic literature

Associate Professor

BRANDIN BARON

Costume design, history of design

DAVID CUTHBERT

Lighting design, CADD, projection design, scenic design

KATE EDMUNDS

Set design for theater and film

PATTY GALLAGHER

Movement training for actors, circus and clown traditions, and Indonesian dance/performance

KIMBERLY JANNARONE

Directing, dramaturgy, dramatic theory and criticism, theater history, acting

EDWARD C. WARBURTON

Development of dance thought in action, creative processes, and technology in theater arts; dance technique, movement research and composition, and applied dance practices

Assistant Professor

PETER H. MOSTKOFF

Dramatic and performance theory, theater history, acting

Lecturer

TANDY BEAL

Choreography, improvisation, technique, performance skills, collaborations with classical and jazz composers, circus, theater and video, children's productions

GREGORY FRITSCH

Acting, directing

Emeriti

ANDREW E. DOE, Emeritus

NORVID J. ROOS, Emeritus

RUTH L. SOLOMON, Emerita

AUDREY E. STANLEY, Emerita

ALMA R. MARTINEZ, Emerita

ELAINE YOKOYAMA ROOS, Emerita



MARY-KAY GAMEL, Professor, Classics and Comparative Literature

Performance studies, ancient Mediterranean performance, Greek and Latin literatures, myth, reception of Greek and Roman texts and artifacts, film, feminist approaches to literature and performance

Program Description

The Theater Arts Department is a diverse group of scholars/artists united by a passionate belief in the value of the performing arts. Based on respect for the classical theater of all cultures, combined with a determination to challenge tradition and fashion with equal courage, we educate our students in the history, theory, and practice of theater to address fundamental issues by using the tools of body, voice, mind, and imagination. Seeking to attain the highest levels of intellectual and artistic integrity with a commitment to cultural diversity, we serve the research mission of UCSC, our audiences, and the students who will shape the theater of the future.

The Theater Arts Department combines drama, dance, critical studies, and theater design/technology to offer students an intensive program of theater as a unified field. The program stresses the inter-relation of all concentrations as essential to the successful practice of the theater arts in the 21st century. Graduates of the UCSC program typically pursue careers in professional theater and dance companies, in film and television, and in teaching at all levels—from university to high school to grade school. Many students go on to higher degrees at prestigious national programs. Others engage in careers in arts, administration, dramatic writing, and related fields.

The lower-division curriculum requires a range of practical work in the various concentrations and an interdisciplinary exposure to critical and historical studies. At the upper-division level, students are given the opportunity to focus on one or more areas of interest in limited-enrollment studios. At the same time, they are asked to expand their theoretical perspectives through confrontation with performance theory and focused coursework in critical studies. The impact of digital and new media on theater is integrated into the curriculum, especially with respect to dance and design.

A wealth of production opportunities is available to students. This includes major productions directed by faculty or distinguished visiting artists each quarter, productions directed or choreographed by students, and faculty-directed workshops. Undergraduate students are also given the opportunity to see their own writing, choreography, or developing concepts put into production in annual festivals of student work. Although majors are given preference in studio courses, most courses and productions welcome nonmajors as well. Opportunities to study and perform non-Western as well as Euro-American traditions are also a significant part of the program.

The stage and studio spaces available to students of theater arts allow for this breadth of training and performance opportunities. The Theater Arts Center contains a 500-seat thrust stage; a state-of-the-art experimental theater; a 200-seat proscenium theater; acting, directing, and dance studios; costume, scene, and properties shops; a sound recording room; a computer lab; and a metal shop.

Elsewhere on campus are the open-air Quarry Theater seating 3,000, the Shakespeare Santa Cruz Festival Glen, and the 150-seat Barn Theater. Library holdings in theater literature and history are extensive, including a large slide collection and dance video holdings; journals in current theater, design/technology, and dance; and recordings, films, videotapes, and CD-ROMs.

A unique resource for UCSC students is Shakespeare Santa Cruz (SSC). Acknowledged to be one of the leading Shakespeare festivals in the country, SSC was founded in 1982 to foster links between modern scholarship and contemporary professional theater practice. SSC's annual summer festival presents the works of Shakespeare in thematic context with other great plays of the world stage, performed, designed, and directed by professionals from all over the country. SSC offers undergraduates various opportunities to work in conjunction with theater professionals through its summer intern program, its winter holiday production (in fall quarter), and Shakespeare-to-Go, a 45-minute Shakespeare outreach production in which students perform and tour (rehearsed during winter quarter and performed during spring quarter) for audiences throughout Santa Cruz County and beyond.

Majors who wish to concentrate their study of one particular theater arts area before seeking admission to graduate school or work with professional companies are encouraged to apply to the department's Fifth-Year Certificate Program.

Requirements to Declare the Major

Prior to petitioning for the major, students must have successfully completed three lower division courses: one course from THEA 61A, B, or C, and two courses chosen from THEA 10, 20, or 30. Students are encouraged to complete these courses as early in their studies as possible so that the petition to major status can be accomplished no later than the end of sophomore year.

Transfer Students

Transfer students who have not satisfied the requirements to declare the major are advised to take as many of the six lower-division requirements listed above as possible in their first two quarters. Transfer students may petition to have equivalent lower-division courses taken at other schools count toward the lower-division major requirements. Petition forms and information on courses and major requirements can be obtained at the department office, J106 Theater Arts Center.

Major Requirements

The Theater Arts major requires seven lower-division courses, six credits of course 50, and eight upper-division courses (inclusive of a senior seminar project). Majors may organize their studies around a concentration in an area of interest in accordance with the requirements outlined below. The following six lower-division courses must be taken by all majors:

10, *Introduction to Theater Design and Technology*

20, *Introductory Studies in Acting*

30, *Introduction to Dance Theory and Technique*

61A, *Issues and Methods in Theater Arts*

61B, *Tragedy*

61C, *Birth of the Modern: After the Renaissance*

One additional lower-division 5-credit elective.

Plus: 50, *Fundamentals of Theater Production* (two-credit course; must take a total of six credits)

The following upper-division courses must be taken to complete the major:

Eight, 5-credit upper-division theater arts courses:

- 160, *Dramatic Theories*
- Two studio courses
- One elective
- One faculty-directed theater arts production course
- Two 161, 163, 164, or 165 series of critical studies courses in dance or drama, or 113, 116A (design) courses
- One senior seminar requirement, (course 185)

Exceptions to the major requirements, through the UC Education Abroad Program (EAP) or transfer credits, are considered on a case-by-case basis by the department chair.

Disciplinary Communication (DC) Requirement

Students of every major must satisfy that major's upper-division Disciplinary Communication (DC) Requirement. The DC Requirement in theater arts is met by completion of the required courses 160 and 185.

Theater Arts Major Planners

The following are two recommended academic plans for students to complete during their first two years as preparation for the theater arts major. Plan One is a guideline for students who are committed to the major early in their academic career; Plan Two is for students who are considering the major.

Plan One

| Year | Fall | Winter | Spring |
|---------------|-----------------|----------|----------|
| 1st (frsh) | THEA 61B | THEA 20 | THEA 10 |
| | gen ed | THEA 61A | gen ed |
| | college core | gen ed | gen ed |
| 2nd (soph) | THEA 30 | elective | THEA 61C |
| | gen ed | THEA 50 | gen ed |
| | college core | gen ed | gen ed |
| | (declare major) | | |

Plan Two

| Year | Fall | Winter | Spring |
|---------------|-----------------|----------------|----------|
| 1st (frsh) | gen ed | THEA 20 | THEA 10 |
| | gen ed | low-div studio | THEA 61C |
| | college core | gen ed | gen ed |
| 2nd (soph) | THEA 30 | THEA 50 | THEA 50 |
| | THEA 61B | THEA 61A | gen ed |
| | gen ed | gen ed | gen ed |
| | (declare major) | | |

Comprehensive Requirement

Theater arts majors are responsible for successfully completing course 185, *Senior Seminar*.

Minor Requirements

Students earn a minor in theater arts by completing eight courses (seven, 5-credit courses and one, 2-credit course) comprising a background in the theory and practice of the theater arts as well as a focus on either drama, theater design/technology, or dance. The course requirements are listed below. There is no comprehensive requirement for the minor.

- THEA 61A
- One quarter of the 2-credit course 50

- One course in the student's area of focus chosen from: 10, 20, 30, or 40
- Three upper-division courses chosen from the following: 113, 116A, 161, 163, 164, 165
- Two upper-division studio courses, one of which may be a faculty-directed production (151)

Independent Studies (199) and *Field Studies* (198) will not satisfy minor requirements unless approved in advance by an adviser and the chairperson.

Transfer students are advised to check with the department office to determine which courses can be articulated from a community college.

Fifth-Year Certificate Program

The Theater Arts Department offers a graduate certificate program that allows a limited number of students to refocus or intensify their skills, concentrating on performance reinforced by scholarship and research.

The program provides the opportunity to experience the benefits of apprenticeship in an academic setting. Students follow an individual program suited to their background, needs, and interests while concentrating in drama, design/technology, dance, playwriting, Western or non-Western theater, or dramatic literature.

Students in the graduate certificate program are expected to complete one academic year (fall-spring) as a full-time resident student, passing eight 5-credit theater arts courses. Of those eight courses, one is a required graduate seminar (course 290); and one must be chosen from the upper-division critical studies electives on offer. An incomplete in course 290 and/or 297 must be completed by the end of the following quarter of the residency year. The remainder of the program is designed by the student according to individual interests and needs in consultation with the faculty adviser. Many students elect to take faculty-supervised individual studies courses in their area of emphasis.

For additional information, contact the Theater Arts Department.

Theater Arts

Lower-Division Courses

10. Introduction to Theater Design and Technology. F,S

Addresses imagination and creativity. Using the framework of theater production, students explore the process of translating a script into a performance. Topics include visual literacy, creative problem solving, establishing effective working teams, tear sheets, storyboarding, drawing, sound and color theory. This course is a prerequisite for all upper-division design courses. (General Education Code(s): IM, IH, A.) *B. Baron, K. Edmunds*

12. Stage Management. F

Designed to acquaint students with the complexities of staging productions from the audition process to final performance. Directing, lighting, scenic production, sound, cueing, and personnel management are aspects that will be touched upon in class. Students are billed a materials fee. (Formerly *Production Management*.) (General Education Code(s): A.) *The Staff*

14. Drawing. F

A fundamental course in drawing from still life, the figure, and in the landscape. The approach is from the tonal and volumetric aspects of the object. Color is introduced as the course progresses. Instruction fashioned to the individual needs of the student. The inexperienced are welcomed as

well as the experienced. Students are billed a materials fee. (General Education Code(s): PR-C, A.) *K. Edmunds*

15. Special Topics in Textiles. *

Introduces varied techniques in textile manipulation to create scenic and costume-design properties including drapery, upholstery, masks, bags, and millinery. Students learn basic sewing and surface-design methods, such as knitting, screen-printing, painting/dyeing, and distressing. Enrollment limited to 20. (General Education Code(s): PR-C, A.) *B. Baron*

17. Costume Construction. W

The process of interpreting a costume designer's sketch into a finished theatrical costume. Some techniques included are dyeing, fabric selection, draping, flat pattern drafting, pattern manipulation, adaptation, fitting, and alteration. Using various techniques, students make basic pattern pieces and learn to modify them to create costumes. Students are billed a materials fee. Enrollment limited to 20. (General Education Code(s): PR-C, A.) *The Staff*

18. Drafting for Theatrical Production. *

An examination of the fundamentals of drafting scale drawings for production, including floor plans, elevations, sections, working drawings, dimensions, layout, and lettering. Students learn isometric drawing, perspective, and rendering techniques. Students are billed a materials fee. Enrollment limited to 20. (General Education Code(s): A.) *The Staff*

18C. Drafting-Computer Aided. *

In-depth exploration of computer-aided drafting, specifically the programs Vectorworks, Spotlight, and Renderworks. Topics include: the user interface, ground plan, section and detail views, paper space vs. working space, tool palettes, USITT drafting standards, layers, line weights, objects, classes, library annotations, importing rasters, and 3D modeling. Students required to do weekly projects such as ground plans, lighting plots, perspectives, and detail drawings, as well as turn in a major final project, and complete a mid-term, final, and quizzes. Students are billed for a materials fee. Enrollment restricted to theater arts majors. Enrollment limited to 10. (General Education Code(s): A.) *D. Cuthbert, The Staff*

19. Design Studio: Lighting Studio A. S

An introduction to the theory and practice of lighting design with attention to the practical skills and creative approaches to lighting performance pieces; the technical side of lighting design via demonstrations, lectures, and labs. Students complete projects evolving and executing concepts for lighting chosen pieces. Students are billed a materials fee. Prerequisite(s): course 10. (General Education Code(s): PR-C, IH, A.) *D. Cuthbert*

20. Introductory Studies in Acting. F,W,S

Introduction to basic acting skills and the problems of performance. Concentrates on expanding the students' range of expression and ability to respond to and analyze dramatic text. Students with little or no experience are encouraged to attend. (General Education Code(s): IM, IH, A.) *The Staff*

21A. Acting Studio 1A: Psychological Realism. F

Explores the fundamentals of the work of Konstantin Stanislavski as developed at the Moscow Art Theater to the works of his and our contemporary playwrights. Specifically, students apply those techniques of action, physical score, given circumstances, subtext, interior monologue, goals, and objectives, throughline, superobjective, and emotional recall to works of Henrik Ibsen, Anton Chekov, and appropriate American realists, such as Sam Shepard, August Wilson, etc. Enrollment by in-

terview only: audition at first class meeting. Enrollment limited to 31. (General Education Code(s): A.) *D. Scheie, P. Gallagher, P. Whitworth*

21B. Acting Studio 1B, Actors' Physicality. W,S

Uses a rigorous physical approach to acting (rather than the text-based approach of course 21A). Provides an "outside-in" starting point for theatrical creation and study, balancing and countering the "inside-out" approach of Stanislavski-based actor training. Emphasis on physical characterization, ensemble theater, mask work, and object performance. May involve practices, theories, and readings of Jerzy Grotowski, Eugenio Barba, Jacques Lecoq, and/or Tadashi Suzuki. Enrollment by interview only. Enrollment limited to 30. (General Education Code(s): A.) *P. Gallagher, D. Scheie*

22. Indonesian Dance and Drama. F

Students learn the basic movement repertoire of the specific characters of the Indonesian dance-drama/puppetry tradition over the quarter with explication of how these types operate in their own cultural context. The course culminates in an open showing of scenework. May be repeated for credit. (General Education Code(s): CC, A, E.) *P. Gallagher, M. Foley*

23. Voice for the Actor. *

Students work on developing resonance, range and expressivity for stage performance via physical exercises and text explorations undertaken in small groups. Prerequisite(s): course 20. Audition required for acceptance into class. Enrollment limited to 20. (General Education Code(s): A.) *The Staff*

30. Introduction to Dance Theory and Technique. F,W,S

Intensive instruction in developing the dancer's mind/body, with introduction to movement theory and practice. Students are billed a materials fee. (Formerly *Introduction to Modern Dance Theory and Technique*.) May be repeated for credit. (General Education Code(s): PR-C, IH, A.) *E. Warburton*

31C. Dance Studio I. S

Introduction to contemporary dance theory and practice. Focus on basic dance technique, range of styles, and aesthetic points of view of historically significant contemporary dance choreographers in America and worldwide. Students are billed a materials fee. Enrollment limited to 30. (General Education Code(s): PR-C, A.) *E. Warburton*

31P. Postmodern Dance I. *

Introduction to postmodern dance theory and technique. Focus on performance practices of historically significant postmodern dance choreographers in the U.S. and worldwide. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): IM, A.) *E. Warburton*

32. Introduction to Ballet. *

Introduction to ballet basics such as healthy alignment, anatomically sound articulation of hips and feet, balance control, moving through space harmoniously, and development of technical strength and combinative capacity in a classical, but fluid, aesthetic. Students are billed a materials fee. Enrollment limited to 35. May be repeated for credit. (General Education Code(s): IM, IH, A.) *E. Warburton*

33. Advanced Introduction to Modern Dance. *

Intensive instruction in developing the dancer's physical instrument. Intended for students who have a previous fundamental knowledge of the basics of classic dance, combined with movement theory. Students are billed a

materials fee. Prerequisite(s): course 30. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): IH, A.) *The Staff*

35. Introduction to Tap Dance. *

Intensive instruction in developing the dancer's physical instrument combined with basic movement theory. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): PR-C, A.) *The Staff*

36. Introduction to Dance Composition. F

Composing solo dances using a variety of approaches for developing movement combinations. Observation and recognition of personal movement patterns and discovering new sources for creative material. Students are billed a materials fee. May be repeated for credit. (General Education Code(s): PR-C, IH, A.) *The Staff*

37. African Dance. F

A griot (musician-entertainer from western Africa) from Burkina Faso teaches "The African Journey," which emphasizes dance as combined in Africa, including singing, history, oral tradition, and storytelling. Students are billed a materials fee. Enrollment limited to 30. (General Education Code(s): PR-C, A.) *The Staff*

40. Introduction to Directing. F

An overview of the analytical and creative processes that inform the director's work. Close examination of texts, concepts, and directorial choices in staged performances, opera, films, and video. (General Education Code(s): IH, A.) *K. Jannarone*

45. Student-Directed Production. F,S

Participation in a student-directed play or student-choreographed dance concert under faculty supervision. (See course 192). Rehearsals culminate in public performances. Prerequisite(s): admission by audition; see department office for more information. *The Staff*

50. Fundamentals of Theater Production (2 credits). F,W,S

Work is on various aspects of theatrical production, including scenery, lighting, costumes, sound, stage management, and video documentation. Satisfies the department's technical experience requirement. May be repeated for credit. (General Education Code(s): PR-E, A.) *D. Cuthbert*

52. Basic Stagecraft. W

Provides introduction to technical theater and basic stagecraft. Course examines two-dimensional and three-dimensional scenery, scenic engineering, the physical theater, stage and scene shop equipment, project organization and process, technical theater graphics, materials, and theatrical construction techniques. Prerequisite(s): course 10. Enrollment limited to 30. (General Education Code(s): A.) *The Staff*

55A. Workshop in Performance: Barnstorm. F,W

Process-oriented investigation of practical theater production by working in and on productions in the Barnstorm season. Requires a total of 150 hours working backstage or onstage. Admission by audition at first class meeting; see department office for more information. May be repeated for credit. *D. Cuthbert*

55B. Workshop in Performance: Barnstorm Lab (2 credits). F,W

Process-oriented investigation of practical theater production by working in and on productions in the Barnstorm season. Requires a total of 50 hours working backstage or onstage. Admission by audition at first class meeting; see department office for more information. May be repeated for credit. *D. Cuthbert*

61A. Issues and Methods in Theater Arts. W

Introduces issues and methods for analyzing historical and contemporary performance practices from a variety of disciplinary perspectives. Readings contextualize theatrical objects as well as offer theoretical tools for analyzing, interpreting, and making performances out of them. (Formerly course 61.) (General Education Code(s): IM, IH, A.) *K. Edmunds, P. Mostkoff*

61B. Tragedy. F

Ancient enmities; horrific acts of parricide; monumental errors; suffering and contrition. This course examines the enormous appeal of the ancient Greek tragic vision from its inception to its enthusiastic rediscovery during the European Renaissance. Enrollment limited to 40. (General Education Code(s): TA, IH, A.) *J. Bierman*

61C. The Birth of the Modern: Drama and Performance After the Renaissance. S

Examines dramatic and theatrical works that sprang into being in the wake of the European Renaissance. Follows the ways modern artists have dramatized their questions, struggles, beliefs, and despair in the face of world wars, cultural fragmentation, unprecedented prosperity, and new technologies that changed the concrete experience of life itself. Enrollment limited to 60. (General Education Code(s): TA, IH, A.) *K. Jannarone*

70. Working in Theater and the Performing Arts (2 credits). *

Creative artists, technicians, and designers discuss the theory and practice of their art. Presentations include discussion of the nature of their artistic work and reflection on the path that brought them to their present work with attention to the creativity and constraint that they experience in their profession. *P. Whitworth*

80A. Introduction to African American Theater. S

Surveys African American theater from late 19th century to contemporary 21st-century playwrights and examines dramatic narratives to trace creation, evolution, and development of African American cultural identity formation in American theater. Enrollment limited to 50. (General Education Code(s): ER, T4 (TH), A, E.) *The Staff*

80B. Rock 'n' Roll Design. *

Examination of the genesis, history, and development of technical theater practices used in large arena rock shows. Topics will include the development of rigging practices used in arenas, touring logistics, lighting instrumentation and aesthetics of rock shows, and the nature, practice, and approach of sound in these venues. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80D. Commercial Design 1900 to Present. *

History of 20th-century commercial design for the theater through the eyes of the Western consumer. (Formerly course 161W, *Critical Survey of Commercial Design, 1900 to Present*.) (General Education Code(s): IM, T4-Humanities and Arts, A.) *B. Baron*

80E. Stand-Up Comedy. *

American comedy from Mark Twain to present, including popular humor, history, and politics, using comedy from the '20s through the women's gay and civil rights movements. Discussions are based on readings and videos of a wide variety of artists. Students present performances weekly. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80G. Creative Process/Dance. *

Introductory dance, with participation in a wide range of movement classes taught by the instructor and guest artists. Students develop their movement experiences through further viewing of world dance, discussion, reading, and

writing. Enrollment limited to 100. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80H. Hamlet Conundrums. *

Offered online, the course explores major issues of interpretation of Shakespeare's classic play, which has occupied the minds of audiences, directors, designers, performers, and critics during its 400-year history. In doing this, it offers a sense of history of people's preoccupations with and thoughts about the play. Students taking this class are expected to complete the course during the quarter for which they are enrolled. All students enrolled in this course should visit elsinore.ucsc.edu and write to elsinore@ucsc.edu. (General Education Code(s): T4-Humanities and Arts, A.) *J. Bierman*

80K. Shakespeare 4every1. S

Introduces all students, regardless of experience, to the plays and theater of Shakespeare, and directly addresses linked relevance to contemporary 21st century American culture. (General Education Code(s): TA, T4-Humanities and Arts.) *P. Whitworth, D. Scheie*

80L. Muppet Magic: Jim Henson's Art. W

The artistic and social impact of the Muppets on American puppetry, children's television, and Hollywood film is explored through viewings, guest lectures, and analysis. Henson's legacy in artistic innovation, mainstreaming of puppet theater for adult audiences, and establishment of puppetry in media and marketing are also explored. (General Education Code(s): IM, T4-Humanities and Arts, A.) *M. Foley*

80M. Chicano/a Teatro. F

Introduction to Teatro Chicano/a with examination of how cultural diversity plays a role in theater. Through lectures, films, and workshop exercises, reflect upon the process of Teatro Chicano. Students write their own acts, improvise, and perform in class. (General Education Code(s): ER, T4 (TH), A, E.) *The Staff*

80N. Walt Disney. S

An examination of Walt Disney's creation of the American vision of "family entertainment." Particular attention will be paid to the classic animated feature films of Walt Disney and to the way this Disney invention has been preserved and developed since his death. We will also look at the live action films, theme parks, and other Disney creations. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80O. Comedy in American Theater and Media Since 1950. *

The interrelationship of comedy in contemporary American media and innovations at Second City, the Chicago-based comedy club, will be explored, as well as the theory and practice of improvisation as a technique for generating comic material and the varied relationships of performers, writers, and audiences in live theater, television, and film. (General Education Code(s): IM, T4-Humanities and Arts, A.) *M. Foley*

80P. The Pixar Feature. *

Combines examination of the canon of Western dramatic literature and theater history through viewings of Pixar Animation Studios' full-length animated features, representing the most popular form of digital art and new media in the world today, and lectures focusing on digital art and new media viewed through established rules and traditions of dramatic art in literature, plays, and the theater. (General Education Code(s): IM, T4-Humanities and Arts, A.) *D. Scheie*

80Q. Introduction to Queer Theater. *

Examines the history of the queer perspective in dramatic

literature, from the Greeks to Marlowe and Shakespeare through the calcification of homosexuality in the era of Freud, then traces theater stewardship by gay and lesbian artists from within the closet and without. (General Education Code(s): IM, T4-Humanities and Arts, A.) *The Staff*

80S. Theater Arts Education and the Community. *

This course is designed to develop ways in which we can direct our interest in the arts into concrete and successful community projects. Although the emphasis will be on developing skills to work within K-12 classrooms, other community projects will be discussed and designed. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80U. Socks, Drugs, and Rock and Roll: American Costume Since 1950. *

This course is an introduction to American fashion and fashion designers from the 1950's to the present with special attention given to the influence of popular media on American costume since 1950, the beginning of rock and roll. Students cannot receive credit for this course and course 116B. (General Education Code(s): IM, T4-Humanities and Arts, A.) *The Staff*

80V. The Circus in American Culture. *

Circus arts from their shamanic roots to contemporary practice will be analyzed in a historical, aesthetic, and creative dimension. Lecture, discussion, and demonstrations will explore the theory and practice of American circus arts. In section, students will explore basic circus skills from clowning to tumbling to exhibition of freaks. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80W. The Way Things Work and the Theater. *

Explores basics of mechanics and movement as applied to theatrical and non-theatrical realms. Utilizes textual materials as well as interaction with technology. Topics include structural elements, motion, energy, sound/light, their physical properties and how they interface with pre- and post-modern theater. (General Education Code(s): T4-Humanities and Arts, A.) *The Staff*

80X. The Performance of Story in Theater and Film. W

An examination of the theory and practice of theater and film, comparing and contrasting works that have been adapted from one genre to another. Lecture, film and video viewing and discussion of materialist, psychoanalytic, and feminist approaches will be shared. (General Education Code(s): TA, T4-Humanities and Arts.) *P. Mostkoff*

80Y. American Musical Theater. S

The history of American musical theater, from its roots to today, is studied through scripts, scores, and film. Major composers and lyricists' work is shown, discussed, and analyzed. (General Education Code(s): T4-Humanities and Arts, A.) *K. Edmunds*

80Z. Indian Dance. F

Classical Indian dance will be studied as a performance practice. Understanding of drum syllables and associated steps, religious and sociological context, and mimesis (abhinaya) as well as introduction to epic stories (*Ramayana*, *Mabharata*, *Bhagavata Purana*) and classical song. (General Education Code(s): CC, T4-Humanities and Arts.) *The Staff*

99. Tutorial. F,W,S

Students must file their petitions for this course with the department office by the end of the fifth day of instruction in the quarter in which they would like to take the tutorial. Prerequisite(s): petition required, approved by

instructor and department. May be repeated for credit. *The Staff*

Upper-Division Courses

100A. Asian Theater/Dance and Global Impacts. * Overview of selected theater/dance performance genres of India, Indonesia, China, Korea, and Japan with attention to how cultural, political, and social flows have impacted contemporary performance in Asia and beyond. Lectures supplemented by workshops. (General Education Code(s): A, E.) *M. Foley*

100B. Black Theater USA. * Spanning slavery, emancipation, reconstruction, the great depression, civil rights, and the black power/black arts movements, course explores African American drama from literary, historical, and biographical perspectives in lecture/discussions, film excerpts, dramatizations, and visits from award-winning guests. (General Education Code(s): A, E.) *The Staff*

100C. Courts, Courtesans, Shamans, and Clowns: Asian Drama. * Asian court and popular performance are traced. Sanskrit drama is contrasted with Indian epic recitation, medium, and courtesan dance. Gender specialization is noted in Indonesian courts using Indian and local legends in dance, mask/puppetry, and clowning. Buddhist and Confucian impulses in Chinese theater and early Korean and Japanese mask and puppetry are introduced. Students are evaluated on participation, tests, writing, and a performance project. (General Education Code(s): A.) *P. Gallagher, M. Foley*

100G. Ancient and Classical Drama. * Examines Western dramatic literature, theater history, and design from ancient Greece to the Renaissance, the Spanish golden age, and Elizabethan England. Looks at dramatic texts in their historical moments, bringing theater design and the function of performance into critical contexts. Major theoretical treatises, scripts, scenarios, background readings, and other texts are discussed in relation to the actual performance and staging practices of the period. (General Education Code(s): A.) *The Staff*

100H. Ballet: A History. * Chronological critical and historical overview of ballet from its origins in the 15th century to the present, fleshing out the sociological, aesthetic, and design (costume and set) aspects of ballet production from the courts to the bourgeois opera house and the independent impresario. Enrollment limited to 40. (General Education Code(s): A.) *M. Franko*

100I. Hemispheric and Trans-Atlantic Theater: Indigenous America. * Considers theater of the Americas with attention to indigenous pre-Colombian roots as well as trans-Atlantic connections forged in Spanish use of performance in conquest and development of African-influenced arts in black communities. Includes use of art in national independence movements, civil-rights struggles, and continuing movement across borders of the Americas with links to Africa. (General Education Code(s): A, E.) *The Staff*

100L. Performance and Conquest. * Looks at use of theater/performance in the U.S. and Latin America by the state, oppositional groups, and theater and performance practitioners to solidify or challenge structures of power beginning with pre-Colombian indigenous civilizations, 16th-century Spanish/European conquest, national independence movements, to the U.S. Latino diaspora. (General Education Code(s): A, E.) *The Staff*

100M. Modern Drama. * Examines modern theatrical experimentation from English Restoration through contemporary era. Major theoretical texts, scripts, and background readings establish critical contexts for analyzing modern performance and dramatic literature. (General Education Code(s): A.) *K. Jannarone*

100W. Black/African Diasporic World Theater. * Examines major black African diasporic playwrights and theater. Focuses on the historical, cultural, and literary contexts that gave rise to the works of dramatists such as Ama Ata Aidoo, Derek Walcott, Wole Soyinke, Aime Cesaire, Debbie Green Tucker, and Paul Boakye. Prerequisite(s): course 61 or 60A or 60B or 60C. (General Education Code(s): A, E.) *The Staff*

104. Multimedia Authoring. * Introduces students to basic tools for the creation of multimedia digital projects. Special attention is given to the integration of video, sound, graphics, text and virtual reality and to the creation and execution of strategies for interaction between users and the projects themselves. With this in mind, students design and create computer puzzles and games. Enrollment limited to 25. (General Education Code(s): A.) *J. Bierman*

105. Introduction to Digital Media Design. * Introduction to digital media design for live theater. Primary focus on developing working understanding of Adobe Photoshop, Final Cut Pro, and DVD Studio Pro as applied to digital media design. Gives additional attention to theoretical questions raised by introduction of moving images in a theatrical space, visual composition, and editing practices. Enrollment limited to 15. (General Education Code(s): A.) *The Staff*

106. Digital Illustration. * Introduces digital rendering techniques using the Adobe Creative Suite. Using Photoshop, Illustrator, Acrobat Writer and InDesign, students solve design problems relevant to scenic, costume, and property design. Material is applicable to anyone with an interest in the Adobe platform. Enrollment by permission of instructor. Application form available at department office. Enrollment limited to 15. (General Education Code(s): A.) *B. Baron*

107. Design Studio: Masks and Makeup. * Advanced work in the design and techniques of stage make-up and masks. Students are billed a materials fee. Prerequisite(s): course 10. Enrollment restricted to theater arts majors; open at the end of priority enrollment if space permits. Enrollment limited to 20. Offered in alternate academic years. *The Staff*

110. Advanced Stage Technology. * An investigation into the intricacies of production, focusing on structural, spatial, and visual concepts, creation and execution of scenic units, drafting, and related areas of technology. Designed to facilitate in-depth studies of specific production problems. Students are billed a materials fee. Prerequisite(s): course 10. (General Education Code(s): A.) *The Staff*

113. The History of Design for Theater. W The development of scenic design from the Greek period to the present. Concentration is on the changing styles of set design in relation to the changing attitudes toward dramatic literature, art, and theater architecture. (General Education Code(s): IM, A.) *B. Baron*

114. Design Studio: Sound. * The intangible and transitory nature of the acoustic reality. Electronically regenerated sounds for use in the performing arts. Broad scope of the course consideration

begins with found sound and includes sound propagation. Emphasis on tape-recording, editing, sound control functions, and equipment utility. Students are billed a materials fee. Prerequisite(s): course 10. (General Education Code(s): PR-C, A.) *The Staff*

115A. Design Studio: Scenic Design. * Advanced work in principles and theory of scenic design. Students are billed a materials fee. Prerequisite(s): course 10. (General Education Code(s): PR-C, A.) *K. Edmunds*

115B. Design Studio: Scenic Design B. W Advanced theory and practice of theatrical set design. Prerequisite(s): course 115. (General Education Code(s): PR-C, A.) *K. Edmunds*

116A. History of Clothing and Costume. F Survey of clothing and theatrical costumes; emphasis on dress of the audience and actor in historical periods of theatrical activity. Students are billed a materials fee. (General Education Code(s): IM, A.) *B. Baron*

117. Design Studio: Costume. S Advanced principles and theory of costume design for theatrical productions. Enrollment by permission of instructor: see enrollment conditions in the quarterly Schedule of Classes. Students are billed for a materials fee. May be repeated for credit. (General Education Code(s): IM, A.) *B. Baron*

117A. Advanced Costume Construction. * Advanced principles in costume construction, including tailoring, advanced pattern drafting, and draping techniques. Focuses on translating modern techniques into historical garment construction. Teaches how to study artifacts and do primary research to unlock the past. Prerequisite(s): course 17. Enrollment limited to 25. (General Education Code(s): A.) *The Staff*

118. Design Studio: Scene Painting. * Emphasis on techniques used in painting scenery for the theater. Students are billed a materials fee. Prerequisite(s): course 10. (General Education Code(s): A.) *The Staff*

119. Design Studio: Lighting Studio B. * The theory and practice of lighting design with emphasis on practical application. Light plots, electricity, optics, design, and manipulation of lighting for the theater and related performance events are investigated. The student explores mechanics and aesthetics with hands-on experience. Students are billed a materials fee. Prerequisite(s): course 19. (General Education Code(s): PR-C, A.) *The Staff*

121. Acting Studio II. F,S Continuing concentrated work on basic acting skills and textual analysis through scene study. May be repeated for credit with consent of instructor. Prerequisite(s): admission by audition at first class meeting. See department office for more information. Course 21 recommended as preparation. May be repeated for credit. (General Education Code(s): A.) *D. Scheie, P. Gallagher, P. Whitworth, M. Foley*

122. Indian Performance: Rama, Siva, Krishna. * Study of the classical theater and dance of India, with attention to performance practice, aesthetic theory, relationship to religious practice devoted to Rama, Siva, and Krishna, political implications and intercultural experimentation. (General Education Code(s): CC, IH, A.) *The Staff*

124. Movement for Performers. * Awareness and extension of personal movement repertoire, through observation, movement experience, and exploration. (General Education Code(s): A.) *P. Gallagher, The Staff*

126. Acting Studio III. W/S

Individual work on acting skills and problems, with emphasis on individual interpretation and scene work with other students. Prerequisite(s): course 121; permission of instructor; audition at first class meeting—contact department office for more information. Enrollment limited to 18. May be repeated for credit. (General Education Code(s): A.) *P. Gallagher, P. Whitworth*

128. Choreographic Workshop. W

Intensive upper-division choreographic workshop that begins from the key motifs of historical dance to develop original work. Dancers made available to the student choreographers. Course is a prerequisite for the student-choreographed production *Random With a Purpose*. Enrollment limited to 15. (General Education Code(s): A.) *M. Franko*

129. Advanced Ballet (2 credits). *

Continued study of classical ballet technique as a serious, expressive art form. Work includes longer combinations, air work, and style study in a regular class routine. Audition at first class meeting. Students are billed a materials fee. Enrollment limited to 20. May be repeated for credit. (General Education Code(s): A.) *The Staff*

130. Intermediate Dance Theory and Technique. W

A progression from the simple phrasing and articulation of beginning technique class to more complex material requiring more acute perceptive skills and richer dynamic range. Emphasis is on both alignment and maintaining the kinetic integrity of the body while moving through space. Students are billed a materials fee. (Formerly *Intermediate Modern Dance Theory and Technique*.) Prerequisite(s): course 30 or 31 or permission of instructor. May be repeated for credit. (General Education Code(s): IM, A.) *E. Warburton*

131. Advanced Dance Theory and Technique. *

Advanced instruction in developing the dancer's mind/body, combined with contemporary movement theory and practice. Students are billed a materials fee. (Formerly *Advanced Modern Dance Theory and Technique*.) Prerequisite(s): course 30 or 31 or permission of instructor. May be repeated for credit. (General Education Code(s): A.) *The Staff*

131C. Dance Studio II. *

Continued study of contemporary dance theory and practice. Focus on intermediate dance technique, individual and group movement invention, choreographic voice, and theatrical applications. Students are billed a materials fee. Enrollment limited to 30. (General Education Code(s): A.) *The Staff*

131P. Postmodern Dance II. *

Continued study of postmodern dance theory and technique. Focus on advanced compositional practice, theatrical applications, and critical analysis of contemporary postmodern dance choreographers in the U.S. and worldwide. Audition at first class meeting. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): IM, A.) *E. Warburton*

132. Modern Dance Studio (2 credits). *

Instruction in developing the dancer's physical instrument, combined with movement theory. Students are billed a materials fee. Prerequisite(s): course 30 or 31 or permission of instructor. May be repeated for credit. (General Education Code(s): A.) *E. Warburton*

135. Dance Improvisation and Theory. S

Exploring sources for movement; gaining facility in a wide range of movement elements; working in ensemble and solos. Students are billed a materials fee. (General Education Code(s): A.) *E. Warburton*

136. Intermediate Ballet. *

Continued study of classical ballet technique as a serious expressive art form. Work includes longer combinations, air work, and style study (Baroque and Romantic) in a regular class routine. Class also involves viewing, reading, and review writing. Students are billed a materials fee. Prerequisite(s): course 32 or permission of instructor. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): IH, A.) *The Staff*

136C. Dance Studio III. *

Advanced study of contemporary dance theory and practice. Focus on dance performance, creative process, and choreographic form in a contemporary style. Students are billed a materials fee. Enrollment limited to 30. May be repeated for credit. (General Education Code(s): A.) *The Staff*

137. Studies in Performance (Dance). *

Studies in dance, taken in connection with performance in a major dance concert. Students are required to work on all aspects of the production. Students work with guest and faculty choreographers. May be repeated for credit with consent of instructor. Students are billed a materials fee. Admission by audition held late winter quarter; see department office for more information. May be repeated for credit. (General Education Code(s): A.) *M. Franko*

138. Movement Research in New Arts Praxis. *

Work at the intersection of creative and research practices, focusing on experimental forms of movement theater, applications in digital arts and new media, and critical analysis of the arts in society. Collaborative, interdisciplinary performance projects required. Audition/interview at first class meeting. Students are billed a materials fee. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *E. Warburton*

139. Random: With a Purpose. W

Participation in a student-choreographed and directed dance concert under faculty supervision. Rehearsals culminate in public performances. Students are billed a materials fee. Auditions to be held on the first day of class. May be repeated for credit. (General Education Code(s): A.) *E. Warburton*

141. Play Direction Studio I. W

Basic studio exploration through scene problems and exercises of the development of directing principles. Intensive work on the director's pre-rehearsal work from text selection, analysis, and casting. Audition at first class. Enrollment limited to 20. *K. Jannarone*

142. Play Direction Studio II. *

Intensive studio exploration of the art and craft of directing. Primary focus on text analysis, collaboration with designers, developing a point of view and visual/auditory language for the play, staging techniques, and communication techniques with actors. Prerequisite(s): course 40, 141, or permission of instructor. Enrollment limited to 15. May be repeated for credit. (General Education Code(s): A.) *The Staff*

151. Studies in Performance (Drama). F,W,S

Studies in theater, taken in connection with participation in a Theater Arts Department sponsored production. Enrollment is limited to those persons chosen to take part in a particular production. Admission by audition; audition schedule to be announced at first class meeting. May be repeated for credit. (General Education Code(s): A.) *The Staff, M. Foley, D. Scheie*

152. Advanced Stagecraft. *

Exploration of stage technology from the scene shop's perspective. Conversion of scenic designs to construction

drawings. Pursuit of scenic-engineering and construction techniques using steel, wood, and other materials. Training on use of stage machinery: rigging, flying, wagons, tracking, and propulsion. Prerequisite(s): course 52. Enrollment limited to 25. (General Education Code(s): A.) *The Staff*

155. Workshop Experiments in Performance. W

A process-oriented investigation of specific playwrights or theatrical styles consisting of work which may culminate in a final production. Admission by audition at first class meeting; see department office for more information. May be repeated for credit. (General Education Code(s): A.) *The Staff*

156. Play Development Workshop. *

"Hands on" study and exploration of the process of developing a new script from the perspective of the playwright, the actor, and the director. Students enrolling in this course as playwrights are selected on the basis of submissions turned in the previous quarter. Students taking the course as directors are required to obtain consent of the instructor. Other students may enroll as usual. May be repeated for credit. (General Education Code(s): PR-C.) *The Staff*

157. Playwriting. S

Students are given the opportunity to write their own scripts and refine them as the result of class discussion and scenework with actors. Work is on specific problems involving such elements as the structuring of a plot or the development of character. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. May be repeated for credit. (General Education Code(s): W,A.) *J. Bierman*

158. Chautauqua Workshop. S

Advanced course that provides directors, writers, and performers with an opportunity to develop new works in performance. Students enrolling in this course as playwrights are selected on basis of submissions turned in the previous quarter. Students are billed a materials fee. Students taking the course as directors are required to obtain consent of the instructor. Other students may enroll as usual. May be repeated for credit. *The Staff*

159. Advanced Playwriting. W

A study, through practice, of the constituent elements in the construction of a drama. Students concentrate, in particular, on the organization of complex plots, the expression of character through conflict, and maximizing the emotional impact of dramatic situations. Prerequisite(s): course 157 or equivalent, satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): W,A.) *J. Bierman*

160. Dramatic Theories. S

An examination of the theories of acting and directing from the 19th century to our own time, starting with the classic theater and concentrating on the 20th-century debate centered in Stanislavski and Brecht, Grotowski, and Robert Wilson. This course must be taken prior to student's senior year; required for course 185. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): A.) *P. Mostkoff*

161. Theater, Literature, and History.**161A. Irish Theater. ***

Examines the idea of a "National Theater" in Ireland from its beginnings in the founding of the National Literary Society in 1892 to the current vitality of the contemporary Irish Theater. Enrollment limited to 45. (General Education Code(s): A.) *P. Whitworth*

161C. The Theater and Drama of Renaissance Europe. W

An examination of selected plays from Renaissance Europe (1580-1680, Italy, Spain, and France) from an explicitly theatrical viewpoint which will include practical scene study. Covers Renaissance theater buildings and some related critical materials. Offered in alternate academic years. (General Education Code(s): A.) *K. Jannarone*

161D. Asian Theater: An Anthropological Approach. F

Art serves simultaneously to educate its audience to the group's traditional values and to test new ideas. Indian, Indonesian, and Japanese forms are studied in relation to their cultural context. Through videotapes, lecture demonstrations, performances, and scenework, students explore the forms. Offered in alternate academic years. (General Education Code(s): CC, A, E.) *M. Foley*

161M. Sexuality, Gender, Drama, and Performance. *

Exploration and analysis of the interrelationships between gender, sexuality, and performance on stage and on the page. Topics include gender and homosexuality in the history of performance and dramatic literature, drag, queer Shakespeare, closet drama, same-sex performance conditions (e.g., Greece) vs. dual-gendered (e.g., Restoration England). Combines study of theoretical texts and script with analysis and practice. (Formerly *Gender and Performance*.) (General Education Code(s): A.) *D. Scheie*

161P. Theater in the "Chicano Power" Movement. *

Covers the rise of Teatro Chicano as a cultural-political force within the 1960's "Chicano Power" Movement starting with founding playwright Luis Valdez and El Teatro Campesino and covering Chicana/o playwrights inspired by the movement, e.g. Cherrie Moraga, Luis Alfaro, and Josefina Lopez. (Also offered as Latin American and Latino Studies 161P. Students cannot receive credit for both courses.) (General Education Code(s): A, E.) *The Staff*

161Q. Queer Theatrics: Representations and Sensibilities. *

An examination of the idea, form, and significance of queer/gay sensibility and representation in the English-speaking theater from the Renaissance to the present. (General Education Code(s): A.) *The Staff*

161R. Theater of American Cultures. F

Interrelationship of ethnicity and the rise of significant American theater groups including the black theater movement, Chicano Teatro, and Asian American theater will be shared via lecture, viewing, and discussion. (General Education Code(s): A, E.) *The Staff*

161S. American Drama: Politics and Theater. *

The dream of group theater, a long-term partnership of actors, directors, and playwrights, has fueled extraordinary and exciting change in the 20th-century American theater theory and practice. We examine ten exemplary manifestations of this dream. (General Education Code(s): A.) *The Staff*

161T. Women in Theater. *

Explores 20th-century American female playwrights from textual, historical, and multicultural perspectives. The course progresses from *Trifles* (1916) through the Harlem Renaissance, Broadway's Lillian Hellman, and today's post-Feminist theatrical explosion in lectures, films, dramatizations, and award-

winning playwrights' visits. (General Education Code(s): A.) *The Staff*

161U. Performance of Story in Theater and Film. *

Examination of theory and practice of theater and film comparing and contrasting works having been adapted from one genre to another. Lecture, film, and video viewing. Discussions of materialist, psychoanalytic, and feminist approaches shared. Students cannot receive credit for this course and course 80X. (General Education Code(s): A.) *P. Mostkoff*

161Y. Modern Ancient Drama. *

Studies 20th- and 21st-century productions and adaptations of ancient Greek drama in theater, dance, music, and film, including Stravinsky, O'Neill, Graham, Pasolini, and Breuer, discussing artists' goals, the sociopolitical context, ideas of authenticity, and audience response. Enrollment limited to 30. (General Education Code(s): A.) *The Staff*

162. Public Space/Public Sphere: The Performance of Public Art in 20th Century America. S

Examines phenomenon of public art as a performative phenomenon in the 20th century. Begins with the theory of the public sphere in the work of Jurgen Habermas and social space in the work of Henri Lefebvre. Concludes with the popular phenomenon of public art in the 1980s and the demise of the NEA by the later 80s with the scandals of the NEA Four. (General Education Code(s): A.) *M. Franko*

163. Special Studies in Individual Playwrights.**163A. Shakespeare. ***

Focuses on selected plays of Shakespeare. Explores the range and variety of interpretations of the plays, both in critical writings and in performance. Also studies other writings and graphic art created on the subjects and themes of the plays. Offered in alternate academic years. (General Education Code(s): A.) *J. Bierman*

163E. Chekhov and His Impact. *

Delves into the work of Chekhov and the Moscow art theater. Through scene work Stanislavski's acting techniques are related to the scripts. The impact on later Russian innovators, especially Meyerhold, and on the American theater is considered. (General Education Code(s): A.) *The Staff*

163G. Special Studies in Playwrights: Artaud. *

Antonin Artaud through three critical lenses: influence on modern and contemporary theater, subject and site of psychoanalytic and social criticism, and theater practitioner. Exercises cultural, historical, and analytic approaches to his work. Prerequisite(s): course 60C; course 160 recommended. Enrollment limited to 40. (General Education Code(s): A.) *K. Jannarone*

164. Issues in Dance History and Theory. *

A research seminar. Topics range from problems in dance aesthetics, criticism, or theory to particular movements, periods, or the work of a choreographer. (Formerly course 133.) Enrollment limited to 20. May be repeated for credit. (General Education Code(s): A.) *E. Warburton, M. Franko*

165. Introduction to Dance Modernism. S

Rare historical footage and the writings of famous choreographers provide an overview of 20th-century dance within the perspective of modernism. Topics include romanticism, "natural" dance, Orientalism, Ausdruckstanz,

"industrial" dance, American modern dance and neoclassicism, chance procedure, postmodernism, and the avant-garde commodity marketplace. (Formerly course 134.) (General Education Code(s): A.) *M. Franko*

170. Design Seminar (2 credits). F

Seminar to help advanced designers segue from student to professional. Topics to include portfolio construction, interview styles, guest speakers, and more. Enrollment restricted to senior and graduate students in Theater Arts. May be repeated for credit. *D. Cuthbert, B. Baron, K. Edmunds*

185. Senior Seminar. F

A required seminar for majors involving readings and discussions of important texts in dance, design, and drama. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; course 160. *D. Scheie*

190. Group Projects. F,W,S

Prerequisite(s): petition required, approved by instructor and department. May be repeated for credit. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching a lower-division seminar under faculty supervision. (See courses 42 and 45). Petition required, approved by instructor and department. *The Staff*

193. Proseminar. *

Exposes students to an aspect of the theory or practice of theater arts. Visiting scholars share their area of expertise in lectures to a small group of students. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *The Staff*

193F. Proseminar (2 credits). *

Exposes students to an aspect of the theory or practice of theatre arts. Visiting lecturers share their area of expertise in lectures to a small group of students. Enrollment limited to 25. May be repeated for credit. (General Education Code(s): A.) *The Staff*

198. Independent Field Study. F,W,S

Provides for department-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Students engaging in field study must complete application procedures for such study by the fifth week of the previous quarter. Petition required, approved by instructor and department. *The Staff*

198F. Independent Field Study (2 credits). F,W,S

Provides for department-sponsored individual study programs off campus for which faculty supervision is not in person (e.g., supervision is by correspondence). Students engaging in field study must complete application procedures for such study by the fifth week of the previous quarter. Petition required, approved by instructor and department. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual study in areas approved by sponsoring instructors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual study in areas approved by sponsoring instructors. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

Graduate Courses**290. Special Topics and Area Concentration. F**

Study group meetings on a regular basis which involve either the study of shared texts or presentations by the group members and invited guests. Enrollment restricted

to graduate students in theater arts. May be repeated for credit. *P. Whitworth*

291. Field Study. F,W,S

Student-designed and conducted research carried out in field settings. A brief prospectus must be filed with the department office before undertaking the research, and a brief final report of activities must be filed upon return. Course intended for students with graduate standing in theater arts. Petition required, approved by instructor and department. *The Staff*

292. Teaching-Related Independent Study. F,W,S

Directed graduate research and writing coordinated with the teaching of undergraduates. Course intended for graduate students in theater arts. Petition required, approved by instructor and department. *The Staff*

297. Independent Study. F,W,S

Independent study or research for graduate students in theater arts. Petition required, approved by instructor and department. May be repeated for credit. *The Staff*

297F. Independent Study/Graduate (2 credits). F,W,S

Independent study or research for graduate students in theater arts. Petition required, approved by instructor and department. Enrollment restricted to graduate students in theater arts. May be repeated for credit. *The Staff*

Western Civilization

Students wishing to pursue a course of study in Western civilization should consult the concentration in pre- and early modern studies under Literature, page 361.

Writing

166 Kresge College
(831) 459-2431
<http://writing.ucsc.edu/>

Faculty and Professional Interests

JAMES WILSON, Lecturer, Chair

Modern European literary, artistic, intellectual, and political movements (especially of France, Italy, and Spain); poetry of Ezra Pound; Chinese poetry and philosophy; translation; argument in popular culture; the rhetoric of sports

Senior Lecturer

ELIZABETH ABRAMS

Composition and rhetoric; writing pedagogy, writing across the curriculum; 19th-century and 20th-century American history and literature, especially concerning the Civil War

CAROL M. FREEMAN

History, theory, and practice of rhetoric; composition theory and pedagogy; the essay as genre

DONALD L. ROTHMAN, Emeritus

Literacy education and democracy; UC/K-12 partnerships; writing, persuasion, and nonviolence; writing pedagogy; connections between beauty and justice

Lecturer

SONDRA ARCHIMEDES

Cultural studies, gender studies, contemporary social issues, 19th-century and 20th-century British literature, writing

JEFFREY M. ARNETT

Poetry, well-being and creativity

DEREDE ARTHUR

Cultural studies, 18th–20th-century British literature, theory of the novel, theories of education, cognitive ethology

MARK BAKER

Media and democracy, postmodernism, 20th-century literature and culture of the Americas, community participation, writing and social responsibility

FARNAZ FATEMI

Comics and graphic novels, poetry, Middle East issues and cross-cultural perspectives, writing pedagogy

BK FAUNCE

Late 18th-century and early 19th-century British literary culture, film, literary theory

TIMOTHY FITZMAURICE

Poetry and politics, writing and publications

SUSAN GORSKY

Composition and rhetoric, writing pedagogy, 19th-century and 20th-century British and American literature, social justice and community

ROXANNE POWER HAMILTON

Writing, poetry, magazine editing, inter-arts performance, gender and queer studies

ROBIN KING

Visual arts, media criticism, sociology of learning and emotions, multi-cultural studies, politics of food

NANCY KRUSOE

Grammar, English as a second language (ESL), politics and writing

BRIJ LUNINE

Writing pedagogy; writing across the curriculum, teaching research; writing pedagogy, reception studies, cultural studies, popular culture and youth subcultures

PATRICK MCKERCHER

Virtual reality educational environments, outreach projects, collaborative research with James Burke, environmental education

ELLEN NEWBERRY

Educational partnerships with K–12 schools, transfer/entry student writing, women's studies, and queer studies

SARAH-HOPE PARMETER, Coordinator, Entry Level Writing Requirement (ELWR)

Writing and democracy; multilingual, multicultural rhetorics; cross-age writing partnerships and public school collaboratives; lesbian/gay/bisexual/transgender young adult literature; rhetoric of the sciences

DAN SCRIPTURE

Vietnam War, popular culture studies, fiction writing

ROSWELL SPAFFORD, Emerita

JUDE TODD

Philosophies of nature, ecopsychology, Native American world views, permaculture, visual arts, cross-cultural and interdisciplinary studies

AMY WEAVER

Creative nonfiction, writing pedagogy

Program Description

The campuswide Writing Program offers courses designed to help students become more competent and confident writers of prose. The courses offered through this program teach skills of grammar and organization and strategies of invention, composition, revision, and editing. These courses approach writing as one of the most important ways we have of making discoveries

about ourselves and the world around us and of communicating these insights to others.

Together with the colleges, the Writing Program administers the writing components (C1, C2) of the campus general education requirements; administers the Entry Level Writing Requirement (ELWR), formerly known as Subject A; and advises students about ways to fulfill these requirements.

Writing Program instructors in each college participate in the college's core course and counsel its students about their writing. The Writing Program offers Writing 2 (a lower-division course that satisfies the C2 requirement); the Writing 20, 21, 22, 23 series to help meet the needs of students who have not passed ELWR, including students with complex linguistics backgrounds; and instruction in the theory and practice of teaching writing for peer tutors and graduate students.

Each year, the Writing Program also offers several specialized lower- and upper-division courses, as well as writing-intensive courses during the summer session.

The Writing Program has offered two minors, a minor in journalism and a minor in communication and rhetoric, though both are suspended at this time.

Courses in creative writing are offered through the Literature Department.

Lower-Division Courses

2. Rhetoric and Inquiry. F,W,S

Explores the intersections of investigation, interpretation, and persuasion and hones strategies for writing and research. Students develop specific, practical ways of improving their writing through sustained critical thinking about diverse issues from multiple points of view. Students cannot receive credit for this course and course 1. Prerequisite(s): satisfaction of the Entry Level Writing and C1 requirements. Enrollment limited to 25. (General Education Code(s): C2.) *The Staff*

11A. Adjunct Tutorial in Writing (2 credits per quarter). F

A tutorial designed to provide follow-up assistance in writing for students who have passed the Entry Level Writing Requirement, but wish to continue to work on various aspects of their writing. Counts only for academic standing and financial aid purposes, but does not apply toward degree requirements (i.e., counts as workload credit only). Prerequisite(s): approval of the Writing Program; satisfaction of the Entry Level Writing Requirement. May be repeated for credit. *The Staff*

11B. Adjunct Tutorial in Writing (2 credits per quarter). W

A tutorial designed to provide follow-up assistance in writing for students who have passed the Entry Level Writing Requirement, but wish to continue to work on various aspects of their writing. Counts only for academic standing and financial aid purposes, but does not apply toward degree requirements (i.e., counts as workload credit only). Prerequisite(s): approval of the Writing Program; satisfaction of the Entry Level Writing Requirement. May be repeated for credit. *The Staff*

11C. Adjunct Tutorial in Writing (2 credits per quarter). S

A tutorial designed to provide follow-up assistance in writing for students who have passed the Entry Level Writing Requirement, but wish to continue to work on various aspects of their writing. Counts only for academic standing and financial aid purposes, but does not apply toward degree requirements (i.e., counts as workload credit only). Prerequisite(s): approval of the Writing Program; satisfaction of the Entry Level Writing Requirement. May be repeated for credit. *The Staff*

20. The Nature of Written Discourse. W

Explores the dynamics of written language: its relationships to speech, thought, and culture; its uses in different personal, academic, professional, and public contexts; its abuses in jargon and propaganda. Course work includes extensive practice in different kinds of writing. Enrollment restricted to students who have not passed the Entry Level Writing Requirement. Open to others by permission of instructor. Enrollment limited to 22. *The Staff*

21. Meaning and Style: The Sentence in Context. S

Explores, via cross-cultural readings, the nature, uses, and abuses of language. Course work includes extensive writing, both take-home and in-class. Emphasis on revising for power of expression and for variety and accuracy at the sentence level. Enrollment restricted to students who have not passed the Entry Level Writing Requirement. Open to others by permission of instructor. Enrollment limited to 22. *The Staff*

22A. Grammar and Editing Workshop (3 credits). F

Offers instruction on selected topics in grammar and conventions of written English as needed to strengthen the writing skills of students whose primary language is not standard English. Provides students practice in applying these concepts to editing their own writing. Designed for entering first-year students. Enrollment restricted to first-year students. Enrollment limited to 22. *N. Krusoe, D. Scripture*

22B. Grammar and Editing Workshop (3 credits). W

Offers instruction on selected topics in grammar and conventions of written English as needed to strengthen the writing skills of students whose primary language is not standard English. Provides students practice in applying these concepts to editing their own writing. Designed for continuing students who have already taken course 20 and/or 21. Enrollment limited to 22. *The Staff*

23. Grammar and Rhetoric: Language for Writing. F

Builds on writing skills gained in previous writing courses; focuses on effective language use in academic writing. Students reinforce their written English proficiency by reading, studying, practicing, and writing structures and patterns of written English. Enrollment restricted to students who have not passed the Entry Level Writing Requirement. Open to others by permission of instructor. Enrollment restricted to first-year students and sophomores. Enrollment limited to 22. *The Staff*

42. Student-Directed Seminar.

Seminars taught by upper-division students under faculty supervision. (See course 192.) *The Staff*

64. Newswriting Workshop. *

Introduction to the basic techniques of newswriting, including practice in leads, formats, and different kinds of news reporting. Emphasis on developing skills in research, interviewing, and shaping stories. Includes an examination of the contemporary media. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements, instructor determination at first class meeting. Enrollment limited to 22. (General Education Code(s): W.) *The Staff*

70. Communication and Rhetoric: An Introduction. *

This course introduces the field of contemporary communication studies, locating its roots in rhetoric and showing how key concepts play out in mass media and other settings as well as in everyday life. Prerequisite(s): satisfaction of the Entry Level Writing requirement. *The Staff*

93. Field Study. F,W,S

For lower-division students: supervised study within commuting distance of campus. May include internships at magazines, newspapers, publishing houses, or newsletters of corporations, and civic or service organizations. Prerequisite(s): satisfaction of the Entry Level Writing requirement; certification of adequate preparation; approval of Writing Program. May be repeated for credit. *The Staff*

93E. Field Study (2 credits). F,W,S

For lower-division students: supervised study within commuting distance of campus. May include internships at magazines, newspapers, publishing houses, or newsletters of corporations, and civic or service organizations. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99. Tutorial. F,W,S

Individual, directed study for lower-division students in expository writing, editing, or journalism. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

99E. Tutorial (2 credits). F,W,S

Individual, directed study for lower-division students in expository writing, editing, or journalism. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Upper-Division Courses***101. Introduction to the History, Theory, and Practice of Rhetoric. ***

A survey of classical and contemporary ideas about rhetoric which explores, practically and theoretically, "the best means of persuasion in any situation whatsoever" and will consider the nature of human discourse in diverse areas of knowledge. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): W.) *C. Freeman*

102. The Rhetoric of the Social Sciences. *

Develops rhetorical facility in disciplinary writing for upper-division social science majors. Requires critical and disciplinary reading, writing in modes appropriate to social science disciplines, and a substantial research or critical paper within the student's own discipline. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. (General Education Code(s): W.) *The Staff*

103. Rhetoric of the Natural Sciences. *

This course explores writing genres within the natural sciences. Emphasis is on the relationships between good science and good writing, clear thinking and clear writing. Frequent papers and substantive revisions required. Prerequisite(s): completion of 10 units coursework in the natural sciences, satisfaction of the Entry Level Writing and Composition requirements. Enrollment restricted to juniors and seniors during priority enrollment. Enrollment limited to 30. (General Education Code(s): W.) *The Staff*

104. Writing in the Arts. *

A writing course focusing on the purposes and composition of various genres of writing about and in the performing arts, visual arts, and music such as reviews, program and exhibit notes, journal and magazine articles, grant proposals, and press releases. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 30. (General Education Code(s): W.) *E. Abrams*

106. Public Speaking. *

Students learn strategies to write, analyze, and deliver effective speeches of various kinds as well as professional presentations using PowerPoint and other visuals. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 25. *The Staff*

107. Technical and Business Writing: An Overview. *

An exploration of the conventions and formats of business and technical writing. Course work involves writing effective resumes, proposals, letters, end-user manuals, and the fundamentals of Web site design. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 30. *The Staff*

108. Electronic Communication. *

An introduction to the evolving conventions of effective Web site design as well as collaborative writing. Course work includes evaluation of Web site content and structure and creation of hypertext. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 24. *The Staff*

109. Argument and Practical Reasoning. *

An investigation of contemporary persuasive discourse with special attention to the elements and forms of argument, the nature of evidence, questions of validity and probability, and the workings of rhetorical reasoning. Emphasizes the analysis of arguments rather than their construction. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 40. *The Staff*

110A. Writing in the Professions. *

Study of writing required in the selected professions, including law, politics, and government. Considers the rhetoric of each discipline and relevant texts. Includes lectures from visiting professionals and a series of writing assignments based on reading and research. Topic may vary from year to year, focusing on the rhetoric of other professional divisions: medicine, engineering, economics, and so forth. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 40. (General Education Code(s): W.) *The Staff*

120. Editing English Prose. *

This course offers extended, detailed instruction in editing one's own and other people's prose for accuracy, clarity, appropriateness, and effectiveness. It provides some history of theories of style and stylistic analysis, and instruction in prose variation according to social context. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 40. *The Staff*

128. Latino Media in the U.S. *

Explores the history and practice of Latino media in the U.S. with an emphasis on work created by, for, with, and about Latino constituencies. Course highlights the role that media plays in struggles for social change, political enfranchisement, creative self-expression, and cultural development. Course content varies with instructor. (Also offered as Latin American and Latino Studies 128. Students cannot receive credit for both courses.) Enrollment limited to 39. (General Education Code(s): IM, E.) *The Staff*

159. Grammar for Tutors and Teachers (3 credits). W

English grammar from a pedagogical perspective, emphasizing structures, patterns, and conventions of written English that commonly challenge basic writers. Students learn strategies for helping multilingual and other writers

improve their writing skills by increasing their awareness of grammar. Prerequisite(s): course 169, or by instructor permission. Enrollment limited to 45. *N. Krusoe*

161. Academic Writing and Research Methods. *

Introduces library and field research methods and also provides instruction and practice in writing from research, addressing issues such as voice, argument, and documentation. Students write four lengthy essays and do considerable informal writing. Course 161 includes sections for re-entry women, transfer students, and students in the EOP Faculty Mentor Program. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements. Students should contact the instructor for enrollment information. Enrollment limited to 20. (General Education Code(s): W.) *The Staff*

163. Advanced Workshop in Expository Writing. *

A composition course for students who, having mastered basic writing skills, wish to concentrate on increasing their effectiveness as rhetoricians, prose stylists, and editors. Assignments include writing and revising essays, responding to other students' work, and reading published essays. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements. Enrollment limited to 22. May be repeated for credit. (General Education Code(s): W.) *The Staff*

165. Practicum in Reporting. *

In-depth, community-based reporting, with an emphasis on skills ranging from interviewing techniques to profiles, integrating research with writing. Students choose a specific area or "desk" of concentration, and all the stories reflect that beat. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; a writing sample, completed in class, is required at first class meeting. Enrollment restricted to journalism minors during priority enrollment. Enrollment limited to 22. (General Education Code(s): W.) *The Staff*

166. Topics in Journalism. *

Courses under this heading explore fields of newspaper and magazine journalism: feature writing, investigative reporting, reviewing, commentary, etc. Students study published writing and hone their own skills as writers under the supervision of a practicing journalist. See the Schedule of Classes for specific offerings. *The Staff*

166A. Magazine Writing. *

Introduces students to the various forms of magazine writing, as well as to pertinent reporting techniques. Students work intensively on process, style, and editing, producing numerous formal and informal pieces. Enrollment priority will be given to journalism minors. Students produce a writing sample on the first day of class. Prerequisite(s): satisfaction of Entry Level Writing and Composition requirements; course 64 or permission of instructor. Enrollment limited to 22. (General Education Code(s): W.) *The Staff*

166B. Investigative Reporting. *

Students acquire basic investigative and research skills, with particular emphasis on how to develop investigative subjects, obtain data, check accuracy, and convert information into well written, publishable articles. Priority given to students concentrating in journalism. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; interview with instructor to review journalism portfolio. Enrollment limited to 22. (General Education Code(s): W.) *The Staff*

166D. Minorities in Journalism. *

Focuses on the minority press and how it has shaped journalism in the U.S. as well as viewing how the media has dealt with this segment of our society. Prerequisite(s):

satisfaction of the Entry Level Writing and Composition requirements and consent of instructor. Enrollment limited to 22. (General Education Code(s): W.) *The Staff*

166J. Online Journalism. *

A course in using electronic sources to report articles for publication and in publishing journalistic pieces online. Prerequisite(s): course 64 or journalism experience; instructor determination at first class meeting. Enrollment limited to 25. *The Staff*

166N. The Rhetoric of Radio. *

Examines the theory and practice of radio. Students explore how the formats of radio create its meaning, and investigate radio's place in the landscape of the media, particularly in the U.S. and Mexico. Prerequisite(s): satisfaction of the Entry level Writing and Composition requirements and consent of instructor. Enrollment limited to 25. *The Staff*

167. Making the News. *

A writing course examining news and feature articles in popular print media. Students write their own articles and analyze how a particular content is mandated by conventional forms, by the structure of the industries, and by ideas of "newsworthiness." Designed for journalism minors and students for whom a course in media criticism is central to their program. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; qualifications determined by instructor at first class meeting. Enrollment limited to 43. (General Education Code(s): W.) *The Staff*

169. Theory and Practice of Tutoring Writing (3 credits). F

An introduction to theory and research on the composing process and practical strategies for teaching writing, especially in tutorial situations. Recommended for writing assistants. Prerequisite(s): instructor determination at first class meeting; course intended for writing tutors only. Enrollment limited to 30. *E. Newberry, A. Weaver*

180. Seminar in Editing and Publishing. *

Newswriting seminar for *City on a Hill* editors and writers. Weekly sessions evaluate newspaper in depth, including writing, reporting, and issues in journalism ranging from ethics to legal questions. Prerequisite(s): instructor determination at first class meeting; open only to editors, interns, and writers at *City on a Hill Press*. Enrollment limited to 40. May be repeated for credit. *The Staff*

189. Methods of Teaching Writing. *

Supervised by a writing instructor, each student attends a weekly seminar on teaching writing and either assists in a class or serves as a facilitator of a small writing group in a course at UCSC or a public school. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

191. Internships.

Individual work in journalism, publishing, or broadcasting. Internships require a contracted amount of writing or other work, and generally involve group tutorials with faculty in the Writing Program as well as individual conferences. *The Staff*

191A. Internship in Writing. F,W,S

Regular writing for newspaper or magazine. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

191B. Internship in Editing. F,W,S

Work in an editorial position involving critique and guidance of reporters. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

191C. Internship in Publishing. F,W,S

All phases of work for a publishing house, from manuscript reading to editorial. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

191D. Internship in Broadcasting. F,W,S

Writing, editing, scheduling, and/or broadcast work for television or radio. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

192. Directed Student Teaching. F,W,S

Teaching of a lower-division seminar under faculty supervision. (See course 42.) Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

193. Field Study. F,W,S

For upper-division students: supervised study within commuting distance of the campus. May include internships at magazines, newspapers, publishing houses, or newsletters of corporations, and civic or service organizations. Prerequisite(s): satisfaction of Entry Level Writing requirement; students submit petition to sponsoring agency. *The Staff*

193E. Field Study (2 credits). F,W,S

For upper-division students: supervised study within commuting distance of the campus. May include internships at magazines, newspapers, publishing houses, or newsletters of corporations, and civic or service organizations. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

194. Group Tutorial. F,W,S

A writing, editing, or publishing project undertaken by a small group of students under the direct supervision of a writing instructor. Students submit petition to sponsoring agency. Enrollment limited to 15. May be repeated for credit. *The Staff*

195. Senior Thesis. F,W,S

Individual work on a thesis for any campus major or individual major. Faculty in the Writing Program help students on all phases of work, from selection and focus to development of bibliographies, research techniques, revision, and editing. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

196. Developing and Editing Field Documentation (2 credits). *

Helps students transform field documentation into fully developed, professional projects. Employs a weekly production schedule and teaches principles of rhetoric as a means of effectively selecting and arranging documentary materials. Prerequisite(s): satisfaction of the Entry Level Writing and Composition requirements; interview with instructor to review documentary materials. Enrollment limited to 20. *L. Lopez*

198. Independent Field Study. F,W,S

Individual study for which faculty supervision is possible only by correspondence. May include internships at newspapers, magazines, publishing houses, or the newsletters of corporations, and civic or service organizations. Prerequisite(s): satisfaction of Entry Level Writing requirement; students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

198E. Independent Field Study (2 credits). F,W,S

Individual study for which faculty supervision is possible only by correspondence. May include internships at newspapers, magazines, publishing houses, or the newsletters of corporations, and civic or service organizations. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199. Tutorial. F,W,S

Individual, directed study for upper-division students in expository writing, editing, or journalism. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

199F. Tutorial (2 credits). F,W,S

Individual, directed study for upper-division students in expository writing, editing, or journalism. Students submit petition to sponsoring agency. May be repeated for credit. *The Staff*

*Graduate Courses***202. Writing and Learning Seminar (3 credits). ***

Strategies for teaching assistants to help undergraduates become better learners and writers in disciplinary courses. Topics include using writing to improve reading and thinking, analysis of assignments, avoiding plagiarism, responding to and evaluating papers, ESL writers, peer response, and technological aids. Enrollment restricted to graduate students. Enrollment limited to 30. *D. Scripture*

203. Teaching Writing. S

Prepares graduate students to teach Writing 1 at UCSC and elsewhere. Development of a syllabus, teaching strategy, and class plans based on study of composition and rhetorical theories, research on students' writing development, and effective writing pedagogies. Enrollment restricted to graduate students. Enrollment limited to 18. *E. Abrams*

Teaching Staff and University Administration

| | |
|----------------|-----|
| Teaching Staff | 469 |
| Administration | 499 |



Teaching Staff

Faculty titles for 2010–12 were verified as of August 31, 2010, and subsequent changes may not be reflected in the following list. Please note that inclusion in this list is not a guarantee that the faculty member will be teaching throughout the 2010–12 academic years. In addition, some faculty listed here as emeriti may be recalled to teach courses.

The listing for most faculty members includes college membership, year of arrival at UC Santa Cruz, academic title, degrees, and former affiliations.

MARTIN ABADI, Stevenson College (2001)
Professor, Computer Science

B.S., M.S., Ph.D., Stanford University. Former affiliations: Systems Research Center, Compaq; Bell Labs Research; Lucent Technologies.

RALPH H. ABRAHAM, Kresge College (1968)
Professor Emeritus, Mathematics
B.S.E., M.S., Ph.D., University of Michigan. Former affiliations: Princeton University; Columbia University; University of California, Berkeley.

W. EMMANUEL ABRAHAM, Cowell College (1973)
Professor Emeritus, Philosophy
B.A., University of London; M.A., B.Phil., Oxford University. Former affiliations: Macalester College; University of Ghana; University of California, Berkeley; Stanford University.

ELIZABETH S. ABRAMS, Porter College (2000)
Senior Lecturer, Writing
A.B., University of California, Berkeley; M.A., M.Phil., Yale University. Former affiliation: Harvard Expository Writing Program.

ZSUZSANNA ABRAMS (2010)
Associate Professor, Language Program
B.A., University of Wisconsin-Eau Claire; M.A., Ph.D., University of Tucson. Former affiliations: University of Texas at Austin.

DEMETRIOS ACHLIOPTAS (2005)
Associate Professor, Computer Sciences
B.Eng., University of Patras; M.Sc., Ph.D., University of Toronto. Former affiliations: Microsoft Research, Redmond, Washington.

ROBERT ADAMS, Crown College (1967)
Professor Emeritus, Economics
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Professor, Computer Engineering
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Associate Professor, Film and Digital Media
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Professor, Electrical Engineering
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Professor Emeritus, English and Comparative Literature
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B.M., M.M., San Francisco Conservatory of Music.
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Professor Emeritus, Politics
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A.B., Princeton University; Ph.D., University of Maryland.
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- STEVEN N. WARD (1984)
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Professor Emeritus, Art
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- ERIKA S. ZAVALETA, College Eight (2003)
Assistant Professor, Environmental Studies
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- PATRICIA J. ZAVELLA, College Eight (1984)
Professor, Latin American and Latino Studies
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IN MEMORIAM

We mourn the deaths of eight valued faculty members since the publication of the last catalog.

February 2008. JAMES B. HALL, Porter College (1969)

Literature

B.A., M.A., Ph.D., University of Iowa.

October 2008. DONALD COYNE, Porter College (1985)

Physics

B.S., University of Kansas; Ph.D., California Institute of Technology.

February 2009. NOEL Q. KING, Merrill College (1968)

History and Comparative Religion

M.A., Oxford University; Ph.D., University of Nottingham.

April 2009. GABRIEL BERNS, Cowell College (1965)

Spanish Literature

B.A., M.A., University of Wisconsin; Ph.D., Ohio State University.

June 2009. ALI AKBAR KHAN (1999)

Music

D.Litt.: Rabinda Bharati University; University of Dacca; University of Delhi; Doctorate: Viswa Bharati University; D.A., California Institute of the Arts.

October 2009. CHING-YI DOUGHERTY (1967)

Chinese Language

B.A., Yenching University; M.A., Mills College.

February 2010. RONALD J. SCHUSTERMAN (1985)

Ocean Sciences

B.A., Brooklyn College; M.A., Ph.D., Florida State University

August 2010. GEORGE P. HITCHCOCK, Porter College (1971)

Literature

B.A., University of Oregon.

University Administration

The governance of the university is entrusted, under the state constitution, to the Regents of the University of California. The Board of Regents is presently composed of 18 members who are appointed by the governor of California, subject to California State Senate confirmation; seven members who participate because of the offices they hold; and a student member appointed by the board.

The president of the university is the chief executive of the 10-campus system. He is appointed by the Regents and is directly responsible to them.

Each of the 10 campuses of the university has a chancellor, its chief administrative officer, who is responsible for the organization and operation of the campus, including academic, student, and business affairs.

The Academic Senate, consisting of the faculty and certain administrative officers, determines the conditions for admission and degrees, subject to the approval of the Regents; authorizes and supervises courses and curricula; and advises the university administration on important matters such as appointments and promotions, budgets, student discipline, and administration of the library.

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Vice President of the Alumni Associations of the University of California

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UC Irvine

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Timothy P. White

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The title of University Professor is the highest honor UC bestows on a professor in recognition of outstanding scholarship and teaching. The title is reserved for scholars of international distinction who are recognized and respected as teachers of exceptional ability. University Professors—appointed by the Regents—visit other campuses for seminars and meetings with faculty and students and for presentations to more general audiences.

Francisco J. Ayala

Department of Ecology and Evolutionary Biology, UC Irvine

J. Michael Bishop

Chancellor, UC San Francisco

E. Margaret Burbidge (*Emerita*)

Department of Physics, UC San Diego

Shu Chien

Departments of Bioengineering and Medicine, UC San Diego

Alexandre J. Chorin

Department of Mathematics, UC Berkeley

Marvin L. Cohen

Department of Physics, UC Berkeley

Michael Cole

Department of Communication, UC San Diego

Robert B. Edgerton

Departments of Psychiatry and Biobehavioral Sciences and Anthropology, UCLA

Emory Elliott

Department of English and Center for Ideas and Society, UC Riverside

Sandra M. Faber

Department of Astronomy and Astrophysics, UC Santa Cruz

Arturo Gómez-Pompa (*Emeritus*)

Department of Botany and Plant Sciences, UC Riverside

M. Frederick Hawthorne (*Emeritus*)

Department of Chemistry and Biochemistry, UCLA

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*Departments of Electrical Engineering and
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Robert Rosenthal
Department of Psychology, UC Riverside

Frank H. Shu
Department of Physics, UC Berkeley

S. Jonathan Singer (Emeritus)
Division of Biological Sciences, UC San Diego

Neil J. Smelser (Emeritus)
*Department of Sociology and Institute for
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Gabor A. Somorjai
Department of Chemistry, UC Berkeley

Charles H. Townes (Emeritus)
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Appendix A: California Residency and Nonresident Tuition Fee

If you do not meet the University of California requirements for residence for tuition purposes on the residence determination date for each term in which you propose to attend the university, you must pay a Nonresident Tuition Fee in addition to all other fees. The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

Regulations Governing Residence

The rules regarding residence for tuition purposes at the University of California are governed by the California Education Code and implemented by Standing Orders of the Regents of the University of California. Under these rules, adult citizens and certain classes of aliens can establish residence for tuition purposes. There are particular rules that apply to the residence classification of minors (see below).

Note: Registered domestic partners are included in rules that apply to spouses.

Who Is a Resident?

If you are an adult student (at least 18 years of age), you may establish residence in California if

- (1) You are a U.S. citizen.
- (2) You are a permanent resident or other immigrant.
- (3) You are a nonimmigrant who is not precluded from establishing a domicile in the U.S. This includes nonimmigrants who hold valid visas of the following types: A, E, G, H-1B, H-4, I, K, L, N, O-1, O-3, R, T, U, or V.

To establish residence you must be physically present in California for more than one year, and you must come here with the intent to make California your home as opposed to coming to this state to go to school. Physical presence within the state solely for educational purposes does not constitute the establishment of California residency, regardless of the length of stay. You must demonstrate your intention to make California your home by severing your residential ties with your former state of residence and establishing those ties with California. If these steps are delayed, the one-year durational period will be extended until you have demonstrated both presence and intent for one full year. If your parents are not California residents, you are required to be financially independent in order to be a resident for tuition purposes. Your residence cannot be derived from your spouse, a registered domestic partner or a parent.

Requirements for Financial Independence

You are considered “financially independent” if one or more of the following applies:

- (1) You are at least 24 years of age by December 31 of the calendar year of the term for which you are requesting resident classification.
- (2) You are a veteran of the U.S. Armed Forces.
- (3) You are a ward of the court or both parents are deceased.
- (4) You have legal dependents other than a spouse or a registered domestic partner.
- (5) You are married, a registered domestic partner, or a graduate student, and you were not/will not be claimed as an income tax deduction by any individual other than your spouse or domestic partner for the tax year immediately preceding the term for which you request resident classification.
- (6) You are a single undergraduate student and you were not claimed as an income tax deduction by your parents or any other individual for the two tax years immediately preceding the term for which you request resident classification, and you can demonstrate self-sufficiency for those years and the current year.

Note: Financial independence is not a factor in determining residence status for graduate student instructors, graduate student teaching assistants, research assistants, junior specialists, postgraduate researchers, graduate student researchers, and teaching associates who are employed 49 percent or more of full time or awarded the equivalent in university-administered funds (e.g., grants, stipends, fellowships) for the term for which resident classification is sought.

Establishing Intent for California Residency

You must demonstrate your intent to make California your home by severing your residential ties with your former state of residence and establishing those ties with California shortly after arrival. Indications of your intent to make California your permanent residence must be dated one year before the term for which you seek residence classification, and can include the following: registering to vote and voting in California elections; designating California as your permanent address on all school and employment records, including military records if you are in the military service; obtaining a California driver's license or, if you do not drive, a California identification card; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside California from the date you establish residence; establishing a home in California where you keep your personal belongings; and licensing for professional practice in California. The absence of these indicia in other states during any period for which you claim California residence can also serve as an indication of your intent. Documentary evidence is required and all relevant indications will be con-

sidered in determining your classification. Your intent will be questioned if you return to your prior state of residence when the university is not in session.

General Rules Applying to Minors

If you are an unmarried minor (under age 18), the residence of the parent with whom you live is considered to be your residence. If you live with neither parent, your residence is that of the parent with whom you last lived. Unless you are a minor alien present in the U.S. under the terms of a nonimmigrant visa, which precludes you from establishing domicile in the U.S., you may establish your own residence when both parents are deceased and a legal guardian has not been appointed. If you derive California residence from a parent, that parent must satisfy the one-year durational/intent requirement.

Specific Rules Applying to Minors

- (1) *Divorced or separated parents.* To derive California resident status from a California-resident parent, you must move to California to live with that parent before your 18th birthday, remain in the state, and establish California indicia of intent from the time you reach 18. Otherwise, you will be considered out-of-state student and will have to meet all applicable UC residence requirements.
 - (a) you remained in California after your parent(s) departed;
 - (b) you enrolled in a California public postsecondary institution within one year of your parent(s)' departure; and
 - (c) once enrolled, you maintain continuous attendance in that institution. Financial independence is not required in this case.
- (2) *Parent of minor moves from California.* You may be entitled to resident status if you are a minor and a U.S. citizen or eligible alien whose parent(s) was a resident of California who left the state within one year of the residence determination date if
 - (a) you remained in California after your parent(s) departed;
 - (b) you enrolled in a California public postsecondary institution within one year of your parent(s)' departure; and
 - (c) once enrolled, you maintain continuous attendance in that institution. Financial independence is not required in this case.
- (3) *Self-support.* You may be entitled to resident status if you are a minor and a U.S. citizen or eligible alien and can prove the following:
 - (a) you lived in California for the entire year immediately preceding the residence determination date;
 - (b) you have been self-supporting for that year; and
 - (c) you intend to make California your permanent home.
- (4) *Two-year care and control.* You may be entitled to resident status if you are a minor and a U.S. citizen or eligible alien and you have lived continuously with an adult who is not your parent for at least two years prior to the residence determination date. The adult with whom you are living

must have been responsible for your care and control for the entire two-year period and must have been residing in California during the one year immediately preceding the residence determination date.

Exceptions that either Confer Residence Status or Exemption from Nonresident Tuition

You may be entitled to an exception conferring residence status or exemption from nonresident tuition if one of the following applies to you. Some of the exceptions conferring residence status and exemptions are for a limited period of time. Check with the Campus Residence Deputy for more information:

(1) *Member of the military; spouse, registered domestic partner, or other dependents of military personnel.*

An undergraduate student who is a member of the U.S. military stationed in California on active duty (unless assigned for educational purposes to a state-supported institution of higher education) is eligible for resident status. A graduate student will be eligible for resident status for two years during which the student must take steps to fulfill the UC resident requirements.

An undergraduate student who is a dependent spouse, registered domestic partner, or natural or adopted child or stepchild of a member of the U.S. military stationed in California on active duty is entitled to resident status. A military dependent who is a graduate student is entitled to resident status only until the student has lived in California the minimum time necessary to become a resident (366 days).

An undergraduate or graduate student who qualifies under federal law (The Higher Education Opportunity Act of 2008) and is a member of the Armed Forces of the United States on active duty for a period of more than 30 days and whose domicile or permanent duty station is in California, or the spouse, registered domestic partner, or dependent child of such a member of the Armed Forces, is entitled to California resident tuition. Student must be continuously enrolled at the University, notwithstanding a subsequent change in the permanent duty station to a location outside of California. The student remains a nonresident, but may petition for residency upon fulfilling the University's residence regulations.

Those who may qualify for an exemption from nonresident tuition and fees (based on federal law: The Higher Education Opportunity Act of 2008).* An undergraduate or graduate student who is a member of the Armed Forces of the United States on active duty for a period of more than 30 days and whose domicile or permanent duty station is in California, or the spouse, registered domestic partner, or dependent child of such a member of the Armed Forces, is entitled to an exemption from nonresident tuition. The student must be continuously enrolled at the university, notwithstanding a subsequent change in the permanent duty station to a location outside of California.

* As of the residence determination date for the term.

(2) *Child, spouse, or registered domestic partner of a faculty member.* To the extent that university funds are available, a student who is the unmarried, dependent child under the age of 21 or the spouse or registered domestic partner of a University of California faculty member who is a member of the Academic Senate may be eligible for an exemption.

(3) *Child, spouse, or registered domestic partner of a university employee.* A full-time UC employee assigned to work outside the State of California in an institution or state agency and the unmarried, dependent child under the age of 21 or the spouse or registered domestic partner of such an employee may be eligible for resident classification. This provision most often applies to employees of Los Alamos National Laboratory.

(4) *Child, spouse, or registered domestic partner of a deceased public law enforcement or fire suppression employee.* A student who is a child, spouse or registered domestic partner of a deceased public law enforcement or fire suppression employee, who was a California resident and was killed in the course of law enforcement or fire suppression duties may be eligible for an exemption.

(5) *Dependent child of a California resident.* A student who has not been an adult resident for more than one year and is the natural or adopted dependent child of a California resident who has been a resident for more than one year immediately prior to residence determination date may be entitled to an exemption from nonresident tuition until the student has lived in California the minimum time necessary to become a resident. The student must also maintain continuous attendance in a California public postsecondary institution.

(6) *Graduate of a California school operated by the Federal Bureau of Indian Affairs (B.I.A.).* A student who is a graduate of a California school operated by the B.I.A. (e.g., Sherman Indian High School) may be eligible for a resident classification.

(7) *Employee of California public school district.* A student holding a valid credential authorizing service in California public schools and employed by a school district in a full-time certificate position may be exempt from nonresident tuition.

(8) *Student athlete in training at U.S. Olympic Training Center, Chula Vista.* An amateur student athlete in training at the U.S. Olympic Training Center in Chula Vista may be eligible for resident status until he or she has resided in California the minimum time necessary to become a resident.

(9) *Graduate of California high school.* A student who attended high school in California for three or more years (9th grade included) and graduated from a California high school (or attained the equivalent) may be exempt from nonresident tuition. You are not eligible for this exemption if you are a nonimmigrant alien.

(10) *Congressional Medal of Honor recipient.* An undergraduate student under age 27 who is the

recipient of the Congressional Medal of Honor or a child of a recipient who at the time of his or her death was a California resident may be eligible for an exemption.

(11) *Surviving dependent of California resident killed in 9/11 terrorist attacks.* An undergraduate student who is the surviving dependent of a California resident who was killed in the 9/11/01 terrorist attacks on the World Trade Center, the Pentagon Building, or the crash of United Airlines Flight 93 may be eligible for an exemption.

Temporary Absences

If you are a nonresident student who is in the process of establishing a residence for tuition purposes and you return to your former home during noninstructional periods, your presence in the state will be presumed to be solely for educational purposes and only convincing evidence to the contrary will rebut this presumption. Students who are in the state solely for educational purposes will not be classified as residents for tuition purposes regardless of the length of their stay.

If you are a student who has been classified as a resident for tuition purposes and you leave the state temporarily, your absence could result in the loss of your California residence. The burden will be on you (or on your parents if you are a minor) to verify that you did nothing inconsistent with your claim of a continuing California residence during your absence. Steps that you (or your parents) should take to retain a California residence include:

(1) *Continue to use a California permanent address on all records*—educational, employment, military, etc.

(2) *Continue to satisfy California tax obligations.* If you are claiming California residence, you are liable for payment of income taxes on your total income from the date that you establish your residence in the state, including income earned in another state or country.

(3) *Retain your California voter's registration and vote by absentee ballot.*

(4) *Maintain a California driver's license and vehicle registration.* If it is necessary to change your driver's license or vehicle registration, you must change them back within the time prescribed by law.

Petitioning for Change of Classification

You must petition in person at the Office of the Registrar for a change of classification from nonresident to resident status. All changes of status must be initiated prior to the first day of classes for the term for which you intend to be classified as a resident. Late petitions will not be accepted.

Time Limitation on Providing Documentation

If additional documentation is required for residence classification but is not readily accessible, you will have until the third week of instruction of the applicable term to provide it. Failure to meet

this deadline will result in your file being closed and your status remaining as a nonresident.

Incorrect Classification

If you are incorrectly classified as a resident, your classification will be corrected and you will be required to pay all nonresident tuition not paid. If you concealed information or furnished false information and were classified incorrectly as a result, you are also subject to university discipline. Resident students who become nonresidents must immediately notify the campus residence deputy.

Inquiries and Appeals

Please be advised: This is only a summary of the UC Residence Regulations and may not cover all of your residence questions or circumstances. All inquiries regarding residence requirements, determination, and/or recognized exceptions should be directed to the Residence Deputy, Office of the Registrar, 190 Hahn Student Services Building, University of California, Santa Cruz, 1156 High Street, Santa Cruz, CA 95064-1077, reg_fees@ucsc.edu, or to the Residence Specialist, University of California Office of the General Counsel, 1111 Franklin Street, 8th Floor, Oakland, CA 94607-5200.

Changes may be made to the residence requirements between the publication date of this statement and the relevant residence determination date. Any student, following a final decision on residence classification by the residence deputy, may appeal in writing to the residence specialist within 30 days of notification of the residence deputy's final decision.

No other University of California personnel are authorized to provide information regarding residence requirements.

Privacy Notice

All of the information requested on the Statement of Legal Residence form is required [by the authority of Standing Order 110.2 (a)–(d) of the Regents of the University of California] for determining whether or not you are a legal resident for tuition purposes. You have the right to inspect university records containing the residence information requested on this form. The records are maintained by the Office of the Registrar, 190 Hahn Student Services Building, University of California, Santa Cruz, 1156 High Street, Santa Cruz, CA 95064-1077.

Appendix B: University Police

The University Police have the same authority and responsibility, by law, as municipal police departments. In emergencies, call 9-1-1, 24 hours a day, from campus or private phones. If you need information, or if you need to report a theft, assault, or other crime, call (831) 459-2231, also 24 hours a day. Officers patrol the campus on foot, bicycle, motorcycle, or by car. They answer calls related to crimes, collisions, injuries, and complaints. The lost-and-found service is

located in the Police Department. Office hours are Monday through Friday, 8 A.M. to 5 P.M. The Police Department is located near the main entrance to campus.

The Parking Enforcement Office (for paying parking citations and requesting special parking consideration) is in the same location. Citation payments may be made in person Monday through Friday, 8 A.M. to 5 P.M.

Crime Awareness and Campus Security Act

In compliance with the federal Crime Awareness and Campus Security Act, UCSC publishes information on campus security and crime statistics. The information is posted on the web: www2.ucsc.edu/police.

Appendix C: Drug-Free Schools and Communities Act

In compliance with the federal Drug-Free Schools and Communities Act, UCSC annually notifies students, faculty, and staff of policies, procedures, and potential consequences related to unlawful possession, use, or distribution of drugs and alcohol on campus. This notice is distributed to students through the colleges and the Graduate Studies Division, and to faculty and staff via e-mail. The university also conducts a biannual review of programs related to drugs and alcohol to determine effectiveness, implement changes, and ensure that disciplinary sanctions are consistently enforced. This review is conducted by the Office of the Vice Chancellor for Student Affairs, (831) 459-2474.

Appendix D: Smoking on Campus Policy

To protect the rights of the nonsmoking campus community to breathe smoke-free air, UCSC has adopted a policy that bans smoking in areas occupied by the nonsmoking population. The policy applies to residential and nonresidential university buildings and vehicles and to all individuals on the campus. Smoking is prohibited inside the residence halls (including student rooms) as well as residence hall lounges, inside individual apartments, community rooms, bathrooms, lounges, cafés and dining halls. Additionally, smoking is prohibited in all indoor public spaces at UC Santa Cruz—both academic and residential. The no-smoking policy includes exterior stairways, decks and balconies. Smoking outside is permitted only in designated areas, 25 feet away from all buildings and air intakes. For more detailed information about the smoking policy see the web: ehs.ucsc.edu (under Environmental Health and Safety [EH&S] Administration, Policies). Tobacco products will not be sold on campus either through vending machines or campus establishments. UCSC supports and assists efforts to stop smoking by providing literature and referrals to community cessation programs. Students may obtain information about the programs from the Cowell Student Health Center (831) 459-2211.

Appendix E: Policies and Regulations

The *Student Policies and Regulations Handbook*, the Code of Student Conduct, and related appendixes may be accessed at www2.ucsc.edu/judicial. The *Student Policies and Regulations Handbook* is also available in alternate formats such as enlarged print, braille, audiocassette, or electronic disc from Student Judicial Affairs. Topics include:

- Policy on Nondiscrimination
- Policy on Speech and Advocacy
- Policy on Use of University Properties
- Policy on Campus Emergencies
- Registered Campus Organizations
- University Obligations and Student Rights
- Policy on Student Governments
- Policy on Campus-Based Student Fees
- Code of Student Conduct
- Policy on Student Grievance Procedures
- Policy on Student Participation in Governance
- Policies Applying to the Disclosure of Information from Student Records
- Guidelines Applying to Nondiscrimination on the Basis of Disability
- University of California Authorized Student Governments
- Use of the University's Name
- Nondiscrimination Policy Statement for University of California Publications Regarding Student-Related Matters
- UCSC Alcohol and Drug Policy
- University of California Policy on Hazing
- Policy on Sexual Harrassment for Undergraduates
- UCSC Academic Dishonesty Policy
- UCSC Policy on Sexual Orientation Harassment/Discrimination
- UCSC Guidelines for Speakers and Public Events for Students and Campus Organizations
- UCSC Computer Guidelines: Policies for Use of UCSC Computing Facilities
- UCSC Smoking Policy
- UCSC Public Nudity and Sexually Offensive Conduct Policy
- UCSC Hate/Bias Incident Policy
- UCSC Procedures for Ensuring Adequate Interim Protection from Retaliation or Intimidation for Complainant(s), Witness(es), and other Individuals
- UCSC Policy on Academic Integrity for Graduate Students

For further information, stop by 245 Hahn Student Services Building or call (831) 459-1738.

Appendix F: Graduate Student–Faculty Adviser Relationship Guidelines

The University of California, Santa Cruz, expects professional, fair, and frequent communication between graduate students and their advisers. Open communication and mutual respect should be the foundation of the relationship between a graduate student and faculty adviser. The graduate adviser and the graduate student should discuss their student-adviser relationship early, and clearly communicate mutual and agreeable expectations from the beginning. Regular interactions, especially face-to-face meetings, are essential in ensuring that expectations and goals are met.

In an optimal learning environment, the faculty adviser should provide timely and constructive feedback on performance and expectations; timely and sufficient warning of inadequate performance; appropriate recognition of a student's intellectual contributions; and academic and professional advice on all stages of the graduate career. The graduate student should be an active participant in seeking advice and getting feedback on progress, keeping the faculty adviser informed of plans, progress, and obstacles, and contributing during regular progress assessments. The faculty adviser and the student each have the duty and responsibility to initiate meetings as necessary to foster and protect the success of the relationship.

Professionalism and fairness should guide the graduate student–faculty adviser relationship. Graduate students and faculty should avoid relationships that conflict with their particular roles and responsibilities. Faculty advisers and graduate students are bound by policies that prohibit discrimination and harassment. (See pages 16–17, Appendix E, and inside back cover.) Graduate students may be entitled to accommodations under the Americans with Disabilities Act. (See pages 16–17, Appendix E, and inside back cover.) When concerns and conflicts arise, they should be raised and attended to professionally, honestly, and promptly. Retaliation and discrimination against students for raising concerns are prohibited.

If something happens that upsets the faculty adviser–graduate student relationship and cannot be resolved either by direct or indirect discussion, a graduate student can seek assistance from a trusted faculty member, the dean of graduate studies, the graduate director, the department chair, the ombudsman, and/or counseling and psychological services. Graduate students may request confidentiality. Many departments have developed processes to address a range of potential concerns. For information about grievance and appeal procedures, see pages 17–18 and Appendix E. For a description of additional informal and formal grievance and appeal processes available to UCSC graduate students, please refer to the *Graduate Student Handbook* at www.graddiv.ucsc.edu.

Appendix G: Student Judicial Affairs

Student Judicial Affairs is responsible for the adjudication of all nonacademic student and student organization misconduct for UCSC. In this capacity, Student Judicial Affairs administers the Code of Student Conduct in accordance with Section 100.00 of the *Student Policies and Regulations Handbook*. Allegations of misconduct may be brought by students, faculty, staff, police, visitors to the campus, and members of our local community. Allegations should be made in writing and delivered to Student Judicial Affairs.

Upon receipt of an allegation, Student Judicial Affairs will review the merits of the allegation and then conduct an investigation to determine if a violation has occurred. If no violation can be proven, the matter will be dropped. If a violation is proven, then an appropriate sanction will be recommended to the student or student organization for their review and acceptance. If the recommendation is unacceptable, the student or student organization may request a formal hearing or file a written appeal. If you have a question about a possible violation, university policy, or your rights in the discipline process, please feel free to contact the office for a phone consultation or to schedule an appointment.

Student Judicial Affairs serves as the Americans with Disabilities Act (ADA) compliance resolution office for grievances of alleged discrimination based on disability or handicap. In addition, Student Judicial Affairs is the resource office for grievances of alleged discrimination based on race, color, national origin, or sexual orientation, and for incidents of hate/bias.

The Office of Student Judicial Affairs is located in 245 Hahn Student Services Building and can be reached by phone at (831) 459-1738, by fax at 459-3188, or via e-mail at SJA@ucsc.edu. Web: www2.ucsc.edu/judicial.

Appendix H: Ombuds Office

The Ombuds Office assists students, staff, and faculty in achieving informal resolution of complaints and conflicts that stem from UCSC policies, procedures, practices, and intracampus relationships. The office seeks fair and equitable solutions to problems, using the principles of informality, impartiality, independence, and confidentiality.

The Ombuds Office operates independently of administrative authorities and protects the privacy of all contacts and communications to the office. When appropriate, Ombuds staff encourage direct interaction between involved parties or may make referrals as appropriate. Ombuds staff are impartial when listening to concerns, providing options, and resolving complaints.

Services include providing information on campus resources, policies, and procedures; facilitating the resolution of problems with the university; and consulting on leadership and organizational-development issues. The office is not involved in formal grievance or disciplinary processes, and cannot set aside any university policy or rule. Speaking to the Ombuds about a concern does not constitute “notice” to the university that the problem exists.

The Ombuds can be reached at (831) 459-2073. Call for further information or for an appointment. All inquiries are confidential. The Ombuds Office is located in Kerr Hall, Room 109; e-mail lmccann@ucsc.edu. Web: <http://www2.ucsc.edu/ombudsman>.

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