UCDAVIS

General Catalog
1997-98

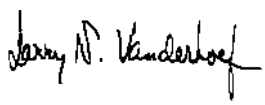
From the Chancellor

Welcome to UC Davis. We're delighted you've chosen the Davis campus as the place to pursue your academic goals. All of us—faculty, staff and administrators—are committed to helping you toward their successful attainment.

In the time you spend at UC Davis, you will acquire knowledge and skills that will help you shape the rest of your life. You will make lifelong friends and have experiences that will determine the direction of your growth as a human being and as a member of the larger community in which you live. For that to happen there must be a partnership among many individuals working together to ensure the most intellectually stimulating, technologically sophisticated and culturally rich environment. That partnership includes you, the student. Your energy and vision are the catalysts that energize and inspire each of us to help make your time at UC Davis challenging, meaningful—and, yes—fun.

We are very proud of UC Davis. Long renowned for its agricultural and veterinary science programs, in recent years we have attained international stature for our programs in engineering, biological sciences, the humanities and the social sciences. Members of our faculty have won MacArthur genius grants, Pulitzer prizes, Fulbright scholarships and election to the nation's top academies of the arts and sciences. This past fall, UC Davis was admitted into the prestigious Association of American Universities, a select group of 62 institutions of higher learning whose membership is by invitation only. Our alumni have made significant and lasting contributions to society as leaders in government, business, technology, media and the arts. And our students are the cream of California's crop.

UC Davis' character has been built through decades of commitment to a unique core of values and principles. We are using our talents and ingenuity to continue working toward a community that honors our diversity as individuals and reflects our belief in a shared set of values. I'm happy you're about to join our community. Congratulations on becoming an Aggie!



Larry N. Vanderhoef
Chancellor

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NOTE

On November 1, 1997, the area code for the UC Davis campus will change to 530.

Please make a note of this change when telephoning the campus after November 1. Typically, both the old and new area codes will work for about six months from the date of change; thereafter, callers should hear a recorded referral to the new area code.

ADDRESS DIRECTORY

University of California
Davis, California 95616
916-752-1011 (main campus number)
World Wide Web: http://www.ucdavis.edu

Office of the Chancellor
Mrak Hall
916-752-2065

College of Agricultural and Environmental Sciences
228 Mrak Hall
916-752-0107

College of Engineering
1050 Engineering II
916-752-0553

College of Letters and Science
200 Social Sciences and Humanities Building
916-752-0392

Division of Biological Sciences
66 Briggs Hall
916-752-0410

Graduate Studies
252 Mrak Hall
916-752-0650

School of Law
1011 King Hall
916-752-0243

Graduate School of Management
106 AOB 4
916-752-7362

School of Medicine
Medical Sciences 1C
916-752-0331

School of Veterinary Medicine
112 Surge IV
916-752-1360

Office of Summer Sessions
44 Mrak Hall
916-752-1647

University Extension
1333 Research Park Drive
916-757-8777

Memorial Union Information Desk
916-752-2222

Information Services Office
Buehler Alumni and Visitors Center
916-752-8111
(campus tours, maps and information)

News Service
334 Mrak Hall
916-752-1930

Residency Matters, Legal Analyst
300 Lakeside Dr, 7th Floor
Oakland, CA 94612-3565

Student Health Service
54A Cowell Student Health Center
916-752-2300

Admissions

Undergraduate:	Undergraduate Admissions and Outreach Services 175 Mrak Hall 916-752-2971
	EOP Office of Admissions 175 Mrak Hall 916-752-2993
Graduate:	Graduate Studies Admissions 252 Mrak Hall 916-752-0655
Law:	School of Law Admissions 115 King Hall 916-752-6477
Management:	Graduate School of Management 106 AOB 4 916-752-7399
Medicine:	School of Medicine Admissions Medical Sciences 1C 916-752-2717
Veterinary Medicine:	School of Veterinary Medicine Admissions 125 Surge IV 916-752-1383

Office of the Registrar
12 Mrak Hall
916-752-2973
(for registration information, transcripts, the *General Catalog*)

Financial Aid Office
201 Voorhies Hall
916-752-2390
(undergraduate and graduate loans, grants, employment information)

Scholarship Office
207 Third Street, Suite B
916-757-3153

Mailing address:
Scholarship Office
University of California
Davis, CA 95616-8696
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Studies
252 Mrak Hall
916-752-7481

Teaching and Research Assistantships
Write to department or group concerned.

Housing

Residence Halls:	Student Housing Office 916-752-2033
Student Family Housing	Orchard Park/Solano Park 916-752-4000

ASUCD (Associated Students UCD)
Basement, South Hall
916-752-1990

Disability Resource Center
160 South Silo
916-752-3184 (voice), 916-752-6833 (telephone device for the speech and hearing impaired)

UC Davis Academic Calendar 1997-98*

	FALL 1997	WINTER 1998	SPRING 1998	FALL 1998 (tentative)
Deadline for filing Independent Study Program project proposal form	April 11	Oct. 8, 1997	Jan. 21	April 16
Class Schedule and Room Directory available	May 19	Oct. 27, 1997	February 2	May 18
Students pick up **RSVP**** registration forms	May 19–20	Oct. 27–29	February 2–3	May 18–19
RSVP Pass 1 (assigned appointments)	May 27–Aug. 21	November 3-12	February 9–20	May 26–Aug. 20
RSVP Pass 2 (assigned appointments)	Aug. 25–Sept. 12	Nov. 17–26	March 2–16	Aug. 24–Sept. 9
Last day to register (pay fees **and** enroll in classes) without incurring a $50 late fee	September 12	December 12	March 13	September 11
Last day to petition for classification to resident status	September 12	December 12	March 13	September 11
Quarter begins	**Sept. 22, Mon.**	**Jan. 5, Mon.**	**April 1, Wed.**	**Sept. 28, Mon.**
Orientation	Sept. 22–24	Jan. 5–6	April 1–2	Sept. 28–30
Instruction begins	**Sept. 25, Thurs.**	**Jan. 7, Wed.**	**April 3, Fri.**	**Oct. 1, Thurs.**
Last day • of late fee payment • to drop courses via **RSVP** • to change from part-time to full-time status or from full-time to part-time status • to file petitions for PELP—current quarter	Oct. 8, Wed.	Jan. 21, Wed.	April 16, Thurs.	Oct. 14, Wed.
Last day • to add courses via **RSVP**	Oct. 15, Wed.	Jan. 28, Wed.	April 23, Thurs.	Oct. 21, Wed.
Last day • to opt to take courses on a P/NP basis • to file to take courses on a S/U basis	Oct. 29, Wed.	Feb. 11, Wed.	May 7, Thurs.	Nov. 4, Wed.
Monday classes meet		Mar. 18, Wed.		
Instruction ends	**Dec. 5, Fri.**	**Mar. 18, Wed.**	**June 11, Thurs.**	**Dec.11, Fri.**
Final examinations	Dec. 8–13	Mar. 20-26	June 13–19	Dec. 14–19
Quarter ends	**Dec. 13, Sat.**	**Mar. 26, Thurs.**	**June 19, Fri.**	**Dec. 19, Sat.**
Commencement 1998			Mid-June§	
Academic and Administrative Holidays	Nov. 27–28 Dec. 24–25 Dec. 31–Jan. 1	Jan. 19 Feb. 16 Mar. 30	May 25	Nov. 26-27 Dec. 24–25 Dec. 31–Jan. 1
Summer Sessions I and II, 1998	**June 29–August 7, 1998, *and* August 10–September 18, 1998**			
Filing for Graduation				
Filing period for those who expect to complete work for a bachelor's degree to file for candidacy with the Office of the Registrar †	June 2– Oct. 10	Nov. 10– Jan. 23, 1998	Feb. 9– April 17	June 1– Oct. 16
Filing for Minor Program				
Deadline for students who plan to complete a minor program to file with the Dean's Office ‡	Oct. 8	Jan. 21	April 16	Oct. 14
Admission/Readmission Deadlines				
Deadline for undergraduates to file admission applications for 1997-98 and fall 1998	Nov. 30, 1996	July 31, 1997	Oct. 31, 1997	Nov. 30, 1997
Deadline for filing readmission applications with the Registrar for undergraduate status	July 31, 1997	Nov. 7, 1997	Jan. 30, 1998	Aug. 6, 1998
Financial Aid Deadlines				
Filing period for grants, loans, work-study and California Student Aid awards for **1998-99: January 1-March 2, 1998**				

* Dates are subject to change and should be checked with appropriate *Class Schedule and Room Directory.*

** ***RSVP*** (Register Students Via Phone) is the UC Davis telephone registration system.

† For students graduating September 1998, the filing period is May 25–July 3.

‡ For students graduating September 1998, the deadline to file a minor program with Dean's Office is July 3.

§ School of Law—May 23; School of Medicine—June 5; School of Veterinary Medicine—June 19; Graduate Studies—June 18; Engineering—June 19; Letters & Science—June 20; School of Management—June 20; Agricultural & Environmental Sciences—June 21; Biological Sciences—June 21.

DEGREES OFFERED BY UC DAVIS

Undergraduate majors are administered by the colleges of Agricultural and Environmental Sciences (A&ES), Letters and Science (L&S) and Engineering. Professional studies are administered by the schools indicated. All graduate programs are administered by Graduate Studies.

Degrees offered: A.B.–Bachelor of Arts, B.S.–Bachelor of Science, M.A.–Master of Arts, M.A.M.–Master of Agricultural Management, M.A.T.–Master of Arts in Teaching, M.B.A.–Master of Business Administration, M.Ed.–Master of Education, M.Engr–Master of Engineering, M.F.A.–Master of Fine Arts, M.P.V.M.–Master of Preventive Veterinary Medicine, M.S.–Master of Science, Ed.D.–Doctorate in Education (joint program between UC Davis and CSU, Fresno), D. Engr.–Doctor of Engineering, Ph.D.–Doctor of Philosophy, J.D.–Doctor of Law, M.D.–Doctor of Medicine, D.V.M.–Doctor of Veterinary Medicine; *=closed to new students.

Major or Discipline	Degree	School or College
Administration	M.B.A.	Graduate School of Management
Aeronautical Science and Engineering	B.S.	Engineering
African American and African Studies	A.B.	L&S
Agricultural and Environmental Chemistry	M.S., Ph.D.	
Agricultural and Managerial Economics	B.S.	A&ES
Agricultural and Resource Economics	M.S., Ph.D.	
Agricultural Education	credential	A&ES
Agricultural Systems and Environment	B.S.	A&ES
Agronomy	M.S.	
American Studies	A.B.	L&S
Animal Behavior	Ph.D.	
Animal Biology	B.S.	A&ES
Animal Science	B.S., M.A.M., M.S.	A&ES
Animal Science and Management	B.S.	A&ES
Anthropology	A.B. or B.S., M.A., Ph.D.	L&S
Applied Mathematics	M.S., Ph.D.	
Applied Physics	B.S.	L&S
Art	M.F.A.	
Art History	A.B.	L&S
Art Studio	A.B.	L&S
Atmospheric Science	B.S., M.S., Ph.D.	A&ES
Avian Sciences	B.S., M.S.	A&ES
Biochemistry	B.S.	A&ES or L&S
Biochemistry and Molecular Biology	M.S., Ph.D.	
Biological Sciences	A.B. or B.S.	A&ES or L&S
Biological Systems Engineering	B.S.	Engineering
Biomedical Engineering	M.S., Ph.D.	
Biophysics	Ph.D.	
Biotechnology	B.S.	A&ES
Cell and Developmental Biology	Ph.D.	
Cell Biology	B.S.	A&ES or L&S
Chemical Engineering	B.S.	Engineering
Chemical/Biochemical Engineering	B.S.	Engineering
Chemical Engineering/Materials Science and Engineering	B.S.	Engineering
Chemistry	A.B. or B.S., M.S., Ph.D.	L&S
Chicana/Chicano (Mexican-American) Studies	A.B.	L&S
Child Development	M.S.	
Chinese	A.B.	L&S
Civil Engineering	B.S.	Engineering
Civil Engineering/Materials Science and Engineering	B.S.	Engineering
Classical Civilization	A.B.	L&S
Classics	M.A.*	
Community and Regional Development	B.S.	A&ES
Community Development	M.S.	
Community Nutrition	B.S.	A&ES
Comparative Literature	A.B., M.A., Ph.D.	L&S
Comparative Pathology	M.S., Ph.D.	
Computer Engineering	B.S.	Engineering
Computer Science	B.S., M.S., Ph.D.	L&S
Computer Science and Engineering	B.S.	Engineering
Crop Science and Management	B.S.	A&ES
Design	B.S.	A&ES
Dietetics	B.S.	A&ES
Dramatic Art	A.B., M.A.*, M.F.A., Ph.D.	L&S
East Asian Studies	A.B.	L&S
Ecology	M.S., Ph.D.	
Economics	A.B., M.A., Ph.D.	L&S
Education	M.A., M.Ed.*, Ph.D., Ed.D., credential	
Electrical Engineering	B.S.	Engineering
Electrical Engineering/Materials Science and Engineering	B.S.	Engineering
Endocrinology	M.S., Ph.D.	
Engineering	M.Engr., M.S., D.Engr., Ph.D.	
Engineering—Applied Science	M.S., Ph.D.	Engineering
English	A.B., M.A., Ph.D.	L&S
Entomology	B.S., M.S., Ph.D.	A&ES
Environmental and Resource Sciences	B.S.	A&ES
Environmental Biology and Management	B.S.	A&ES

Environmental Horticulture and Urban Forestry	B.S.	A&ES
Environmental Policy Analysis and Planning	B.S.	A&ES
Environmental Toxicology	B.S.	A&ES
Epidemiology	M.S., Ph.D.	
Evolution and Ecology	A.B. or B.S.	A&ES or L&S
Exercise Science	A.B., B.S., M.S.*	L&S
Family Nurse Practitioner/Physician Assistant	Credential	School of Medicine
Fermentation Science	B.S.	A&ES
Fiber and Polymer Science	B.S.	A&ES
Food Biochemistry	B.S.	A&ES
Food Engineering	B.S.	Engineering
Food Science	B.S., M.S., Ph.D.	A&ES
French	A.B., M.A.*, Ph.D.	L&S
Genetics	B.S., M.S., Ph.D.	A&ES or L&S
Geography	M.A., Ph.D.	
Geology	A.B. or B.S., M.S., Ph.D.	L&S
German	A.B., M.A., Ph.D.	L&S
Greek	A.B.*	L&S
History	A.B., M.A.*, Ph.D.	L&S
History of Art	M.A.	
Horticulture	M.S.	
Human Development	B.S., Ph.D.	A&ES
Hydrologic Science	M.S., Ph.D.	
Hydrology	B.S.	A&ES
Immunology	M.S., Ph.D.	
Individual Major	A.B., B.S.	A&ES or L&S
International Agricultural Development	B.S., M.S.	A&ES
International Relations	A.B.	L&S
Italian	A.B.	L&S
Japanese	A.B.	L&S
Landscape Architecture	B.S.	A&ES
Latin	A.B.*	L&S
Law	J.D.	School of Law
Linguistics	A.B., M.A.	L&S
Materials Science and Engineering	B.S.	Engineering
Mathematics	A.B. or B.S., M.A., M.A.T., Ph.D.	L&S
Mechanical Engineering	B.S.	Engineering
Mechanical Engineering/Materials Science and Engineering	B.S.	Engineering
Medicine	M.D.	School of Medicine
Medieval Studies	A.B.	L&S
Microbiology	A.B. or B.S., M.S., Ph.D.	A&ES or L&S
Music	A.B., M.A., M.A.T.*, Ph.D.	L&S
Native American Studies	A.B.	L&S
Nature and Culture	A.B.	L&S
Neurobiology, Physiology and Behavior	B.S., M.S., Ph.D.	A&ES or L&S
Neuroscience	Ph.D.	
Nutrition	M.S., Ph.D.	
Nutrition Science	B.S.	A&ES
Pharmacology and Toxicology	M.S., Ph.D.	
Philosophy	A.B., M.A., Ph.D.	L&S
Physical Education	M.A.*	
Physics	A.B. or B.S., M.S., Ph.D.	L&S
Plant Biology	A.B. or B.S., M.S., Ph.D.	A&ES or L&S
Plant Pathology	M.S., Ph.D.	
Plant Protection and Pest Management	M.S.	
Political Science	A.B., M.A., Ph.D.	L&S
Political Science—Public Service	A.B.	L&S
Population Biology	M.S, Ph.D.	
Preventive Veterinary Medicine	M.P.V.M.	School of Veterinary Medicine
Psychology	A.B. or B.S., Ph.D.	L&S
Range and Wildlands Science	B.S.*	A&ES
Religious Studies	A.B.	L&S
Rhetoric and Communication	A.B., M.A.*	L&S
Russian	A.B., M.A.*	L&S
Sociology	A.B., M.A., Ph.D.	L&S
Sociology—Organizational Studies	A.B.	L&S
Soil Science	M.S., Ph.D.	
Soil and Water Science	B.S.	A&ES
Spanish	A.B., M.A., Ph.D.	L&S
Statistics	A.B. or B.S., M.S., Ph.D.	L&S
Textiles	M.S.	
Textiles and Clothing	B.S.	A&ES
Textile Arts and Costume Design	M.F.A.	
Transportation Technology and Policy	M.S., Ph.D.	
Vegetable Crops	M.S.	
Veterinary Medicine	D.V.M.	School of Veterinary Medicine
Viticulture and Enology	B.S.	A&ES
Wildlife, Fish and Conservation Biology	B.S.	A&ES
Women's Studies	A.B.	L&S

MINOR PROGRAMS OFFERED BY UC DAVIS

Minor programs are offered by both the College of Agricultural and Environmental Sciences (A&ES) and the College of Letters and Science (L&S). The College of Engineering does not offer any minors. The list below indicates the minor program, the offering department (if the department name is different than the name of the minor) and the college offering the minor.

African American and African Studies, L&S
Aging and Adult Development (Human & Community Development), A&ES
Agricultural and Managerial Economics (Agricultural and Resource Economics), A&ES
Agricultural Computing & Information Systems (Agronomy), A&ES
Agricultural Entomology (Entomology), A&ES
Agricultural Systems and Environment (Agronomy), A&ES
American Studies, L&S
Animal Science, A&ES
Anthropology, L&S
Apiculture (Entomology), A&ES
Applied Biological Systems Technology (Biological & Agricultural Engineering), A&ES
Art History, L&S
Art Studio, L&S
Asian American Studies, L&S
Atmospheric Science (Land, Air and Water Resources), A&ES
Avian Sciences (Avian Sciences), A&ES
Biological Sciences, A&ES or L&S
Chicana/Chicano (Mexican-American) Studies, L&S
Chinese, L&S
Classical Civilization (Classics), L&S
Community Development (Human & Community Development), A&ES
Community Nutrition (Nutrition), A&ES
Comparative Literature, L&S
Computer Science, L&S
Dramatic Art, L&S
East Asian Studies, L&S
Education, L&S
Energy Policy (Environmental Studies), A&ES
English, L&S
Entomology, A&ES
Environmental Geology (Geology), L&S
Environmental Horticulture, A&ES
Environmental Policy Analysis (Environmental Studies), A&ES
Environmental Toxicology, A&ES
Exercise Science, L&S
Fiber and Polymer Science (Textiles and Clothing), A&ES
Film Studies (Humanities), L&S
Food Service Management (Nutrition), A&ES
French, L&S
Geographic Information Systems (Biological & Agricultural Engineering), A&ES
Geology, L&S
Geophysics (Geology), L&S
German, L&S
Greek (Classics), L&S
History, L&S
History and Philosophy of Science, L&S
Human Development (Human & Community Development), A&ES
Hydrology (Land, Air and Water Resources), A&ES
Insect Ecology (Entomology), A&ES
International Agricultural Development (Human & Community Development), A&ES
Italian, L&S
Japanese (Chinese and Japanese), L&S
Jewish Studies (Humanities), L&S
Latin (Classics), L&S
Linguistics, L&S
Mathematics, L&S
Medical-Veterinary Entomology (Entomology), A&ES
Medieval Studies, L&S
Music, L&S
Native American Studies, L&S
Nature and Culture, L&S
Nematology, A&ES
Nutrition and Food (Nutrition), A&ES
Nutrition Science (Nutrition), A&ES
Philosophy, L&S
Physics, L&S
Plant Biology , A&ES or L&S
Political Science, L&S
Psychology, L&S
Recreation (Environmental Studies), A&ES
Religious Studies, L&S
Rhetoric and Communication, L&S
Russian, L&S
Science and Society, A&ES
Social and Ethnic Relations (African American Studies, Asian American Studies, Native American Studies, Women's Studies), L&S
Sociology, L&S
Soil Science (Land, Air and Water Resources), A&ES
Spanish, L&S
Statistics, L&S
Textiles and Clothing, A&ES
War–Peace Studies (International Relations), L&S
Women's Studies, L&S

INTRODUCTION

THE UNIVERSITY OF CALIFORNIA

The University of California began in 1868, when Governor Henry H. Haight signed the Organic Act, thus providing for California's first "complete University." Classes began the following year at the College of California in Oakland. The first buildings on the Berkeley campus were completed in 1873; the following June, the University of California conferred bachelor's degrees on 12 graduates.

Today the university is one of the largest and most renowned centers of higher education in the world. Its nine campuses span the state, from Davis in the north to San Diego in the south. In between are the Berkeley, San Francisco, Santa Cruz, Santa Barbara, Riverside, Irvine and Los Angeles campuses.

All UC campuses adhere to the same admission guidelines and high academic standards, yet each has its own distinct character, atmosphere and academic individuality. Together, the nine campuses have an enrollment of more than 154,000 students, 90 percent of them California residents.

Some 150 laboratories, extension centers, and research and field stations strengthen teaching and research while providing public service to California and the nation. The collections of the more than 100 UC campus libraries are surpassed in size in the United States only by the Library of Congress collection.

The faculty of the University of California is internationally respected for its distinguished scholarly and scientific achievements. The faculty on its nine campuses currently includes 18 Nobel laureates, and membership in the National Academy of Sciences is the largest of any university in the country. More UC academic programs are consistently rated among the top 10 nationally than those of any other public or private university.

The Davis Farmer's Market features locally grown fruits, vegetables and flowers, and is the most popular place in town on Saturday mornings.

UC DAVIS

The University Farm

UC Davis was founded in 1905 as the University Farm, where students from the first UC campus in Berkeley learned the latest in agricultural methods and technology. This beginning gained Davis students their nickname, "Cal Aggies." As the state's population grew, so did demand for higher education, and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was awarded to students completing the Davis program. A few years later, the Davis campus had its own College of Agriculture.

In 1948, California's only School of Veterinary Medicine was established at Davis. The College of Letters and Science was founded in 1951, bringing degree programs in the humanities to add to the campus' strong scientific foundation. By 1959, Davis had expanded enough to be declared a general campus of the university by the regents, and the campus continued to grow. The College of Engineering came into being in 1962. The School of Law held its first classes in the fall of 1966, and the School of Medicine admitted its first students in the fall of 1968. Davis' newest addition, the Graduate School of Management, opened its doors in 1981.

From its beginning as a 778-acre teaching farm, UC Davis has grown and diversified, establishing an international reputation for teaching and research.

Unique within the University of California system, UC Davis offers a full range of undergraduate and graduate programs, as well as professional schools of law, management, medicine and veterinary medicine. With 5,200 acres, UC Davis is the largest of the nine University of California campuses, and third in budget, total expenditures and enrollment. UC Davis stands 23nd in research funding among universities in the United States, according to the most recent information from the National Science Foundation. For the second consecutive year, *U.S. News & World Report* ranked UC Davis among the top 10 public universities nationally. In 1996, UC Davis was admitted into the prestigious Association of American Universities; membership in this group of 62 institutions of higher learning is by invitation only.

The university's reputation has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. UC Davis faculty rank 16th in quality among comprehensive public universities nationwide, according to a multi-year study of U.S. doctoral programs reported in 1995 by the National Research Council. Creative teaching and academic innovation are encouraged by several programs, including the $30,000 Prize for Teaching and Scholarly Achievement, believed to be the largest award of its kind in the country. UC Davis undergraduate students persist and graduate at the highest rates among UC campuses.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering and Letters and Science. Undergraduate enrollment is more than 18,000 students. Graduate Studies administers graduate study and research at all schools and colleges. Professional studies are carried out at the schools of Law, Management, Medicine and Veterinary Medicine; nearly 5,100 students are engaged in graduate or professional study. The campus supports numerous laborato-

ries, extension centers and special off-site facilities, such as the UC Davis Medical Center (Sacramento), Veterinary Medicine Teaching and Research Center (Tulare), Bodega Marine Laboratory (Bodega Bay), College of Engineering's Applied Science Department (Livermore), and the UC Davis Washington Center.

A Small-Town Setting

Davis is surrounded by open space—including some of the most valuable agricultural land in the state. Outdoor sports enthusiasts will find many beautiful recreational areas within a 70-mile drive from campus: Folsom Lake, Clear Lake, Lake Berryessa, the Napa and Sonoma valleys and the historic Mother Lode country. The Sierra Nevada, Lake Tahoe ski resorts and coastal areas of Mendocino and Monterey are about 150 miles from Davis.

If you prefer city life, Sacramento, the state capital, is 15 miles to the east, and San Francisco is just 72 miles to the southwest. Both cities offer music, the ballet, sporting events, theater, shopping and other entertainment.

For long-distance travel, Davis has a Greyhound bus terminal and an Amtrak station. If you travel by plane, the Sacramento Metropolitan Airport is an easy 20-minute drive from downtown Davis. Within Davis, bicycles are a favorite mode of transportation. The terrain is flat and 50 miles of bike paths crisscross the city. With more bicycles per capita than any other city in the nation, Davis has earned the title "City of Bicycles."

Winters in Davis are generally mild. It rarely snows, but you should get good use from your rainwear. Summers are sunny, hot and dry. Although on some days the thermometer can exceed 100 degrees, summer days are usually in the low 90s, with overnight temperatures in the 60s. Spring and fall weather is among the most pleasant in the state.

The City of Davis

Ecologically aware and socially innovative, Davis has a small-town friendliness and spirit of volunteerism that distinguishes it from cities of similar size. Residents are active in local, national and international political causes, in the arts, and in community organizations ranging from Little League to the Rotary Club.

Students compose a large portion of the city's population of 53,000, making Davis one of the state's few remaining "college towns." You'll find an abundance of bookshops, coffee houses and restaurants catering to students in the bustling downtown area adjacent to campus.

Though closely linked to the university, the city maintains a strong identity of its own. The Davis Art Center, Davis Comic Opera Company, Davis Musical Theatre Company and several local galleries provide creative outlets for people in the community and supplement the cultural events presented by the university.

The city has long recognized the importance of open space in maintaining its small-town atmosphere and has created 31 city parks offering a variety of attractions: tennis courts, playgrounds, swimming pools, playing fields and even a skateboard facility.

Campus Life

Like the city of Davis, the campus has a relaxed, country atmosphere, with plenty of open space, trees and lawns. Even as the student population grows, the campus manages to maintain its informal, friendly ambience.

Underlying the casual style of Davis students, however, is a fundamental seriousness and a dedication to academic excellence. Davis students do study hard. After your studying is done, however, you can relax at a movie, public lecture, dance recital or concert. For the energetic, intercollegiate sports, club sports and one of the largest intramural programs in the country offer athletics for fun or competition.

Davis welcomes the exchange of opinions and ideas and is committed to advancing the diversity of its students, faculty, staff and administrators. UC Davis' commitment to a learning environment characterized by mutual respect and understanding is reflected in the "Principles of Community" (see page 12).

VISITING THE CAMPUS

Information:
Visitor Services Office
Buehler Alumni and Visitors Center
916-752-8111

You may want to visit UC Davis sometime before you apply. For individual or group weekday tours of the campus, contact the Visitor Services Office at least one week in advance. Weekend tours depart from the Buehler Alumni and Visitors Center at 11:30 a.m. and 1:30 p.m. No appointment is necessary. If you have specific questions about application procedures or entrance requirements, write or visit Undergraduate Admissions and Outreach Services at Mrak Hall.

The Quad is a popular gathering place when spring weather arrives in Davis.

University of California, Davis

Principles of Community

THE UNIVERSITY OF CALIFORNIA, DAVIS, is first and foremost an institution of learning and teaching, committed to serving the needs of society. Our campus community reflects and is a part of a society comprising all races, creeds, and social circumstances. The successful conduct of the University's affairs requires that every member of the University community acknowledge and practice the following basic principles:

WE AFFIRM THE DIGNITY inherent in all of us, and we strive to maintain a climate of justice marked by respect for each other. We acknowledge that our society carries within it historical and deep-rooted misunderstandings and biases, and therefore we will endeavor to foster mutual understanding among the many parts of our whole.

WE AFFIRM THE RIGHT of freedom of expression within our community and also affirm our commitment to the highest standards of civility and decency towards all. We recognize the right of every individual to think and speak as dictated by personal belief, to express any idea, and to disagree with or counter another's point of view, limited only by University regulations governing time, place, and manner. We promote open expression of our individuality and our diversity within the bounds of courtesy, sensitivity, and respect.

WE CONFRONT AND REJECT all manifestations of discrimination, including those based on race, ethnicity, gender, age, disability, sexual orientation, religious or political beliefs, status within or outside the University, or any of the other differences among people which have been excuses for misunderstanding, dissension, or hatred. We recognize and cherish the richness contributed to our lives by our diversity. We take pride in our various achievements, and we celebrate our differences.

WE RECOGNIZE that each of us has an obligation to the community of which we have chosen to be a part. We will strive to build a true community of spirit and purpose based on mutual respect and caring.

The "Principles of Community" were prepared and adopted after extensive discussion within the campus community about the need for a statement that reflects UC Davis' commitment to a learning environment characterized by diversity, understanding and the acceptance of all people. This statement of common principles was published on April 20, 1990, carrying the endorsement of Chancellor Theodore L. Hullar and the leadership of the Davis Division of the Academic Senate, the Academic Staff Organization, the UCD Staff Assembly, the UCDMC Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.

THE UNDERGRADUATE COLLEGES

The College of Agricultural and Environmental Sciences

Information:
College Office
228 Mrak Hall
916-752-0108; World Web Web: http://www.aes.ucdavis.edu

The College of Agricultural and Environmental Sciences offers a diverse program of majors and courses that focus on improving the quality of life in all of its facets. The college is committed to creative education that emphasizes a spirit of discovery, based on the premise that tomorrow's citizens will need to anticipate, understand and solve emerging societal problems and contribute to the discovery and application of new knowledge. Hence, education in the college aims to foster:

- critical thinking and an appreciation for diversity in thought and in approaches to problem solving
- an ethos of lifelong learning—of teaching oneself and others while confronting challenges and solving problems
- an ability to move beyond either/or thinking and to pursue innovative and integrative understandings of the biological, social and physical sciences
- intellectual skills that will prepare individuals to secure a healthful physical and cultural environment based on a sound, respectful management of all resources
- a commitment to serve the public with an informed and open-minded dedication to understanding, critiquing and addressing complex societal needs and interests

The college is proud of its rich agricultural history and is world-renowned today for its accomplishments. From this foundation, it has expanded its educational offerings to encompass programs that highlight interconnections among the environment, plant and animal biology, and human health and well-being. Through a wide array of major programs, the college prepares high-potential students for advanced studies in diverse disciplines and leadership in such arenas as public policy; research and development; managerial and natural resource economics; agricultural systems; environmental protection, safety and design; human nutrition, health and development; and the food, fiber, textile and apparel industries.

Students are brought into early contact with faculty advisers, graduate students and postgraduate researchers. A symbiotic relationship is developed in which undergraduate students bring new perspectives and join in the excitement of discovery. This enriches and broadens the educational experience of all.

Available to students are several levels of academic advising designed to enhance the student's undergraduate experience. Advisers assist students in course planning, meeting degree requirements and in taking maximum advantage of the resources available at the university. Students are encouraged to meet regularly with their assigned faculty adviser and with the Advising Associates and peer advisers housed in departmental offices. Through a shared commitment to education for service to society, college faculty, staff and students work together to improve the relationship between humanity and the natural world.

The College of Engineering

Information:
Dean's Office
1050 Engineering II
916-752-0557; World Wide Web: http://www.engr.ucdavis.edu

The College of Engineering has a tradition of excellence in instruction, in research and in public service. To its undergraduate enrollment of approximately 2,500 and graduate enrollment of 700, the college offers both a friendly atmosphere and the varied academic programs in basic sciences and engineering that have made UC Davis engineering graduates highly valued in private practice and research. The college has seven departments; each has outstanding programs of instruction.

- The **Department of Applied Science** instructs engineering graduate students in broad areas of scientific technology.
- The **Department of Biological and Agricultural Engineering** combines study in engineering with instruction in the biological processes used to solve challenging environmental and technical problems.
- The **Department of Chemical Engineering and Materials Science** offers curricula integrating an effective knowledge of chemistry, biological sciences, or materials science engineering to enable students to solve problems in both current and future manufacturing technologies or to analyze the structure, properties and behaviors of materials.
- The **Department of Civil and Environmental Engineering** educates students to plan and design systems that have a direct impact on health and human productivity and on the quality of human life.
- The **Department of Computer Science** offers programs of study that educate students in all aspects of design and use of computer hardware and software systems. The department also plays a significant service role for programs throughout the campus.
- The **Department of Electrical and Computer Engineering** offers programs in research and education crucial for the continued success of high technology industries in California and the nation, preparing students to design, analyze and use electronic and computer systems effectively.
- The **Department of Mechanical and Aeronautical Engineering** educates students to design and manufacture complex engineering systems for transport, industry or energy and to design, manufacture and operate aircraft and aeronautical structures.

Every effort has been made to provide students in engineering with the maximum flexibility consistent with rigorous professional education standards. The key to flexibility is academic advising. Incoming students are assigned to a faculty adviser during their first term on campus. Faculty advising is supplemented by a well-developed peer advising system and by staff advising in the dean's office and in departments.

Undergraduate education in engineering at Davis is intended to serve as a sound basis for beginning professional practice in engineering design and development, as a preparation for careers in corporate or governmental operations or as a foundation for graduate study. To these ends, the college emphasizes fundamental sci-

ences to give the student the maximum postgraduate flexibility. Technological developments in recent years have made it clear that engineering education must be based on fundamentals or rapidly become obsolete.

Engineers will continue to face new challenges as society continues its demand for improvements in the quality of life, and as our state and nation demand greater participation by engineers in efforts toward competitiveness in a global market. As a unit in a land-grant institution, the UC Davis College of Engineering must help maintain the technological leadership long enjoyed by the United States, while advancing technology for the benefit of all.

The College of Letters and Science

Information:
Office of the Deans
200 Social Sciences and Humanities Building
916-752-0392; World Wide Web: http://www-lsdo.ucdavis.edu

The College of Letters and Science is the largest of the three undergraduate colleges at UC Davis. Through its nearly 500 faculty members, the college offers more than 50 major programs of study and thousands of courses per year across a broad range of subject matter areas. The faculty of the college reside in academic departments and programs organized into three Divisions—Humanities, Arts and Cultural Studies; Mathematical and Physical Sciences; and Social Sciences—as well as in the affiliated intercollege Division of Biological Sciences. The college confers Bachelor of Arts (A.B.), Bachelor of Science (B.S.) and Bachelor of Arts and Science (B.A.S.) degrees.

The College of Letters and Science is a community of scholars and students sharing a commitment to liberal education rather than to specialized, vocationally oriented training. The college seeks to expose students to the worlds of human experience, of ideas, of artistic accomplishments and of matter and things. Although separate and distinct to the casual observer, these realms are interconnected and may be studied in a coherent curriculum. It is within this curriculum that students are able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge, and gain the capacity for independent study and thought. By learning to think carefully and critically, students will be able to continue the ongoing process of education that begins in the classroom but continues over a lifetime. They will have learned how to learn—the ultimate objective of a liberal arts education.

The educational goals of the college are reflected in the three primary groups of requirements established by the faculty: the English Composition Requirement, the Foreign Language and Area Requirements and the Major Requirements.

The **English Composition Requirement** ensures that students are well versed in the skills of written communication.

The **Foreign Language and Area Requirements** provide students with a broad background of knowledge, guide them in an exploration of the interdependencies of knowledge and acquaint them with other cultures.

The **Major Requirements** provide students intellectual depth and competence in a selected area of study.

The College of Letters and Science recognizes and affirms the importance of perceptive and knowledgeable academic advising. The college has a well-developed system of faculty advisers, student peer advisers and professional staff advisers who are available for individual consultations with undergraduates in a variety of settings ranging from the deans' office to departmental offices to campus residence halls.

Woven throughout the tapestry of diversity that is the College of Letters and Science is a fundamental and unswerving commitment to excellence. The faculty of the college is dedicated to advancing the frontiers of human knowledge through research, artistic expression and other creative endeavors, and to the effective communication and application of that knowledge through teaching and public service. Together, faculty and students in the College of Letters and Science pursue these goals and ideals with enthusiasm and excitement.

Something bugging you? Call the UC Davis Bug Line in the Department of Entomology to find out just what it is.

GRADUATE AND PROFESSIONAL STUDY

Graduate Studies offers more than 70 graduate programs leading to master's or doctoral degrees. In addition, the Graduate School of Management offers the M.B.A. degree, and the campus has three professional schools: the School of Law (J.D.), the School of Medicine (M.D.) and the School of Veterinary Medicine (D.V.M., M.P.V.M.). These schools and programs are described in later chapters.

ACADEMIC RESOURCES

The University Library

Information:
916-752-6561
World Wide Web: http://www.lib.ucdavis.edu

The General Library at UC Davis is one of the premier research libraries in North America. In addition to Peter J. Shields Library, there are four other General Library facilities: the Physical Sciences Library, the Loren D. Carlson Health Sciences Library, the Agricultural Resource Economics Library and the Medical Center

Geologist Richard Cowen teaches freshmen students in the Davis Honors Challenge program.

Library in Sacramento. The combined collections of the various General Library facilities total more than 2.5 million volumes, and more than 41,000 periodical and journal titles are received annually. An extensive variety of government documents, maps, microfilms and CD-ROMs are also part of the collection.

Shields Library houses the collections in the humanities, arts, social sciences, biological sciences, agricultural sciences, mathematics and computer science. The collections of the Physical Sciences Library support teaching and research in engineering, chemistry, geology and physics. The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine. The library at the UC Davis Medical Center provides a clinical collection of 27,000 volumes. A Law Library, under the administration of the School of Law, is located in King Hall.

The MELVYL® System, an online catalog of books and journals, can be used to access the collections of UC Davis and the other eight UC campuses. The MELVYL System can be searched in the libraries, at campus computer laboratories, and remotely with a modem on the Internet. The libraries also offer access to databases and numerous other electronic resources, both on site and via UCD Network. Additionally, terminals with Internet access are available for patron use in all of our facilities.

Information about library services, new full test electronic databases, important subject-specific World Wide Web sites and a current schedule of free library classes on the use of MELVYL and the Internet is available at the library's Web site. Librarians are also available for consultation on resources for research projects.

UC Davis Arboretum

Information:
Arboretum Headquarters
916-752-2498

The 150-acre UC Davis Arboretum, located along Putah Creek's historic north fork, maintains a large documented collection of trees, shrubs and perennials for use in teaching and research. Outstanding plant collections include the Shields Oak Grove, the Mary Wattis Brown Garden of California native plants, the Ruth Storer Garden of drought-tolerant flowering perennials and the T. Elliot Weier Redwood Grove. The arboretum program of seed exchange, international in reputation, serves to distribute California native plants throughout the world and has provided the university with numerous exotic plant specimens. Internships are available in nursery management, landscape design and maintenance, environmental education, conservation biology, Integrated Pest Management (IPM) and Geographic Information Systems (GIS).

Information Technology

Information:
916-754-HELP (754-4357); e-mail: ithelp@ucdavis.edu;
World Wide Web: http://itexpress.ucdavis.edu/

I.T. Information & Events: 754-9832; e-mail: itpubs@ucdavis.edu
Creative Communications Services: http://ccs.ucdavis.edu

The Division of Information Technology (I.T.) provides computing, communications, and media services in support of research and instruction. I.T. Express, located on the first floor of Shields Library, offers copy services and consultation on the various information technologies in use at UC Davis. Faculty can reserve specially equipped classrooms for multimedia presentations and computer-assisted learning, and some of these classrooms are available for individual student use on a drop-in basis when not reserved for classes. Multimedia labs provide students with access to media production and editing equipment. Other computer labs host PCs, Macintoshes, Silicon Graphics workstations and scanners. In addition, time can be reserved at several national supercomputing centers.

A free campus e-mail account is required for many computing services and to use computer labs. For information on activating your account, see the Student Computing Guide (available at I.T. Express) or the Fac-

ulty Services Guide (contact I.T. Information and Events). Other services include free computer workshops and technology presentations, computer systems and software evaluations, and computer and printer repair. Creative Communications Services offers media and publishing services for professional-quality presentations and publications, as well as digital imaging, graphic design, photography, video and multimedia production, Web page design, and photocopying services.

RESEARCH PROGRAMS AND RESOURCES

Organized Research Units (ORUs)

Organized Research Units (ORUs) are campuswide interdisciplinary research programs that further the university's missions of teaching, research and public service, but do not offer courses of instruction. Members of an ORU come from more than one department and normally from more than one school, college or division.

Agricultural History Center

Information:
5202 Social Sciences and Humanities Building
916-752-1827

The center coordinates and administers several research and publication programs that further the study of agricultural and natural-resource history. Research activities include studies of comparative farm policy, migration and agricultural development, the history of farm land values, the agricultural-environmental border, rural international borderlands in the Americas, the causes and consequences of agricultural mechanization and other sources of productivity improvements in the 19th and 20th centuries, and the impact of scientific research.

Bodega Marine Laboratory and Reserve

Information:
Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923
707-875-2211; fax: 707-875-2089; e-mail: ucdbml@ucdavis.edu
World Wide Web: http://www-bml.ucdavis.edu

The Bodega Marine Laboratory is dedicated to research and teaching in marine biology and related fields. Research areas include population biology/ecology, cell and developmental biology, and aquaculture and fisheries. Well-equipped facilities feature running seawater in two classrooms and most laboratories, a marine science library, lecture hall, housing facilities, greenhouses, aviary, experimental freshwater system for anadromous fish studies, and a dive locker and air station. Faculty teach a number of undergraduate courses during the academic year and summer session. The laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis.

The Bodega Marine Reserve, part of the UC Natural Reserve System, is 362 acres of remarkably diverse habitats, including an excellent rocky intertidal zone, sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh, coastal prairie and dunes. The reserve also administers adjacent subtidal sand and rock habitats in a marine life refuge. Areas of research include a broad spectrum of field studies of plants and animals in coastal marine, intertidal and terrestrial ecosystems.

California Regional Primate Research Center (CRPRC)

Information:
Primate Center
916-752-0447
World Wide Web:
http://www.crprc.ucdavis.edu/crprc/homepage.html

The research staff of the California Regional Primate Research Center investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral and neurobiology, developmental and reproductive biology, respiratory diseases, virology and immunology, genetics and a variety of biomedical collaborative research projects. Self-sustaining breeding colonies of macaques, squirrel and titi monkeys are available for study of spontaneously occurring disorders.

Center for Geotechnical Modeling

Information:
119 Everson Hall
916-752-6986
World Wide Web: http://www.engr.ucdavis.edu/~cgm/

At the Center for Geotechnical Modeling, students and faculty from several departments and other universities

The residence halls are home to some 3,600 students; many choose living groups that focus on a particular area of academic or social interest.

conduct research in physical and numerical modeling of geotechnical problems. The center operates two centrifuges, including the 9-m radius, 4,500-kg payload National Geotechnical Centrifuge. These centrifuges are used to study a variety of topics, including the effect of earthquakes on earth structures, toxic waste transport in groundwater, and deformations of foundations of bridges and large buildings.

Center for Image Processing and Integrated Computing

Information:
Bernd Hamann and David Rocke
916-752-2387; 916-752-8894; e-mail: cipic@ucdavis.edu
World Wide Web: http://info.ece.ucdavis.edu

The two major objectives of the Center for Image Processing and Integrated Computing are: (1) to investigate, develop and make use of an integrated computing and multimedia environment for computer science, engineering research and advanced applications with a special emphasis on image analysis and processing, computer graphics, computer vision, and software engineering for man-machine interaction; and (2) to carry out interdisciplinary research, principally in conjunction with all the engineering disciplines and with the biological sciences, that is related to the core research carried out at the center.

Crocker Nuclear Laboratory

Information:
Crocker Nuclear Laboratory
916-752-1460

This facility is an interdepartmental laboratory for the application of nuclear science to a variety of disciplines. The laboratory has research programs in nuclear physics and chemistry, air pollution analysis, use of pulsed ultraviolet light as an alternative to pesticides and insecticides, biology, material damage studies, the effect of background radiation on computers, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications, including pioneering work in brain imaging.

Institute of Governmental Affairs

Information:
Shields Library
916-752-2042
World Wide Web: http://polar.ucdavis.edu/igahome.html

The Institute of Governmental Affairs (IGA) serves as a research base for social science faculty in eight departments on campus and visiting scholars from throughout the U.S. and the world. IGA houses seven formal research programs (Center for State and Local Taxation; Joint Center for International and Security Studies; Program on Immigration, Population and the Economy; Program on Pacific Rim Business and Development; Program on Telecommunications Policy; Program on Workable Energy Regulation; Undergraduate Fellows Research Program) and provides specialized services, including grant advising, preparation and administration; academic program development; library and data services; social science computing, programming and statistical consulting; seminar, workshop and conference organization. IGA also enhances the training of undergraduate and graduate students by providing research opportunities and by exposure to its public affairs programs.

Institute of Theoretical Dynamics

Information:
2201 Academic Surge Building
916-752-0938; e-mail: info@itd.ucdavis.edu
World Wide Web: http://itd.ucdavis.edu/
Training Group: http://itd.ucdavis.edu80/rtg/

The institute promotes research and graduate education in the mathematical sciences and provides a focus for extramural and intramural research pursuits. The two most important research themes are dynamics and stochastic processes. Approximately 30 faculty from all of the colleges participate in the activities of the institute, which include conferences, workshops, seminars and summer schools. The institute provides networking of computer workstations, a gateway to supercomputers, research offices and facilities for interaction with students, faculty and visitors. The institute supports research in mathematical biology, mathematical physics and applied mathematical analysis, especially fluid dynamics, and houses the NSF Computer Graphics Facility for computational biology, which is open to faculty, graduate students and postdoctoral researchers for graphic visualization in biology. The institute also coordinates a campuswide NSF research training group, "Nonlinear Dynamics in Biology."

Institute of Toxicology and Environmental Health (ITEH)

Information:
Institute of Toxicology and Environmental Health
916-752-1340

ITEH coordinates interdisciplinary research on biomedical and toxicological problems related to exposure to chemical, physical and biological toxic agents or to ionizing radiation. This research aims to determine basic mechanisms of toxic effects and to predict hazards to human and animal health from continual exposure to realistic levels of toxic substances in the environment or at the workplace. Studies on toxic, radioactive, mutagenic, carcinogenic and teratogenic compounds are carried out in special animal holding facilities. Laboratories are equipped for studies in analytical chemistry, biochemical toxicology, cell and molecular biology, endocrinology, inhalation toxicology, morphology and reproductive and developmental biology. The institute houses federally funded centers in toxicology and occupational health.

Institute of Transportation Studies

Information:
Daniel Sperling
916-752-6548; 916-752-6572
e-mail: dsperling@ucdavis.edu
World Wide Web: http://www.engr.ucdavis.edu/~its

The major areas of current research at the institute are advanced vehicle and highway systems, travel behavior, electric vehicle technology and policy, energy and environmental aspects, and safety and human factors. About 25 faculty members and 70 students from more than 10 academic disciplines, including the departments of Civil and Environmental Engineering and Mechanical Engineering, Economics, Environmental Studies, the Graduate School of Management, and Agricultural and

Resource Economics participate in the research activities of the institute. The institute aims to encourage and strengthen interdisciplinary research in tackling the complex challenges of growing traffic congestion and local and global pollution, and to disseminate research results to the broader academic and professional community.

John Muir Institute of the Environment (JMIE)

Information:
Robert G. Flocchini
916-752-1460

The John Muir Institute of the Environment facilitates research and exchange of information to improve the scientific basis for decisions on environmental issues. The institute encourages and facilitates multidisciplinary research focused on environmental topics, acts as administrative coordinator for specific programs of organized environmental research, and facilitates communication among policy makers, resource agencies, academic scientists and the public through outreach programs.

Program in International Nutrition

Information:
Kenneth H. Brown
3150 Meyer Hall
916-752-1992; 916-752-3406; e-mail: khbrown@ucdavis.edu
World Wide Web:
http://www-nutrition.ucdavis.edu/pin/index.htm

Faculty members of the Program in International Nutrition are studying the epidemiology and causal mechanisms of the major nutritional problems of human populations in developing countries, with the ultimate objective of implementing programs to ameliorate these problems. Current areas of research emphasis include maternal and child nutrition, nutrition and infection, nutritional assessment, and food and nutrition policy. The program manages a small microcomputer center for the analysis of clinical and population-based studies of relevance to international nutrition.

The plaza at the main entrance to Shields Library offers a sunny spot for a study break.

Additional Research Centers and Resources

Adult Fitness Program

Information:
Department of Exercise Science
916-752-2540

The Adult Fitness Program serves as an educational laboratory for undergraduate and graduate students engaged in advanced study of the role of exercise and nutrition in the management of optimal physiological function. Basic and clinical research studies focus on cardiovascular, respiratory and metabolic functions. The program emphasizes risk reduction for cardiovascular disease and development of cardiorespiratory endurance. Studies stress fitness, relaxation, and weight reduction and control through appropriate diet and exercise programs that are individually prescribed after extensive medical and physiological testing.

California Agricultural Experiment Station

Information:
College of Agricultural and Environmental Sciences
916-752-1610

The California Agricultural Experiment Station has branches in Davis, Riverside and Berkeley. The Davis branch includes 500 faculty in more than 30 departments in the College of Agricultural and Environmental Sciences, the Division of Biological Sciences and the School of Veterinary Medicine. In addition to laboratory facilities, it has approximately 3,000 acres devoted to agricultural research in the areas of experimental crops, orchards and animal facilities. The Experiment Station facilitates research in agricultural production, food processing, nutrition, animal care and disease prevention, consumer sciences and community development and environmental quality, with emphasis on resource conservation and management, water and soil pollution and regional planning.

Center for Child and Family Studies

Information:
West House of Child and Family Study Center
916-752-2888

The Center for Child and Family Studies is a research, teaching and demonstration laboratory of the Division of Human Development and Family Studies in the Department of Human and Community Development. At the laboratory, students enrolled in Human Development courses develop observational techniques and participate with peers, children, parents and professionals in a fully integrated laboratory of developmental programs for young children. Students study theories of development in a naturalistic setting. Students link theory to principles of interaction and develop a recognition and respect for individual differences. Selected undergraduate students participate in faculty and graduate student research at the laboratory.

Center for Neuroscience

Information:
Leo M. Chalupa, Director
1544 Newton Ct., Davis
916-757-8708; Fax: 916-757-8827

The Center for Neuroscience is an interdisciplinary unit that serves as the focal point for the study of the neuro-

sciences at UC Davis. Faculty affiliated with the center are from 13 departments and sections. The center sponsors a seminar series, conferences and symposia, distributes a quarterly newsletter, provides research space for center members and supports graduate students, postdoctoral scholars and distinguished visitors.

Faculty and students are engaged in the study of brain mechanisms responsible for normal human cognitive and perceptual processes. A core group of cognitive neuroscientists uses various imaging techniques and electrophysiological techniques to study both the normal and lesioned cortex to increase their understanding of how the normal brain produces behavior. Four faculty members use animal models to understand how information is processed in the cortex.

Conservation and Natural Resources Program

Information:
1323 Academic Surge
916-754-9489

This program aims to help focus Division of Natural Resources (DANR) research and extension on high priority natural resource issues in California, coordinate and facilitate connections among existing DANR academic staff and programs, increase collaboration between DANR academics and other UC and non-UC programs and experts, and increase programmatic links between DANR and state and federal agencies with natural resource management responsibilities in California.

Facility for Advanced Instrumentation

Information:
9 Hutchison Hall
916-752-0284

The Facility for Advanced Instrumentation is a training and research center where students, faculty and staff have access to major scientific instruments. An electron microscope laboratory houses scanning and transmission electron microscopes with x-ray microanalytical capabilities and an atomic force microscope. A mass spectrometer laboratory consists of a research-grade GC/MS, a high resolution instrument; a MALDI-TOF mass spectrometer, and an HPLC/MS equipped with electrospray ionization for analysis of proteins and peptides. The facility also coordinates access to additional instruments located in other departments on campus.

Food Intake Laboratory

Information:
TB 33
916-752-7516

The Food Intake Laboratory supports predoctoral and postdoctoral research in nutrition and behavior, emphasizing studies on the control of food intake and the nature of the factors that govern feeding choices. The laboratory promotes collaborative research involving the roles of metabolic, psychological, neurochemical, hormonal, gender, genetic and sensory inputs in the feeding behavior of experimental animals.

Health Sciences Research Laboratories

The Health Sciences Research Laboratories are biological science facilities with research staff and assistance for faculty, staff and students.

- **Animal Surgery Laboratory**

Information:
Buildings H and J—ARS
916-752-7756

Animal Surgery Laboratory provides facilities in compliance with NIH/AAALAC standards for researchers who perform both survival and non-survival experimental animal surgeries.

- **Biochemistry and Special Instrumentation Laboratory**

Information:
TB 161
916-752-0320

This central facility provides investigators access to certain common but expensive laboratory equipment. Equipment includes ultracentrifuges and high-speed centrifuges with rotors, scintillation and gamma counters, UV/VIS spectrophotometers, densitometers, Betaplate and Elisa readers.

Human Performance Laboratory

Information:
164 Hickey Gym
916-752-0965/ 916-754-8675

The Human Performance Laboratory houses equipment for the study of blood and muscle chemistry and enzymology, metabolism and energetics, muscle mechanics and electromyography, movement kinetics and kinematics, body composition and anthropometry, cardiorespiratory function during exercise in a controlled environment, control and acquisition of motor skills and the psychosocial aspects of human performance. The laboratory has Apple Macintosh and IBM microcomputers that can be used for data collection, reduction, graphing and statistical analysis as well as for biomechanical, physiological systems and human performance modeling.

Humanities Institute

Information:
2223 Social Sciences and Humanities Building
916-752-2295; fax: 916-752-4263

The Davis Humanities Institute organizes interdisciplinary research seminars open to graduate students and faculty and promotes creative exchanges between the humanities, social sciences and environmental sciences. Its fellowship program enables campus fellows and distinguished visitors to participate in year-long seminars on designated themes. The seminar theme in 1997-98 will be "Communities of Belief." The institute also sponsors distinguished visiting lecturers, supports interdisciplinary research clusters and a graduate student research assistantship program, co-sponsors lectures with other departments, organizes a Friday noon series of talks and films entitled "Problems and Paradigms," produces a calendar of events and publishes a newsletter, *Humanities at Davis*.

Intercampus Institute for Research at Particle Accelerators

Information:
Richard L. Lander
325 Physics/Geology Building
916-752-1780

This institute conducts research that uses the unique facilities at national and international accelerator labo-

ratories, particularly the Stanford Linear Accelerator Center, the Enrico Fermi National Accelerator Laboratory, the Japanese accelerator laboratory (KEK) and the German laboratory (DESY) in Hamburg. High-energy particle physics is the dominant area of research. The institute also promotes seminars and lectures by visiting researchers at individual campuses.

Mann Laboratory

Information:
104 Mann Laboratory
916-752-1410; fax: 916-752-4554

Plant scientists in the Louis K. Mann Laboratory direct their physiological, biochemical and molecular research to improving the quality of harvested fruits, vegetables and seeds. The five faculty housed in this facility are members of the Department of Vegetable Crops and are assisted by numerous students, postdoctoral researchers and visiting scientists. Research ranges from the basic molecular biology of fruit ripening and seed development to practical storage technologies for lightly processed fruits and vegetables. Results are communicated to other researchers and to growers, shippers, marketers and consumers. The facility is equipped with 18 controlled-temperature rooms, seven research laboratories, a teaching laboratory and a conference room and library.

Natural Reserve System

Information:
Office of Research
410 Mrak Hall
916-752-6949
World Wide Web: http://www.ucop.edu/DANR/nrs/nrs.html

The Davis campus administers seven natural reserves that are available for teaching and research.

- Bodega Marine Reserve, located at Bodega Bay, 100 miles west of campus, consists of coastal dune vegetation and bay and coastal tidal areas with facilities for overnight and longer stays. (See Bodega Marine Laboratory above.)
- Eagle Lake Field Station is on the shore of Eagle Lake in northeastern California and has boats, a small laboratory and facilities for overnight and longer stays.
- Jepson Prairie Reserve, located in Solano County 15 miles south of the campus, consists of native California bunchgrass grasslands and vernal pools.
- Donald and Sylvia McLaughlin Reserve, located near Clear Lake about 70 miles northwest of campus, consists of intercoastal range habitat and serpentine soil habitat.
- Putah Creek Campus Reserve is a 150-acre corridor along the north bank of Putah Creek with a remnant of the riparian (streamside) ecosystem.
- Quail Ridge Reserve consists of intercoastal range habitat located about 25 miles west of campus on a peninsula jutting into Lake Berryessa. The reserve has a small facility plus camping for overnight stays.
- Stebbins Cold Canyon Reserve, located about 24 miles west of campus, consists of several different plant communities found in California's inner and outer coast ranges.

The university maintains over 30 reserves throughout the state, many of which are available for teaching and research.

Nuclear Magnetic Resonance Facility

Information:
Medical Sciences 1D
916-752-7677

The Nuclear Magnetic Resonance Facility provides qualified researchers in the biological, medical and physical sciences access to state-of-the-art NMR instrumentation for spectroscopy and imaging. At present, the facility operates six spectrometers of varying purposes and capabilities. Three horizontal magnet bore spectrometers are used for in vivo spectroscopy and imaging of small animals and materials, and in vitro spectroscopy of perfused organs. Two vertical bore spectrometers are used primarily for solution studies of biomolecules, with an additional vertical bore instrument for in vitro studies. All of the spectrometers are multinuclear, and a large variety of high resolution, surface and imaging coils are available for use. The facility also has SUN and Silicon Graphics workstations for off-line data processing and molecular modeling.

Protein Structure Laboratory

Information:
1145 Surge 1
916-752-6228

The Protein Structure Laboratory provides state-of-the-art biotechnological instrumentation for protein sequencing, amino acid analysis, and protein and DNA synthesis and consultation for protein related research. Also available are a micro-protein sample preparation (in-gel and on-membrane digestions) and various analyses (amino acid analysis, sequencing, peptide mappings and MS analysis) for protein identification.

Social Science Data Service

Information:
107 Social Sciences and Humanities Building
916-752-6063

The Social Science Data Service (SSDS) is a unit of the Institute of Governmental Affairs (IGA). SSDS provides consulting, computing and specialized support services to faculty involved in quantitative social science research on the UC Davis campus. SSDS staff provide consulting on a wide range of software used by social scientists and assist with questions regarding the use of SSDS computers, as well as statistical and data-related programming. SSDS manages a UNIX system that provides a platform for quantitative social science computing. Specialized support is available for extramurally funded research projects managed by IGA.

Student Experimental Farm

Information:
Student Experimental Farm
916-752-7645

The Student Experimental Farm is an innovative teaching and research facility located on 25 acres of university land just west of the Recreation Pool. Since its inception, the Student Experimental Farm has provided students with unique opportunities to explore alternative agricultural technologies and philosophies through classes, special projects, internships, work study jobs

and original research. Because the farm includes several acres of land that have been managed organically for two decades, it provides researchers with a facility for conducting field research into sustainable agriculture.

UC Agricultural Issues Center

Information:
132 Social Sciences and Humanities Building
916-752-2320

The UC Agricultural Issues Center, headquartered at Davis, is a universitywide research and outreach unit that draws on expertise from many disciplines. The center is particularly interested in issues such as the impacts of demographic change on agriculture, natural resources and rural life in California; the social, economic and environmental effects of agricultural technologies; food consumption and international trade; and local and national policies that affect Western agriculture or its workers.

UC Davis Herbarium

Information:
Section of Plant Biology
916-752-1091/0617

The UC Davis Herbarium is used for research in plant systematics and ecology, as well as for public service requests (especially identification of weeds and poisonous plants). The herbarium contains more than 200,000 plant specimens, including vascular plants, bryophytes, lichens and algae. The majority of these specimens are angiosperms (flowering plants), mainly from California, but the collections are worldwide in scope, with strong holdings from North America, Ecuador, Baja California and regions with Mediterranean climate regimes. The herbarium is well known for its collection of weeds and poisonous plants, although it also has world-class collections of grasses, oaks and spurges.

Veterinary Genetics Laboratory

Information:
Horse Bloodtyping Laboratory, Armstrong Tract, 916-752-2211
Cattle Bloodtyping Laboratory, Armstrong Tract, 916-752-7383

The laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities include gene mapping and discovery and screening of DNA markers and biochemical polymorphisms. Knowledge acquired is applied to detecting disease relationships, parentage and solving questionable parentage cases arising from the breeding of horses, cattle, sheep, goats, llamas, alpacas and dogs. The laboratory continues to utilize red cell, serum and karyotyping for diagnosis of clinical diseases.

Veterinary Medicine Teaching and Research Center (VMTRC)

Information:
UC Davis VMTRC
18830 Road 112
Tulare, CA 93274
209-688-1731

VMTRC is a clinical teaching and research center within the UC Davis School of Veterinary Medicine. The center offers a forum for teaching, research and service programs for D.V.M. students, M.P.V.M. students, graduate students, residents, university faculty and visiting researchers interested in food animal medicine. VMTRC programs emphasize herd health medicine, epidemiology and preventive medicine, production management, agricultural economics, environmental protection, food safety and animal welfare.

Water Resources Center

Information:
1323 Academic Surge
916-752-8070

The center supports water-related research in such areas as agricultural and biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences and political science. Research interests include drought responses, aquatic ecosystem structure and function, water resource systems engineering, economic evaluation of water development and conservation, political strategy in water resources development, environmental and energy relationships in water resources management, watershed hydrology, ground water use, soil and land use management in relation to water resources use, and maintenance and improvement of water quality. The center has an annual call for proposals in fall quarter.

Wildland Resources Center

Information:
1323 Academic Surge
916-752-8070

The center coordinates activities among the university's research and extension programs and stimulates research into conservation, management and utilization of wildland resources with a view toward the optimum present and future uses of wildlands. Projects focus on such topics as habitat conservation, assessment and management of timber resources and old-growth forests, and development of a system for evaluating California's environmental resources. The center increases the awareness of the university's research and extension programs related to wildlands and serves as liaison between the university and state and federal agencies and other organizations concerned with wildland resources and problems.

X-Ray Crystallographic Facility

Information:
Marilyn Olmstead
Department of Chemistry
916-752-6668

The X-Ray Crystallographic Facility is located in the Department of Chemistry. There are three automated four-circle diffractometers. One of these is equipped with a Siemens 15-kW rotating anode X-ray source. There are also traditional Weissenberg and precession cameras. All diffraction equipment is fitted with low-temperature (liquid nitrogen) attachments. In addition, the facility contains a Silicon Graphics Indigo 2, two VAX-station 3000 series computers, microcomputers, graphics terminals and multi-pen plotters. The laboratory is known for pioneering work in low-temperature crystallography, for the development of rapid structure determination methods, and techniques for handling reactive materials.

UNDERGRADUATE ADMISSION

UNDERGRADUATE ADMISSION

Information:
Undergraduate Admissions and Outreach Services
175 Mrak Hall
Davis, CA 95616-8507
916-752-2971; 916-752-4360 (TTY), 916-752-1280 (Fax)
e-mail: thinkUCD@ucdavis.edu
World Wide Web: http://www.ucdavis.edu/admissions.html

You can obtain the *Application for Undergraduate Admission and Scholarships* from the counseling office of any California high school or community college or from the admission office of any UC campus.

Application Filing Periods

Submit your application for admission and scholarships during the filing period for the quarter in which you want to attend UC Davis.

Quarter of Attendance	Filing Period
Winter quarter 1998	July 1–31, 1997
Spring quarter 1998	October 1–31, 1997
Fall quarter 1998	November 1–30, 1997

Submit your completed application form to:

University of California
Undergraduate Application Processing Service
P.O. Box 23460
Oakland, California 94623-0460

Winter and spring quarters may require that you submit the application with an appeal letter directly to the Davis campus if we are closed to new applicants. Please call Undergraduate Admissions and Outreach Services during the winter and spring filing periods to find out the application filing status.

Application Fees

The application fee of $40 entitles you to apply to one University of California campus. If you wish to apply to more than one UC campus, you must pay an additional $40 for *each* campus you select. These fees *are not refundable*. You must include the fee with the application or it will not be processed. Attach a check or money order made payable to the *Regents of the University of California* to the application form.

Preparing for University Work—Freshman

A carefully planned program of high school courses provides you with the best preparation for university work. As a prospective university student, you should give priority to completing the high school courses required for admission—the "A to F" subject requirements.

You should take college preparatory courses that will challenge you to work hard and will prepare you beyond minimum levels of competence in reading, writing and mathematics. A student who is well prepared for university work will have taken four years of English in high school, four years of mathematics, two to three years of foreign language, two to three years of laboratory science, two or more years of history/social science, and one or more years of art or humanities.

Reading: You should become proficient in reading and understanding technical materials and scholarly works. Learn to read analytically and critically, actively questioning yourself about the author's intentions, viewpoint, arguments and conclusions. Become familiar, and comfortable, with the conventions of standard written English, and with various writing strategies and techniques. Your reading experience should include original works in their entirety, not just textbooks and anthologies, and should encompass a wide variety of forms and topics.

Writing: Effective critical thinking and proficiency with the written language are closely related, and both are skills that every university student must master. By university standards, a student who is proficient in English composition is able to understand the assigned topic; select and develop a theme by analysis and argument; choose words that aptly and precisely convey the intended meaning; construct effective sentences, i.e., sentences that economically and successfully convey the writer's ideas and display a variety of structures; and demonstrate an awareness of the conventions of standard written English.

If you plan to attend the university, you must take English courses in high school that require the development and practice of these skills. You must take at least four years of English composition and literature classes that stress expository writing.

Mathematics: Many undergraduate majors require preparation in mathematics beyond the three years required for admission to the university. All majors in the natural and life sciences, engineering and mathematics require calculus. Many majors in the social sciences require statistics or calculus, or both. Calculus is also required for undergraduates preparing for careers in the environmental sciences, dentistry, medicine, optometry, pharmacy and biostatistics. If you select a major that requires either calculus or statistics, you should expect to take that course during your first year at the university.

Prepare yourself for university courses in mathematics while you are still in high school. Good preparation includes a year of mathematics beyond second-year algebra (such as precalculus, mathematical analysis, analytic geometry) and, definitely, a course in mathematics during your senior year.

Algebra is necessary for success in university mathematics courses. Students who do not take a mathematics course during their last year in high school often find they need to take a preparatory course at the university in order to renew their algebra skills. The need to take such a course at the university could delay your undergraduate studies for which mathematics is a prerequisite.

Finally, take advantage of any guidance your high school offers in study skills and diagnostic tests designed to assist you in assessing your college preparation. Managing your time well and studying effectively are critical to excelling at the university. Together with solid academic preparation, these skills should enable you to realize your educational goals and, ultimately, fulfill your career aspirations.

ADMISSION AS A FRESHMAN

The University of California defines a *freshman applicant* as a student who has graduated from high school but

has not enrolled since then in a regular session in any college-level institution. Summer session immediately following high school graduation is excluded in this determination.

Admission requirements for California residents are different from those for nonresidents. Nonresidents must meet higher scholarship requirements.

The following describes the minimum requirements to establish eligibility at the University of California. **At UC Davis, students generally must perform well above these minimums in order to gain admission,** since the number of applicants exceeds the number of students we can admit. We give priority to students on the basis of highest academic achievements and test scores.

Minimum Requirements for California Residents

To be eligible for admission to the University of California as a freshman, you must meet the subject requirements, scholarship requirement and examination requirements that are described on this and the following pages.

Subject Requirements: A to F

You must complete at least 15 high school units in the subject areas listed below. At least seven of the required 15 units will have to be taken in the last two years of high school. The required course sequence is often referred to as the "A to F" pattern.

Courses taken in the 9th grade and completed with a grade of C or better can satisfy a subject requirement; however, the grades will not be used in computing your grade point average. If you receive a grade of D or lower in a 9th-grade course, you have not satisfactorily completed the subject requirement until you repeat the course (or, in some cases, complete a more advanced course) with a grade of C or better.

A. History/Social Science—2 years

One year of United States history, or one-half year of United States history and one-half year of civics or American government; and one year of world history, cultures and geography.

B. English—4 years

Four years of English—composition and literature (classes should stress preparation for university study, including frequent and regular practice in writing expository prose compositions of some length). Not more than one year will be accepted from the 9th grade. (See English Proficiency below.)

C. Mathematics—3 years; 4 years recommended

Three years of mathematics—elementary algebra, geometry and intermediate algebra. (Courses taken in grades 7 and 8 may partially satisfy the requirement if they are accepted by the high school as equivalent to its own courses.)

D. Laboratory Science—2 years; 3 years recommended

Two years of laboratory science providing fundamental knowledge in at least two of these three areas: biology, chemistry and physics. Not more than one year of laboratory science taken in the 9th grade may be used to meet this requirement.

E. Language other than English—2 years; 3 years recommended

Two years of the same language other than English. Courses should emphasize speaking and understanding, and include instruction in grammar, vocabulary, reading and composition. (Courses taken in grades 7 and 8 may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

F. College Preparatory Electives—2 years

Two years in addition to those required in "A" through "E" above.

- **History and English:** courses that fit the general description for elective courses above.
- **Advanced mathematics:** trigonometry, linear algebra, pre-calculus (mathematical analysis), calculus, statistics, computer science and similar courses. (Courses containing significant amounts of material for arithmetic or from shop, consumer or business mathematics are not acceptable.)
- **Laboratory science:** courses in the biological and physical sciences. A general science course taken in grade 9 as preparation for a laboratory science may be used.
- **Language other than English:** courses may be in either the same language used to satisfy the "E" requirement or a second foreign language. If a second language is chosen, however, at least two years of work in that language must be completed.
- **Social science:** courses that fit the general description for elective courses above, and that serve as preparation for lower division work in social science at the university. (Courses of an applied, service or vocational nature are not acceptable.)
- **Visual and performing arts:** courses should enable students to understand and appreciate artistic expression, and to talk and write with discrimination about artistic materials studied. Courses that develop creative artistic ability or artistic performance may be used. (Courses that are recreational or are offered under physical education are not acceptable.)

If you are a California high school graduate, the courses used to satisfy the **Subject Requirement** must appear on a list that your high school principal has certified meets the course descriptions above, and has been accepted by the university's Office of Student Academic Services. If you submit courses from an out-of-state school, Undergraduate Admissions and Outreach Services will determine if your courses fulfill the Subject Requirement.

English Proficiency

Instead of a fourth year of high school English, you may satisfy the **English Proficiency Requirement** by completing one of the following:

- SAT II Subject Test in Writing (a score of 660 or above);

OR

- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, or 3).

The requirement may also be satisfied with a transferable college-level English course in literature, composi-

tion, or speech, worth 3-semester or 4-quarter units in which you earned a grade of C or higher.

Scholarship Requirement

An applicant must have earned a grade of C or better in all high school courses to satisfy the "A to F" requirements above. The grades earned in these courses that are taken in grades 10 through 12 will be used to evaluate the grade point average for minimum eligibility.

If you attain a grade point average of 3.30 [where the letter grade A=4, B=3, C=2, and D=1, and in university-approved honors or advanced placement courses taken during the 10th, 11th and 12th grades (limit of four year-long courses with not more than two coming from the tenth grade) where the letter grade A=5, B=4, and C=3] in the required "A to F" subjects taken after the 9th grade, you will meet the minimum requirements to be eligible to enter the university, regardless of your scores on standardized tests. If your grade point average falls between 3.29 and 2.82, you will meet the minimum requirements for the university if you achieve the specified scores on the standardized tests (see the Eligibility Index opposite).

In determining the required grade point average, the university will use a semester grade of A in one course to balance a semester grade of C in another. Grades you received in courses taken in the 9th grade or earlier are not used in determining your grade point average. (However, these courses may be used to satisfy subject requirements.) The grades that appear on your official high school transcript, including those earned in accelerated and advanced courses, are the grades the university will use in evaluating your record. Grades are counted on a semester basis unless your school gives only year grades.

To meet the **Subject** and **Scholarship Requirements** you may repeat courses in which you received a grade of D or lower. The grade achieved in the repeated course will be calculated into the grade point average. There is no limit to the number of repeated courses that may be used in the "A to F" pattern, but each course may be repeated only one time.

Examination Requirement

All freshman applicants must submit official scores from the College Board or the American College Testing (ACT) Program. If you are applying for admission to the fall quarter, take the tests no later than December of your senior year (earlier testing is recommended). The following tests are required:

- Scholastic Assessment Test-I (SAT-I–College Board)—The verbal and mathematics tests scores you submit must be from the same sitting,

OR

- American College Test

AND

- Three Scholastic Assessment Tests-II (SAT-II–College Board), which must include (a) writing test, (b) mathematics (level I or II) and (c) one test from the social studies or science or foreign language, or the test in English literature. The English Language Proficiency Test is not an acceptable option.

Eligibility Index

"A-F" GPA	SAT I ACT[1]	SAT I total[2]	"A-F" GPA	SAT I ACT[1]	SAT I total[2]
2.82	36	1590/1600	3.06	25	1030/1150
2.83	36	1570/1590	3.07	24	1010/1130
2.84	35	1540/1580	3.08	23	980/1110
2.85	35	1520/1570	3.09	23	960/1090
2.86	35	1500/1560	3.10	22	940/1070
2.87	34	1470/1550	3.11	22	910/1050
2.88	34	1450/1530	3.12	21	890/1030
2.89	33	1430/1510	3.13	21	870/1010
2.90	33	1400/1490	3.14	20	840/980
2.91	33	1380/1470	3.15	20	820/960
2.92	32	1360/1450	3.16	19	800/940
2.93	31	1330/1430	3.17	19	770/920
2.94	31	1310/1400	3.18	18	750/900
2.95	31	1290/1370	3.19	18	730/870
2.96	30	1260/1350	3.20	17	700/840
2.97	30	1240/1330	3.21	17	680/810
2.98	29	1220/1310	3.22	16	660/780
2.99	28	1190/1290	3.23	16	630/750
3.00	28	1170/1270	3.24	15	610/720
3.01	27	1150/1250	3.25	15	590/690
3.02	27	1120/1230	3.26	14	560/660
3.03	26	1100/1210	3.27	14	540/630
3.04	26	1080/1190	3.28	13	520/600
3.05	25	1050/1170	3.29	12	490/570

[1]The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.

[2]The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600. Use the first score listed if you took the test prior to April 1995. Use the second score if you took the test April 1995 or later.

If you are a California resident and your grade point average in the required high school subjects is 3.30 or higher, the tests are required but your scores will not be used to determine your minimum eligibility for admission. *(Reminder: At UC Davis, students generally must perform well above the minimums in order to gain admission.)*

If your grade point average in the "A to F" requirement is less than 3.30, refer to the table above to see the examination scores you must earn to be eligible for university admission.

Make arrangements to take the required SAT-I and SAT-II by writing to College Board SAT, Princeton, NJ 08541. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not to the university.) UC Davis' College Board code is 4834 and the ACT code is 0454.

Minimum Requirements for Residents of Other States

If you are a freshman applicant who does not claim California residency, you must meet the following requirements for minimum admission eligibility to the University of California (Students generally must perform well above the minimum in order to gain admission to UC Davis):

- Graduate from a regionally accredited or state-accredited high school

- Satisfactorily complete the subject requirements listed under Requirements for California Residents
- Earn a grade point average of at least 3.4 (B+) in the courses used to meet the subject requirements
- Complete the examination requirements listed for California residents

Minimum Eligibility by Examination Alone

If you do not meet the minimum scholarship and subject requirements for admission, you can meet minimum requirements for admission as a freshman by examination alone. The examinations must be taken before you graduate from high school. (If you have completed transferable college courses, College Board subject tests cannot be taken in academic subjects covered in those courses.) You must take the same College Board tests discussed above and receive a total score of at least 1400 on the SAT-I, or a score of 31 on the American College Test. Your total score on the SAT-II must be 1760 or higher with no score less than 530 on an individual test. If you are a nonresident applicant, your score on the SAT-II must be 1850 or higher with no score less than 530 on an individual test.

High School Proficiency Examination

The University of California will accept the Certificate of Proficiency or the General Education Development (GED) certificate awarded by the State Department of Education in lieu of the regular high school diploma. However, you must also meet all other university entrance requirements (subject, scholarship and examination).

Transfer Credit

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

Transfer credit is also granted for each College Board Advanced Placement Examination completed with a score of 3, 4 or 5. International Baccalaureate Higher Level Examinations with scores of 5, 6 or 7 will receive transfer credit. If students take college courses in combination with Advanced Placement or International Baccalaureate Examinations in the same subject areas, transfer credit may be limited due to duplication of credit.

Advanced Placement Examinations

If you take one or more of the College Board Advanced Placement (AP) Examinations and score 3, 4 or 5, you will be awarded college credit. The credit will become part of the minimum 180 quarter units you need in order to receive a bachelor's degree. The credit from the AP Examinations may also be used to satisfy specific degree requirements.

Consult the chart on the facing page to learn how many units you will receive for an AP Examination (see the column headed: Credit Toward Degree), and how those units will be applied toward specific degree requirements (see the column headed: Credit Allowed Toward Specific Degree Requirements). Please note that the courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement. (See General Education in the Undergraduate Education chapter.)

In general, you may not earn university credit for courses that duplicate credit already earned through AP. There are, however, a few exceptions to this general rule. Since it is often difficult to know exactly which UC Davis course you should take when you have earned AP credit, you should talk with an academic adviser in your department or dean's office before selecting and enrolling in classes.

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 since last attendance at high school. Summer session attended immediately following high school graduation is excluded in this determination. If you are a transfer applicant, you may not disregard your college record and apply for admission as a freshman.

California residents must meet the requirements that follow. If you are not a California resident, see Requirements for Residents of Other States below. **At UC Davis, students generally must perform well above the minimums in order to gain admission,** since the number of applicants exceeds the number of students we can admit.

The highest priority for admission is given to California Community College transfer applicants with 60 semester or 90 quarter units of transfer work with the highest academic achievement, as well as, in some areas, the completion of lower division major program.

Minimum Requirements for California Residents

Transfer applicants who plan on entering the university any term through spring 1998 must meet one of the following conditions:

- If you were eligible for admission to the university when you graduated from high school—meaning you satisfied the subject, scholarship, and examination requirements—you are *minimally eligible* for admission if you have a C (2.0) average in your transferable college course work.

  If you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation, you must also satisfy the examination requirement for freshmen. However, the examination must have been taken prior to graduating high school. All transfer students, regardless of the date of high school graduation, must meet the high school requirements stated earlier in this catalog, or establish eligibility as junior-level transfers.
- If you have graduated from high school and meet the needed scholarship and examination requirements but you have not completed one or more of the "A to F" subjects while in high school, you will be minimally eligible to be considered for admission after you have:
  1. established an overall grade point average of 2.00 or better in another college or university;
  2. completed with a grade of C or better appropriate college courses in the high school subjects that you lack; and,

College Board Advanced Placement (AP) Examination Credit

EXAMINATION	SCORE	UCD COURSE EQUIVALENCIES	CONTINUING COURSE	CREDIT TOWARD DEGREE	CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS
ENGLISH					**English/Humanities Credit**
English	5, 4	English 1, 3		8 units	Satisfies Subject A requirement. *College of Agricultural and Environmental Sciences:* 4 units Four units satisfies first part of English composition requirement. *College of Engineering:* 8 units Satisfies English 1, 4 units toward Humanities/Social Sciences electives. *College of Letters and Science:* Satisfies first course toward English Composition requirement.
English	3			8 units	Satisfies Subject A requirement.
FOREIGN LANGUAGES					**Humanities Credit/Unrestricted Electives**
French	5	French 22	French 23, or consultation with adviser	8 units	4 units For each foreign language examination passed. In the *College of Agricultural and Environmental Sciences*, satisfies credit toward breadth/Unrestricted electives.
French	4	French 21	French 22	8 units	In the *College of Letters and Science*, examinations (except for Latin) satisfy the Foreign Language requirement. In the *College of Engineering,* 4 units toward Humanities/Social Science electives.
French	3	French 3	French 21	8 units	
German	5, 4	German 20	German 21, upper division literature courses	8 units	
German	3	German 3	German 20	8 units	
Latin (Vergil)	5, 4, 3	Latin 2	Determined by consultation with Classics adviser	4 units	
Latin (Lyric)	5, 4, 3	Latin 2	Determined by consultation with Classics adviser	4 units	
Spanish	5, 4	Spanish 21	Spanish 22, 23 or 24, or more advanced course in consultation with adviser	8 units	
Spanish	3	Spanish 3	Spanish 21, or consultation with adviser	8 units	
HUMANITIES					**Humanities Credit/Unrestricted Electives**
Art Studio	5	Art Studio 2, 5		8 units	8 units In the *College of Letters and Science*, partially satisfies Area (breadth) requirements for A.B. degree.
Art Studio	4	Art Studio 2		8 units	4 units In the *College of Letters and Science,* partially satisfies Area (breadth) requirements for A.B. degree.
Art Studio	3			8 units	
Art History	5	Art History 1A, 1B, 1C		8 units	8 units In the *College of Letters and Science*, partially satisfies Area (breadth) requirements for A.B. degree. In *College of Agricultural and Environmental Sciences,* satisfies credit toward breadth requirement or Unrestricted electives.
Art History	4, 3			8 units	
American History	5, 4, 3	History 17A, 17B		8 units	8 units Satisfies American History and Institutions requirement. History 17A and 17B may be taken for full credit.
European History	5, 4, 3	History 4B, 4C		8 units	8 units History 4A and 4B may be taken for full credit.
Music	5, 4, 3	Music 10		8 units	4 units In the *College of Letters and Science*, partially satisfies Area (breadth) requirements for A.B. degree.
NATURAL SCIENCES					**Natural Sciences Credit/Preparatory Courses for Science Majors**
Biology	5, 4, 3	Biological Sciences 10		8 units	4 units Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences.
Chemistry	5	Chemistry 2A	Determined by consultation with adviser	8 units	4 units Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 2HA, 2HB, 2HC sequence.
Chemistry	4, 3	Chemistry 10		8 units	
Computer Science AB	5, 4	Computer Science Engineering 30	Computer Science Engineering 40	4 units	Credit for Computer Science Engineering 30 may serve as prerequisite for Computer Science Engineering 40 with consent of instructor
Computer Science AB	3			4 units	In the *College of Engineering,* examination awards units towards the unrestricted electives requirement.
Computer Science A	5, 4, 3		Computer Science Engineering 30	2 units	
Mathematics AB	5, 4	Mathematics 12, 16A, or 21A	Mathematics 16B or 21B	4 units	4 units Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.
Mathematics AB	3		Mathematics 16A or 21A	4 units	
Mathematics BC	5	Mathematics 12, 16A-16B, or 21A-21B	Mathematics 16C or 21C	8 units	8 units Mathematics 16A, 16B, 21A, or 21B may be taken for full credit. Mathematics 16A, 16B, 21A, or 21B equivalents may serve as a prerequisite for Mathematics 16B, 16C, 21B, or 21C.
Mathematics BC	4, 3	Mathematics 12, 16A, or 21A	Mathematics 16B or 21B	8 units	4 units Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.
Physics B	5	Physics 1A, 1B, 7A, 7B, 7C, 10	Determined by consultation with adviser	8 units	8 units Physics 7A, 7B, 7C may be taken for full credit.
Physics B	4, 3	Physics 10		8 units	4 units
Physics CI	5	Physics 1A, 7B, or 9A		4 units	4 units In the *College of Engineering*, only a score of 5 on Physics (CI and
Physics CI	4	Physics 1A or 7B		4 units	4 units CII) Examinations applies toward Physics requirement.
Physics CI	3			4 units	
Physics CII	5, 4	Physics 1B or 7A		4 units	4 units
Physics CII	3			4 units	
SOCIAL SCIENCE					**Social Science Credit/Unrestricted Electives**
American Government and Politics	5, 4, 3	Political Science 1		4 units	4 units Political Science 1 satisfies American History and Institutions requirement.
Comparative Government and Politics	5, 4, 3	Political Science 2		4 units	4 units In *College of Agricultural and Environmental Sciences,* satisfies credit toward breadth requirement or Unrestricted electives. In *College of Engineering,* awards credit toward Humanities/Social Sciences electives requirement.
Economics (Micro)	5, 4, 3	Economics 1A	Determined by consultation with Economics adviser.	4 units	
Economics (Macro)	5, 4, 3	Economics 1B	Determined by consultation with Economics adviser.	4 units	
Psychology	5	Psychology 1		4 units	
Psychology	4, 3			4 units	

3. completed 12 or more transferable quarter (or semester) units, or have met the freshman examination requirement.

- If you did not meet the needed scholarship requirement or did not meet the scholarship requirement and lack the required subjects, you will be minimally eligible to be considered for admission after you have:
  1. completed 84 transferable quarter (56 semester) units of credit in college courses (Note: Although the minimum requirement is 84 quarter/56 semester units, to be competitive for admission to UC Davis, students should complete at least 90 quarter/60 semester transferable units); and
  2. established an overall grade point average of 2.40 or better on transferable courses in another college or university; and
  3. completed one of the following:
     a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit = one year-long course) of credit may be waived except in English and mathematics;

     OR

     b. a college course, or courses, in mathematics; one transferable course in English; and one transferable course in either U.S. history, a laboratory science, or a language other than English, all with grades of C or better. The mathematics component may be satisfied in one of the following ways: *(a)* take courses in algebra, geometry, and advanced algebra; *(b)* take a course that employs the topics of advanced algebra—for example, college algebra, pre-calculus, calculus, linear algebra; *(c)* take a transferable statistics course that has advanced algebra as a prerequisite.

New UC Minimum Requirements Effective Fall 1998

- Students who were eligible for admission to the university when they graduated from high school—meaning they satisfied the Subject, Scholarship and Examination Requirements—are UC minimally eligible to transfer if they have a C (2.0) in their transferable college course work. (No change from current requirements.)
- Students who met the Scholarship Requirement but did not satisfy the Subject Requirement must take transferable college courses in the subjects they are missing, earn a grade of C or better in each of of these required courses, and earn an overall C (2.0) average in all transferable college course work to be minimally eligible to transfer. Students who met the Scholarship Requirements but did not meet the Examination Requirement must complete a minimum of 12 semester (18 quarter) units of transferable work and earn an overall C (2.0) average in all transferable college course work completed.
- Students who were not eligible for admission to the university when they graduated from high school because they did not meet the Scholarship Requirement must:

  a. complete 90 quarter units or 60 semester units of transferable college credit with a grade point average of at least 2.4,

  and

  b. Complete a course plan requirement to include:
     1. Two transferable college courses (3 semester or 4-5 quarter units each) in English composition; and,
     2. One transferable college course (3 semester or 4-5 quarter units) in mathematical concepts and quantitative reasoning; and,
     3. Four transferable college courses (3 semester or 4-5 quarter units each) chosen from at least two of the following subject areas: the arts and humanities, the social and behavioral sciences, the physical and biological sciences.

     Each of the courses in this pattern must be completed with a grade of C or better.

Minimum Requirements for Residents of Other States

If you meet the requirements for admission as a nonresident freshman, you must have a grade point average of 2.8 or better in college courses that are accepted for transfer credit by the University of California.

If you don't meet the minimum requirements for admission as a nonresident freshman, you must have completed at least 84 quarter units (56 semester units) of transferable work with a grade point average of 2.8 or better and have completed the subject requirements for California residents. Starting in fall 1998, the unit requirements changes to 90 quarter units (60 semester units). In either case, students generally must perform **well above the minimums** to gain admission to UC Davis.

Transfer Admission to the College of Engineering

Typically, transfer students are only admitted into engineering as advanced standing transfers, completing in excess of 90 quarter units by the time of transfer. If you are admitted with *fewer than 90 quarter units* of college work (60 semester units), you are classified in lower division standing and must complete all course work listed in one of the nine Lower Division Programs listed under Engineering in the Programs and Courses section of this catalog. You are advanced to upper division standing after completing 90 units.

When there are more applicants than space available in the college, priority is given to transfers from California community colleges who have completed the lower division program for engineering with a high grade point average. You must select a major before admission, and once admitted, you may be limited in your freedom to change majors within the college.

Unit Credit for Courses Taken Elsewhere

The university gives unit credit to transfer students for courses they have completed at other accredited colleges and universities. To be accepted for credit, your courses must be comparable to those offered at the university, as determined by the Undergraduate Admissions and Outreach Services Office.

A total of 105 quarter units (70 semester units) 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.

UC Intercampus Transfer

If you are an undergraduate student currently or previously registered at another UC campus and have not since been registered in another institution, you may apply for transfer to the Davis campus. Filing dates, the application, fees and admission requirements are the same as those listed for new applicants.

ADMISSION AS AN INTERNATIONAL STUDENT

UC Davis welcomes competent, qualified applicants from around the world. An international application may be obtained by writing to Undergraduate Admissions and Outreach Services, University of California, Davis, California, 95616-8507. It is very important that the application be filed during the appropriate filing period.

To be eligible for admission to the university, international students need to meet specific academic and financial qualifications. International students are responsible for providing the university with all secondary school and college transcripts. The Test of English as a Foreign Language (TOEFL) is a requirement of admission for applicants from abroad or for those with little schooling in the United States when English is not the applicant's native language. A minimum score of 500 is required.

The Scholastic Assessment Tests (SAT-I and SAT-II) are required for international freshman applicants who are graduates of U.S. high schools or American-type schools abroad. These tests are also required for applicants who come from countries that do not have national, external examinations at the end of secondary school. Because many preliminary admission decisions are made on the basis of test scores and marks, all international freshman applicants are strongly encouraged to take these tests and to have the official scores reported to UC Davis as early as possible.

For transfer students, course work is considered transferable if the applicant completed the course at an institution that is recognized by the University of California and is comparable to course work offered at the University of California.

Most international students are required to complete a "Financial Statement for Students Seeking Nonimmigrant Status" that attests to the student's ability to pay for nonresident tuition and fees and living expenses.

All international students who have not satisfied the Subject A requirement through domestic course work or testing, or whose native language is not English, must take the Examination in English as a Second Language upon entering UC Davis. Depending on the results of the exam, students may be required to enroll in appropriate classes until they have achieved the necessary language skills.

CAMPUS ADMISSION STANDARDS

UC Davis makes every effort to provide a place for all California resident applicants who meet the minimum UC admission requirements and file an application during the appropriate priority filing period.

In recent years, the number of applicants for some majors has far exceeded the number of spaces available. When UC Davis cannot accept all eligible applicants, it uses standards that are more demanding than the minimum requirements to select students. These standards, which are called selection criteria, identify those students who have demonstrated the capacity for high academic achievement and who have a variety of other qualities that can contribute to the strength and diversity of the campus community.

The selection criteria described below will be used for applicants for the fall 1998 term. The criteria may differ for the winter and spring terms because enrollment targets and applicant qualifications change. Applicants for winter or spring should contact Undergraduate Admissions and Outreach Services for more information.

Selection Guidelines

Each campus, in consultation with the Office of the President, develops enrollment targets that specify the number of new freshman and advanced standing students expected to enroll. Campuses that receive more applications than the number required to meet their enrollment target admit students using the criteria described below.

Freshman Applicants

Academic Criteria *(used to select up to 60 percent of admits):* UC Davis selects freshman applicants who have made the greatest effort to fully prepare academically as measured by the following criteria:

1. Calculated GPA on all academic courses completed in the "A to F" subject areas, with additional points given for honors courses. Maximum value is 4.00.
2. College entrance test scores—SAT-I or ACT and the three SAT-II test scores.
3. The number and content of college preparatory courses taken in academic subjects beyond UC minimums.
4. The number of university-approved honors or advanced placement courses completed or in progress.

Supplemental Criteria (*used to select up to 40 percent of admits*): Applicants are evaluated using the selection criteria described above in conjunction with the following supplemental criteria:

1. Personal accomplishments, talents, experiences or interests that will contribute to the educational environment of the campus.
2. Special circumstances which may have affected the applicant's life, including personal hardship, disabilities, economic and educational disadvantage, and membership in groups historically underrepresented at the university. (Special note: The regents of the University of California have decided that starting

spring 1998, we no longer will consider race, gender or ethnicity in the admission process.)

Transfer Applicants

Academic Criteria: Top priority for admission consideration is given to UC-eligible California community college junior level transfer applicants with 60 semester/90 quarter units of transfer work. Other UC-eligible transfer applicants will be admitted if space is available.

When applications far exceed the number of spaces available—for majors such as engineering, biological sciences, computer science, international relations and psychology, for example—the completion of specific lower division preparatory courses for the major is required. Contact Undergraduate Admissions and Outreach Services for information on which majors are so impacted.

Supplemental Criteria: The same supplemental criteria described above for freshmen are used.

Notification and Acceptance of Admission

Upon completion of a review of your academic records, you will be notified of your admission status by letter.

The length of time before admission notification varies, depending upon the completeness of your application. For example, most applicants for fall quarter will be notified of their admission status between March 1 and mid-March for freshmen, and March 1 and May 1 for transfer applicants. When you receive your notification of admission you will also receive an important form called the **Statement of Intent to Register (SIR).** Complete the form and return it to the Cashier's office, along with the required *nonrefundable* $100 deposit, in order to complete the admissions process. This advance deposit is applied to your university registration fee as long as you register in the quarter to which you are admitted. EOP and readmission applicants are not required to submit the $100 advance deposit; however, they will pay full registration fees at the time of registration.

The Statement of Intent to Register (SIR) for the fall term should be returned by May 1 (freshman) or June 1 (transfer) to notify the campus that you wish to attend. Students admitted to winter or spring quarter *must* return the SIR by the date specified in the notification letter of admission. Students not selected for admission consideration within the academic year at any UC campus to which they have applied and who are UC eligible may have their application considered at another UC campus where space is still available through a referral process; applicants in this category will be contacted by any UC campus with remaining spaces.

READMISSION

If you are a former UC Davis undergraduate student planning to resume studies at the Davis campus as an undergraduate, you must file an Application for Readmission, available in the Office of the Registrar, and pay a nontransferable, nonrefundable fee of $40. (You are a former student if you have interrupted the completion of consecutive terms of enrollment on the Davis campus.) Official transcripts of all work you may have attempted in the interim must be submitted to the Office of the Registrar.

Students applying for readmission must file their applications on or before the following deadlines:

Quarter	Deadline Date
Fall 1997	July 31, 1997
Winter 1998	November 7, 1997
Spring 1998	January 30, 1998

SPECIAL PROGRAMS

Concurrent Enrollment

Concurrent courses are regular university courses open to the community on a space-available basis through University Extension. This program allows an individual to pursue academic interests and to test academic abilities at the university.

For information, write to the University Extension office, Research Park, University of California, Davis, CA 95616 (916-757-8777).

Educational Opportunity Program (EOP)

The Educational Opportunity Program assists students from economically and/or educationally disadvantaged backgrounds and students with disabilities. EOP can help students with the admission application process and offers academic, social and cultural support. (See also under the Academic Advising and Student Resources chapter.) An admissions application fee waiver and financial aid are available to those individuals with demonstrated financial need. Contact Undergraduate Admissions and Outreach Services for information on obtaining the fee waiver, and contact the Financial Aid Office regarding financial assistance.

To apply for the program, each applicant must complete the regular UC admission application form and complete the appropriate items related to EOP. In addition, the applicant is advised to discuss the reasons for requesting EOP assistance in the required personal statement.

Limited Status

Students in limited status are those whose special attainments qualify them to take certain courses in the university toward a definite and limited objective. To apply for limited status admission, you must either have a bachelor's degree but not be a candidate for an advanced degree, or have completed a substantial amount of college work with a satisfactory grade point average. You must submit an undergraduate application with fee as well as a limited status petition and an official transcripts from all schools attended. As a limited status student you will be expected to maintain a certain scholarship average during a predetermined time of enrollment.

Application filing dates are the same as those for new undergraduate applicants. Fees for limited status students who do not already have a bachelor's (or higher) degree are the same as those for new applicants. You will not be admitted to limited status for the purpose of raising a low scholarship average.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the undergraduate admissions director and the dean of the college.

Enrollment pressures have necessitated closing this category of admission for the College of Engineering and the College of Letters and Science.

Second Baccalaureate

If you have a bachelor's degree substantially equivalent to one that is granted by the University of California, you may be allowed to enroll as an undergraduate seeking a second bachelor's degree. Admission in this category will depend upon a superior academic record and clear evidence of a change in objective.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the undergraduate admissions director and the dean of the college. You must submit an undergraduate application, a second baccalaureate petition as well as an official transcripts from all schools attended, including high schools.

*Enrollment pressures have necessitated closing this category of admission for the College of Letters and Science. The College of Engineering will accept applicants if their first degree is **not** in engineering **and** if they complete the lower division engineering program at a California community college. Admission requires the approval of the undergraduate admissions director and dean of engineering.*

Special Status

The special status classification is for applicants 21 years of age or older who have not had the opportunity to complete a satisfactory high school program or who have not completed a substantial amount of college work, but by reason of special attainment or background may be prepared to undertake certain courses at UC Davis toward a definite and limited objective.

You will not be admitted to special status for the purpose of fulfilling requirements for admission as a regular student. Conditions for admission are determined by the admissions director and are subject to approval by the dean of Agricultural and Environmental Sciences. Admission is for a specified time only and a prescribed scholarship average must be maintained. Application, special status petition, fees and filing dates are the same as those for new applicants.

Enrollment pressures have necessitated closing this category of admission for the College of Engineering and the College of Letters and Science.

ADMISSION CHECKLIST

☐ **1.** Obtain the *Application for Undergraduate Admissions and Scholarship* from your local high school, community college, or a campus of the University of California. If you are not a California resident, request an application from the Undergraduate Admissions and Outreach Services, 175 Mrak Hall, University of California, Davis, CA 95616-8507.

☐ **2.** Complete the application, including the essay, and list the college and major you prefer. Attach a check or money order to cover the application fee with your application materials, and return them in the preaddressed envelope **during the priority filing period for the quarter in which you are interested;** do not attach any other documents.

☐ **3.** **Keep a copy of your application and essay.**

☐ **4.** Keep the notices you receive from both the Undergraduate Application Processing Service and the Undergraduate Admissions offices that acknowledge receipt of your application.

☐ **5.** If you are applying from high school, *do not send* a preliminary transcript unless asked to do so by Undergraduate Admissions and Outreach Services. If test scores are required, please arrange to have these forwarded by the testing agency.
If you are applying as an advanced standing student, arrange to have all official transcripts sent, including high school to the UC campus to which you applied.

☐ **6.** High school applicants for the fall quarter should take the SAT-I or ACT and the three SAT-II tests *no later than December.* We strongly encourage you to complete these tests by the November test date.

☐ **7.** Undergraduate Admissions and Outreach Services may request additional information, such as official transcripts, or confirmation of work in progress. Send this information right away so your application can be evaluated without delay.

Your eligibility for admission cannot be evaluated until all your application materials are received; i.e., application form, filing fee, essay, official transcripts (if required), work in progress, and test scores (if required).

☐ **8.** If you are admitted, keep your admission letter for your records.

☐ **9.** Return your "Statement of Intent to Register" (SIR), "Statement of Legal Residence," Student Address form, and the nonrefundable advance deposit of $100 (if required) as soon as possible, and no later than the date stated on the SIR, so you can be authorized to complete registration.

☐ **10.** After your SIR is received, you will be sent information from the Cowell Student Health Center. Return your completed Medical History and Immunization forms to the Cowell Student Health Center as soon as possible.

FEES, EXPENSES AND FINANCIAL AID

FEES AND EXPENSES

Give careful consideration to the total financing of your university education. If you will need funds beyond those that you and your family can provide, you should apply for financial aid well in advance of enrollment. The deadlines for applying for financial aid (grants, loans, work-study and scholarships) are listed on the following pages.

For details concerning fees and deposits, consult the publication *1997-98 Student Fees and Deposits,* available from the Office of the Registrar. Current fees are also published in the current *Class Schedule and Room Directory,* and on the World Wide Web at: http://www.mrak.ucdavis.edu/budget/index.htm

At the time of registration each quarter, every student must pay the quarterly fees as shown in the box below. (A Registration Fee Deferred Payment Plan, which allows students to pay quarterly fees in three monthly installments, is available.)

Part-Time Students

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 the Nonresident Tuition Fee. Undergraduates file their part-time petition with the Office of the Registrar, 12 Mrak Hall. Graduate students file their petition with Graduate Studies, 252 Mrak Hall.

Undergraduate Student Fees

These are the proposed fees for the 1997-98 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.

	Fall Quarter	Annually
University Registration Fee	$238.00	713.00
Educational Fee	$1,029.00	$3,086.00
Associated Students (ASUCD) Fee	$23.50	$70.50
Memorial Union Fee	$28.50	$85.50
Undergraduate Health Insurance Fee (optional)*	—	—
Student Health Services Fee	$32.00	$96.00
Student Services Maintenance Fee and Student Activities and Services Initiative Fee	$71.50	$214.50
Student Facilities Safety Fee	$22.00	$66.00
Total for full-time California residents	**$1,444.50**	**$4,331.50**
Tuition for nonresidents	2,995.00	$8,984.00
Total for full-time nonresidents	**$4,439.50**	**$13,315.50**
Total for **part-time** California residents	$930.50	$2,788.50
Total for **part-time** nonresidents	$2,428.50	$7,280.50

*Undergraduates may elect to purchase university-sponsored health insurance at regisration. The fee for the 1997-98 academic year is approximately $138.00 per quarter. Foreign undergraduate students and students in the Family Nurse Practitioner and Physician Assistant Programs must participate in the Graduate Student Health Insurance Plan (GSHIP) and pay a Graduate Student Health Insurance Plan Fee of approximately $143.00 per quarter.

The Cal Aggie Marching Band-uh performs its high-energy repertoire at all UC Davis home games.

UC Employee-Student Fees

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the university. Once admitted, the employee-student must file a petition for the reduction in fees before each quarter of enrollment. Employee-students pay one-third of the full-time Registration Fee, one-third of the full-time Education Fee. Employee-students also pay the Memorial Union Fee and the Student Facilities Safety Fee. The fees for employee-students for the 1997-98 academic year are $473.50 quarterly ($1,418.50 annually).

Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is greater. Information is in the Personnel Policies For Staff Members Manual (section 51) available in department offices, at Shields Library or the Staff Development and Professional Services Office. Petitions can be obtained through the employee's unit.

Course Materials Fees

Students may be charged fees in some courses for the use, rental or consumption of materials, tools or equipment, or for the costs of materials or services necessary to provide a special supplemental educational experience. For example, course materials fees may cover the purchase of chemicals and glassware for a science laboratory or of art supplies for an art studio class. They might also cover film rentals, field trips, or the purchase or rental of specific equipment. The campus is currently reviewing the application and extent of such fees.

Graduate and Professional Student Fees

Graduate and professional student fees are listed in the relevant chapters of this catalog.

Motor Vehicle Parking Permit and Bicycle Licensing Fees

Parking permit rates are available at Parking Services or you may call (916) 752-8277.

A California State License fee is required for all bicycles on campus (initial license, $6; renewals, $3).

Costs for a Year at UC Davis

The costs listed below are average costs, and your own living expenses may differ somewhat from these. More information on living expenses can be found in the section on housing or from the Financial Aid Office.

Average Student Costs Annually

Undergraduate

Fees	$4,326
Books and supplies	$858
Housing	$3,812
Food	$1,953
Personal expenses	$1,439
Transportation	$799
Total (off-campus residence)	**$13,187**
Total (on-campus residence)	**$13,525**

Graduate (Single, living off campus)

General	$14,521
Graduate School of Management	$20,521
School of Law (depending upon the year in school)	$21,135 to 18,949
School of Medicine (depending upon the year in school)	$21,695 to 21,412
School of Veterinary Medicine (depending upon the year in school)	$19,534 to 19,684

International Student Expenses

International students are responsible for all of their expenses while studying at UC Davis. The expenses include non-resident tuition, educational fees, room and board and a modest amount for personal expenses. For the 1997-98 academic year, we estimate the cost will be $25,000. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, $25,000 is only a preliminary figure. This minimum allowance may be increased without advance notice.

During the admission process, most international undergraduate students are required to complete the Financial Statement for Students Seeking Nonimmigrant Status form certifying that funds are available for twelve months support. It is very important that students have adequate, reliable, and continuing financial support for the whole time they are here. After students arrive in the United States, it is extremely difficult to obtain additional funding. The university does not offer grants or financial aid to international undergraduate students.

All students need to be aware that there are numerous initial expenses during the first few months, including tuition and fees, an initial down payment for housing, food and personal expenses. We suggest that you bring a minimum of $4,000 for immediate expenses. Careful budgeting is essential for international students.

Cancellation, Withdrawal and Fee Refunds

If you registered for courses and wish to cancel your registration or withdraw from the university, you must complete a Notice of Cancellation/Withdrawal form, available from the Office of the Registrar. Failure to do so may make you liable for fees according to the university refund policy (below). The number of days elapsed is determined from the date the completed withdrawal form is returned to the Office of the Registrar. All of your courses will be dropped automatically when this form is processed.

New Undergraduate Students:

Before Day 1, Registration fees paid are refunded in full except for the $100 acceptance of admission fee.

Day 1 and after, the $100 acceptance of admission fee is withheld from the registration fee and the Schedule of Refunds is applied to the balance of fees assessed.

All Continuing and Readmitted Students and New Graduate Students:

There is a service charge of $10 for cancellation of registration before the first day of instruction. After the first day of instruction the Schedule of Refunds is applied to the total of fees assessed.

Schedule of Refunds

The Schedule of Refunds below applies to all continuing and readmitted students and new students **who do not receive** federal financial aid.*

The Schedule of Refunds refers to **calendar days** beginning with the first day of instruction. Percentages listed (days 1-35) should be applied respectively to Nonresident Tuition, Educational Fee, University Registration Fee, and other student fees. The effective date for determining a refund of fees is the date the student files an official notice of withdrawal with the university, and it is presumed that no university services will be provided to the student after that date.

University Registration Fee, Educational Fee, Nonresident Tuition and other student fees:**

0-1	100%
2-7 days	90%
8-18 days	50%
19-35 days	25%
36 days and over	0%

*New students who receive federal financial aid and withdraw during their first academic term may be refunded fees according to a Modified Fee Refund Schedule, available at the Financial Aid Office.

**Refund Schedule subject to change.

Refund of Health Insurance Fee

If you paid the health insurance fee and you are cancelling your registration before the first day of instruction, you are entitled to a 100 percent refund of this fee. **Undergraduates** must contact the Health Insurance Office at 916-752-2612 to receive the refund. **Graduates** will get an automatic refund from the Accounting Office.

After the first day of instruction, no refund of the health insurance fee will be issued. Any questions regarding the refund of health fees for withdrawals should be directed to the Student Health Center.

FINANCIAL AID

Information:
Financial Aid Office
227 Voorhies Hall
916-752-2390; 916-754-6073 (TTY)
e-mail: undergradfinaid@ucdavis.edu
World Wide Web: http://faoman.ucdavis.edu/

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants and work-study employment. Financing an education is a responsibility that is shared by the student, the parents of dependent students and the Financial Aid Office (through distribution of federal, state and university funds). All students are expected to work to help finance their education.

Financial Aid Deadlines

Priority filing period for grants, loans, work-study and California Student Aid Commission applications for 1998-99	Jan. 1–Mar. 2
Deadline to file for fellowships and graduate scholarships for 1998-99 with Graduate Studies	Jan. 15

Students who miss the March 2 deadline should still apply for financial aid. Even though Cal Grant, scholarship, and work-study funds may be depleted, eligible applicants can receive Pell Grants and Federal Direct Stafford/Ford Loans to help meet their need. The Free Application for Federal Student Aid (FAFSA) is available at local high schools, community colleges and the Financial Aid Office. Continuing UC Davis students and prospective graduate students should obtain the FAFSA from the Financial Aid Office in December.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. See "Scholarships and Awards" at the end of this section for information about scholarship applications.

Graduate students are eligible for most of the same types of financial aid as undergraduates. In addition, graduate scholarships, fellowships, and teaching and research assistantships are administered through Graduate Studies. State graduate fellowships are awarded to students who are pursuing an advanced or professional degree with intent to become college or university faculty members. Applicants must demonstrate financial need and academic eligibility. The awards pay part of the cost of registration fees and are based on undergraduate grades, test scores, parents' educational level and consideration of disadvantaged background and parents' financial information.

Eligibility for most assistance is based upon demonstrated financial need. (However, most scholarships are not based on need.) Eligibility is determined by the following formula: *(1)* the student is assigned a standard budget reflecting the average costs for a student attending UC Davis; *(2)* the student's resources are analyzed according to federal and state regulations; *(3)* the resources and an expected student contribution from work are subtracted from the budget; the remainder is the amount of eligibility. The Financial Aid Office attempts to fill this amount with a combination of grants, work-study, and loans.

The awards for married students are based on the same basic budget plus the addition of a standard child care allowance, unless documentation is provided about a spouse who is unable to work, in which case a dependent living allowance will also be awarded. Single parents' awards are based on the single student's budget and a child care allowance. If single parents' resources (earnings and benefits) are not sufficient to meet the basic living expenses of their dependents, a standard dependent living allowance may be awarded upon receipt of documentation.

Satisfactory Academic Progress. Federal regulations require that financial aid recipients meet the published Standards for Satisfactory Academic Progress for Financial Aid concerning units, grade point average and maximum quarters of attendance allowed to obtain a degree. A copy of these standards is available at the Financial Aid Office. Review the policy in detail and discuss it with your academic adviser.

For more information, contact the Financial Aid Office. Regulations and deadlines are subject to change.

Types of Financial Aid

Grants

A grant is a gift that does not have to be repaid as long as the student remains eligible. Whenever criteria and funding levels permit, a student's financial aid award includes grants.

Federal Pell Grants. All undergraduate financial aid applicants are required to apply for a Federal Pell Grant each year by following the instructions in the financial aid application packet. Recipients must be enrolled at least half time and must maintain good academic standing and make satisfactory academic progress. Eligibility is determined by the federal government according to a formula developed by the Department of Education and approved annually by Congress. All applicants are notified via a "Student Aid Report" (SAR). The amount you receive depends on your financial need.

Cal Grants are awarded by the California Student Aid Commission and may be renewed each year. All undergraduate financial aid applicants who are California residents are required to apply for one of these awards. Follow the instructions in the financial aid application packet.

Cal Grant A awards are based on financial need and academic achievement. Recipients must complete at least 36 units per academic year. Cal Grant A pays partial registration fees.

Cal Grant B awards are based on financial need and are for entering undergraduate students primarily from low-income backgrounds. Recipients are required to complete at least 12 units each quarter. Cal Grant B pays a quarterly stipend for living expenses for first-year students, and a portion of the registration fees plus a quarterly stipend for living expenses for students in their second through fourth years.

University Grants are available to both graduate and undergraduate students. The maximum varies each year depending on funds available.

Educational Opportunity Program (EOP) Grants are restricted to undergraduates.

Supplemental Educational Opportunity Grants are awarded on the same basis as University Grants. They are available to U.S. citizens or permanent U.S. residents who are at least half-time students and who demonstrate exceptional financial need while pursuing their first undergraduate degree.

Bureau of Indian Affairs (BIA) Grants are awarded to students who are at least one-fourth American Indian, Eskimo or Aleut as recognized by a tribal group served by the Bureau of Indian Affairs and who show financial need. Applicants must submit a Free Application for Federal Student Aid (FAFSA) and provide supporting documents. Write to the agency that administers your tribal affairs and request a BIA Higher Education Assistance application. The BIA Financial Aid counselor on campus can help you complete the application. The amount of BIA grant depends on need and availability of funds at each BIA agency.

Loans

Financial Aid almost always includes a long-term loan. Repayment of these loans (with the exception of Federal Direct Unsubsidized/Federal Direct PLUS loans) begins after you graduate or withdraw from school. Students are encouraged to work as much as possible (while remaining full-time students) and to develop modest personal budgets to keep final loan indebtedness within a manageable range.

Federal Perkins Loans are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of student's need because of demand and limited funds. Repayment starts six to nine months after graduation or withdrawal from school and may be extended over 10 years. Additional deferments are possible for temporary total disability or volunteer service in a private, non-profit organization, VISTA or the Peace Corps. Some teachers of students from low-income families and full-time teachers of handicapped children may also qualify for partial loan cancellation.

- $3,000 undergraduate annual loan limit
- $15,000 undergraduate maximum loan limit
- $30,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)

Health Profession Student Loans (HPSL) are awarded to students in the Schools of Medicine and Veterinary Medicine who demonstrate exceptional financial need. Parental income information is required for all applicants regardless of age and dependency status. HPSL borrowers must commit themselves to complete a primary care residency program, and practice in a primary care field until their HPSLs are repaid.

- $2,500 plus fees maximum for veterinary medicine and first-year medical students
- $3,333 plus fees maximum for medical students in the second, third or fourth year of study
- 5 percent interest
- Repayment begins twelve months after receipt of the degree or withdrawal

Federal Direct Subsidized and Unsubsidized Stafford/Ford Student Loans (Direct Loans) are available through the Financial Aid Office. Subsidized loans are based on financial need, and interest accrued while the student is in school is paid by the federal government. Unsubsidized loans are available to students regardless of income and assets, and there is no interest subsidy. Students are advised to speak with a Financial Aid officer before borrowing an unsubsidized loan.

The campus radio station, KDVS 90.3 FM, offers an eclectic mix of music, sports and public affairs broadcasting from the basement of Freeborn Hall.

- Undergraduate students may borrow up to annual maximums of $2,625 for freshmen, $3,500 for sophomores, and $5,500 for juniors and seniors, up to a maximum aggregate indebtedness of $23,000.
- Independent undergraduate students may borrow unsubsidized Direct Loans up to annual maximums of $4,000 for freshmen and sophomores, and $5,000 for juniors and seniors.
- Graduate and professional students may borrow up to $8,500 per year, not to exceed a maximum aggregate of $65,500 for combined undergraduate and graduate borrowing.
- Graduate and professional students may borrow unsubsidized Direct Loans up to an annual maximum of $10,000.
- Variable interest rate is adjusted annually, capped at 8.25 percent.
- Repayment begins six months after graduation or withdrawal.

Federal Direct Parent Loans for Undergraduate Students (Direct PLUS) are government-insured loans that are made to parents of dependent students.

- Parents may borrow Direct PLUS up to the cost of education minus other financial aid received during the years the dependent student is an undergraduate.
- The maximum interest rate is 9%. There is no interest subsidy for this loan.
- Repayment begins within 60 days after loan disbursement.

Short-Term Loans meet temporary or emergency financial needs of registered students. Loan funds are provided by UC Davis alumni, ASUCD, the Cal Aggie Foundation, the Regents of the University of California, and private donors.

- Emergency Loans: $200 maximum. The maximum repayment period is 30 days.
- Short-Term Loans: $300 maximum. The maximum repayment period is five months or the end of the academic year.
- Assistant Loans: graduate students who are in the teaching assistant, research assistant, associate-instructor or postgraduate researcher classifications can apply for a maximum of one month's salary. The maximum repayment period is six months or the end of the academic year.

For information about how to apply, applications are available in the display rack on the first floor of Voorhies Hall. Application procedures vary slightly during the registration cycle of each quarter. Check the Short-term Loan bulletin board outside 116 Voorhies Hall for instructions.

Work-Study

Information:
Student Employment Center
16 South Hall
World Wide Web: http://jobs.ucdavis.edu

College work-study programs enable students to earn part of their financial aid through part-time employment. To participate, you must first receive work-study as a part of your financial aid package. Your work-study award offers you both money for your education and work experience. You should obtain a work-study job or ask to defer your work-study before October 31 (and again before January 31, if needed) or your award will be canceled. The Student Employment Center coordinates all undergraduate college work-study programs.

Work-study funds for graduate students are allocated directly to the chairpersons of the graduate programs or departments. Graduate students seeking work-study funding should contact their respective departments for further information.

Federal College Work-Study Program is funded by the federal government. Employment may be on or off campus with profit or nonprofit organizations. Many community service work-study jobs are available that can provide you with an educational and rewarding work experience. To be eligible, you must be a citizen or permanent resident of the U.S., carry at least a half-time academic course load, and maintain minimum academic progress.

California State Work-Study is funded by the state, and employment may be with profit or nonprofit organizations. The employment must be educationally beneficial or related to a particular career interest or the exploration of a career option. To be eligible, students must meet the requirements for federal student aid eligibility and be California residents.

University Work-Study is funded by the University of California, and employment is limited to jobs on campus.

UNDERGRADUATE SCHOLARSHIPS AND AWARDS

Information:
Scholarship Office
228 Voorhies Hall
916-752-2804; e-mail: ugscholofc@ucdavis.edu

Mailing address:
Scholarship Office
University of California
Davis, CA 95616-8696

UC Davis recognizes exceptional students with scholarships awarded on the basis of academic excellence and exceptional promise. The Scholarship Office administers approximately 200 different undergraduate scholarships. Many more scholarships are handled through outside agencies.

Scholarship recipients are chosen by committees made up of both students and faculty. In addition to academic records (a minimum grade point average of 3.25 is required), selection may be based on letters of recommendation, test scores, and a personal essay in which your university goals and objectives are stated. *Some awards are limited to students in specific majors or colleges, residents of certain geographical areas, students of a particular class standing, or students with demonstrated financial need.* Most scholarships are not renewable and you must re-apply each year for scholarship aid.

Students applying to the university for the fall quarter are considered for scholarships using the same forms completed for admission purposes. Winter and spring quarter admission applicants should contact the Schol-

No matter what your mode of transportation, Davis' flat terrain makes it easier to make tracks.

arship Office for instructions no later than November 1. Continuing students should obtain scholarship applications from the Scholarship Office in October. These applications are due in early December. Announcement of winners is usually made beginning in April.

Graduate students are also eligible for various scholarships and fellowships. (See the Graduate Studies chapter.)

Regents Scholarships, among the highest honors that undergraduates at the university can receive, are granted to exceptionally promising freshmen or juniors enrolling in the fall quarter. Awards may be honorary (a $1,000 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs. These scholarships are renewable as long as you maintain a 3.25 grade point average.

- Dollar amounts vary—up to full financial need
- 2-year and 4-year renewable scholarships

Alumni Scholarships, provided by the Alumni Association in cooperation with the university, are based primarily upon leadership and scholastic achievement. Your financial need and extracurricular activities may also be considered.

- $1,000 maximum
- New undergraduates only
- Selection by local Alumni Association chapters

Military Scholarships are awarded to outstanding high school seniors without regard to financial need, as well as to UC Davis students who have demonstrated exceptional leadership and scholastic achievement during their freshman and/or sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UC Davis scholarship students participate in the Military Science (ROTC) Program. Information and applications are available from the Department of Military Science, 125 Hickey Gymnasium, 916-752-0543.

- Full fees, books and supplies
- $1,000 per year for miscellaneous expenses
- 1-, 2-, 3-, or 4-year scholarships

Other Scholarships are made possible by individual donors, private corporations, and various agencies. Many organizations and groups conduct their own scholarship programs. In most cases, you apply directly to these sponsoring groups.

- Generally $100 to $3,200

Special Prizes at UC Davis recognize outstanding performance, achievement and promise in special programs or majors. The most prestigious prize is the University Medal, presented to the most outstanding graduating senior.

- Plaques or certificates and cash awards
- College and school medals to outstanding graduates

STUDENT LIFE

LIVING AT DAVIS

Residence Halls

Information:
Student Housing Office
916-752-2033; e-mail: housing@ucdavis.edu
World Wide Web: http://www.housing.ucdavis.edu

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 3,600 undergraduate and graduate students do just that. Students and professional staff in each of the residence hall complexes help create and maintain an environment conducive to personal growth and educational achievement. About 90 percent of the freshman students live in residence halls. Twenty-five percent of the transfer students elect to live in a residence hall environment. All new freshmen whose Statements of Intent to Register (SIR) are received on time are guaranteed residence hall housing as long as they complete all of the instructions that accompany their contracts. Graduate students will be offered contracts on a space-available basis in Lysle Leach Hall.

The total room-and-board rate for the 1997-98 academic year is $5,540–$6,255 for a double-occupancy room and $6,130–$6,845 for a single room (of which there are very few available to new residents). Cost depends on which of the six meal plans you choose. Rooms are furnished with a bed, desk and chair, bookcase, chest of drawers, study lamp and bulletin board for each resident.

If the Davis campus is your choice, the Student Housing Office mails necessary housing information with your admissions letter. If you have a physical disability that requires special housing accommodation, please send a detailed letter of explanation to the Housing Residential Services Office, Room 160, Student Housing Office, at the time you return your Statement of Intent to Register. Your housing contract will be mailed to you between May 15 and July 15. At that time you will be able to choose your meal plan.

Student Family Housing

Information:
Orchard Park/Solano Park Apartments
916-752-2033

Orchard Park and Solano Park Apartments offer 476 university-operated, furnished and unfurnished on-campus apartments for UC Davis student families. The monthly rates for the 1997-98 academic year will be as follows:

- Orchard Park
  two-bedroom unfurnished apartment, $518
  two-bedroom furnished apartment, $551
- Solano Park
  one-bedroom unfurnished apartment, $417
  two-bedroom unfurnished apartment, $473

Vacancies in Orchard Park/Solano Park Apartments are filled from a waiting list based on the date the application is received. For a fall assignment, you should apply at least six to nine months in advance. For an assignment during the remainder of the year, the waiting period is usually shorter. (You may submit an application before you are admitted to the university and before you are married, but you must show documentation of your student or parental status before occupancy can be granted.) If a member of your family has a physical disability that requires special housing accommodation, please attach a detailed letter of explanation to your application.

Rain doesn't keep students away from the Coffee House, where the daily fare includes everything from bagels and pizza to sushi and veggie chili.

Russell Park

Information:
916-753-7322

Privately owned and managed on-campus living accommodations are available for student families. Russell Park features one-, two-, and three-bedroom unfurnished units.

Graduate Student Apartment Housing

Information:
The Atriums
916-753-0659

The Atriums offers on-campus living accommodations for single graduate students. The *privately owned and managed* apartments feature studio and two-bedroom unfurnished units.

STUDENT SERVICES

Student Health

Information:
Cowell Student Health Center
916-752-2300

The services of Cowell Student Health Center are made possible, in part, by the Student Health Services Fee. As an enrolled student, you are eligible to use the Health Center from the first day of the quarter through the last day of the quarter or to the date of official withdrawal. Some of the Health Center services and facilities are: general outpatient care; regularly scheduled clinics; X-ray, laboratory and pharmacy services; physical therapy; and Women's Clinic. The Health Center currently does not provide services for dental problems.

Health Center services are available to students' dependents on a fee-for-service basis. Also, you may purchase a Health Insurance Plan at the Health Center for your spouse and children.

Health Insurance. Graduate, professional and international students must purchase a mandatory insurance plan as part of registration. Undergraduate students have an opportunity to purchase a voluntary plan. For more information, you may call 916-752-2612 or visit the Patient Accounts Office at Cowell Student Health Center.

Child Care

Information:
260 Student Housing Office
916-752-5415
e-mail: baashby@ucdavis.edu
World Wide Web:
Child care: http://www.housing.ucdavis.edu/general/child.htm
Breastfeeding: http://www.housing.ucdavis.edu/html/bpump.htm

Need help with child care? **Student Housing/Child Care Services** is the principal resource on campus for child care information and referrals. The office distributes child care publications, coordinates an information network among campus units, and serves as the university's liaison with the on-campus day care centers (LaRue Park Children's House, Russell Park Child Development Center), and City of Davis Parks and Community Services/Child Care. Additional services include client advising and grievance counseling.

The following programs are available on campus and in the community.

On-Campus Child Care Programs

- **LaRue Park Children's House** and **Russell Park Child Development Center** are privately owned and operated child care centers on the UC Davis campus serving infants through kindergarten-age children. Residents of Russell Park, Orchard Park, and Solano Park student family housing pay reduced rates. Student Housing/Child Care Services administers the contracts and oversees the programs.
  Information: LaRue Park Children's House, 916-753-8716, e-mail: laruepark@ucdavis.edu; Russell Park Child Development Center, 916-753-2487, e-mail: jonhillis@ucdavis.edu
- The **Center for Child and Family Studies** is a teaching and research laboratory for the Department of Human and Community Development. Four different part-time programs accommodate children from the ages of six months to five years, following the UC Davis academic calendar. The center is located on campus, and student families pay reduced tuition. Children are selected from a waiting list according to criteria designed to meet academic goals.
  Information: West House (office), 916-752-2888
- **Cooperative playgroups** are sponsored by the student family housing parents' associations of Orchard and Solano Parks. Each program may serve up to 15 children aged 2 to 5 years.
  Information: 916-759-0146
- **The Perfect Tender Infant Care Cooperative** serves infants under twelve months of age whose parent(s) attend the School of Law.
  Information: 916-752-0243

On-Campus Family Support/Resources

- Student Housing/Child Care Services and the Division of Human Resources and Risk Management sponsor the UC Davis **Breastfeeding Support Program,** which provides lactation sites with electric breast pumps, registration and orientation sessions, and sales of breastfeeding supplies for mothers who wish to continue breastfeeding their infants after returning to school or work.
  Information: 260 Student Housing Office , 916-752-5415, e-mail: baashby@ucdavis.edu; World Wide Web: http://www.housing.ucdavis.edu/html/bpump.htm
- The Women's Resources and Research Center sponsors the **Child Emergency Notification Service,** which provides schools and child care providers a means of contacting student parents if they are in class at the time of a health-related emergency involving their child. This service is available to all student parents and requires in-person registration each quarter. It is intended as a back-up if the school or child care provider cannot reach the primary emergency contact.
  Information/registration: 10 Lower Freeborn, 916-752-3372
- The **Community Housing Listing Service/Child Care Binder** addresses the need for part-time, evening, weekend and mildly-ill arrangements. Parents seeking license-exempt child care can publicize their needs and providers seeking employment can advertise their availability for a small monthly fee.
  Information: 252 South Silo, 916-752-4699
- The **Student Employment Center** posts job listings of parents wishing to hire child care providers.
  Information: Basement, South Hall, 916-752-0520
- The **Financial Aid Office** can assist student parents who qualify for financial aid with allowances for direct child care costs.
  Information: Financial Aid Information Desk
  125 University House Annex, 916-752-2390

Community Child Care Programs

Information and application:
City of Davis Parks and Community Services/Child Care
604 Second Street
Davis, CA 95616
916-757-5691
World Wide Web:
http://city.davis.ca.us/city/parks/ccare/caremain.htm

City of Davis Parks and Community Services/Child Care maintains information on licensed family child care homes, day care centers, nursery schools, playgroups and other family-related services for Yolo County. Additional services include parenting workshops and handouts; a bimonthly newsletter; a parenting resource library; and a book, video and toy lending library. Funded jointly by UC Davis, the City of Davis and the California Department of Education, the program provides referrals to licensed family child care homes and administers the following child care subsidies.

- The **UC Davis Registration Fee Child Care Subsidy Program** provides partial child care subsidies to full-time students. Spouses must also be attending school and/or employed full time. Special needs situations will be considered on a case-by-case basis. Eligibility is based on low to moderate family income, with awards determined through a lottery each fall. Parents may choose from licensed family child care homes and day care centers.
- The **Child Care Grant Program,** funded through the California Department of Education, can help low-income families pay for child care through a variety of

subsidies. Eligibility requirements and choices of child care settings vary with each program, but all parents need to be employed, in school or seeking employment, and all care must be provided within Yolo County. Parents may be required to pay a fee on a sliding scale. Admittance is based on income and priority guidelines set by the state and federal government. A waiting list is maintained for all programs, with applications accepted year round.

Student Employment

Information:
Student Employment Center
16 Basement, South Hall
916-752-0520
World Wide Web: http://jobs@ucdavis.edu

The Student Employment Center, through a referral system, provides employment opportunities to students on campus, in the city of Davis and in adjacent communities. Students who are enrolled in a full-time or part-time degree program, students on PELP, students' spouses, and students with a letter of acceptance for the following quarter who have not yet registered are eligible.

Full-time, part-time and temporary jobs are available during the school year and vacation periods. New listings are posted daily. Listings of employment opportunities for the summer with government agencies, camps and resorts throughout California are located at the center. The Center sponsors a Summer Job Fair in March. Students are encouraged to attend the fair and to begin looking in early March for summer jobs. Registered students can check the World Wide Web address given above for the list of all off-campus positions.

Offers of employment are conditional, subject to proof of identity and U.S. citizenship or your right to work in the U.S., as required by federal law (Immigration Reform and Control Act 1986).

Transportation and Parking

Information:
Transportation and Parking Services (TAPS)
Extension Center Drive
916-752-8277
Motorist Assistance Program: 916-752-3729
Bicycle Program: 916-752-BIKE

Bicycles. All bicycles operated or parked on campus must have a current California State Bicycle License. Licenses and renewal tags can be obtained at TAPS. Regulations pertaining to the operation and parking of bicycles are strictly enforced.

Parking. If you park a vehicle (including a motorcycle or moped) on the Davis campus, you must have a valid parking permit or pay at a meter. Daily permits may be purchased at dispensers in any Visitor/Public (VP) parking lot. Long-term permits are required for all other lots, and may be purchased at Parking Services. Parking lots on campus are financed solely by fees collected from parking permits and meters.

Visitor parking information is available at the South Gate Kiosk on Old Davis Road. Parking regulations are enforced Monday through Friday, 7:00 a.m. to 10:00 p.m. during the academic year (September 15 through June 15) and 7:00 a.m. to 5:00 p.m. during the summer (June 16 through September 14).

During business hours, the Motorist Assistance Program provides complimentary services, including lockout service, inflation of flat tires, battery jump service and, if you're out of gas, a gas can and a ride to the nearest gas station.

Ridesharing. UC Davis encourages ridesharing. For information on transportation alternatives to the Davis campus, call 916-752-MILE or visit TAPS. Alternatives include carpooling and vanpooling (registered pools receive reduced parking rates as well as preferential parking), public transit, commuter match assistance and shuttle systems.

Shuttles. The UCD/UCDMC Shuttle provides hourly service between the Davis campus and the medical center in Sacramento. The shuttle operates Monday through Friday and is available to all members of the UC Davis community.

The Intracampus Bus provides transportation between the Davis campus and the Berkeley campus for university employees, registered students and other university affiliates. Call Fleet Services at 752-8287 for schedule information and reservations.

Buses. Unitrans, 13 bus lines operated by the Associated Students, serves the campus and city year round. Undergraduate students ride by showing a valid registration card. Others ride by paying a cash fare or purchasing tickets or passes at TAPS or the Campus Box Office. Full service is provided each UC Davis school day (Monday through Friday) and Monday through Thursday night during the regular school year—fall, winter and spring quarters. Reduced schedule bus service operates during the summer, finals week, all academic break periods and on Saturdays. Schedules are available at the MU Information desk, bus terminals, City Hall and the Unitrans office.

RECREATION AND THE ARTS

Whatever your recreational bent—horseback riding, outdoor activities, listening to music, arts and crafts, bowling, swimming or sports—there's a place or program on the Davis campus where you can enjoy your favorite activities.

Memorial Union and Campus Recreation

Information:
Memorial Union Programs and Campus Recreation
Lower Freeborn
916-752-1730; World Wide Web:
http://www-bookstore.ucdavis.edu/CR/recreation1.html

Memorial Union Programs and Campus Recreation at UC Davis provide the community with numerous choices for social, physical, creative, intellectual and cultural expression. These programs complement the academic mission of the university, enhance the quality of life for the campus, and provide many healthy activities to offset the stresses associated with a rigorous academic environment. Facilities and programs such as those listed below will help you balance the academic demands at UC Davis with your leisure interests. A catalog of recreational activities is published quarterly, mailed to all residences in Davis and distributed throughout campus.

Outdoor Adventures

The Barn (on the corner of California and Hutchison)
916-752-1995/1730

Outdoor Adventures will help you develop your outdoor skills and plan your outdoor excursions. You can rent equipment of professional quality and arrange for custom-designed trips and group rates. An up-to-date library contains topographic maps, trail guides and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, whitewater rafting, kayaking, sea kayaking, mountaineering, cross-country skiing and other sports are offered throughout the year. Outdoor experts conduct many special activities, such as wilderness emergency-care clinics, whitewater river guide training, slide presentations and programs. Stop in and share your own outdoor experiences.

Equestrian Center

Garrod Dr. (southwest of Veterinary Medical Teaching Hospital)
916-752-2372/1730

The Equestrian Center is open all year round, providing trail rides, practice sessions and instruction in both English and Western riding. Group and private lessons are available for beginning through advanced levels, along with training in horse care and stable management. The Equestrian Center sponsors clinics, horse shows, summer equestrian camps and special events, and also coordinates the Equestrian Club for student participation.

Craft Center

South Silo
916-752-1475/1730

The Craft Center is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or purchase a pass for more frequent use of the equipment and work space. Workshops and classes are offered each quarter in woodworking, weaving, jewelry-making, art and graphics, computer imaging, ceramics, photography, silkscreen printing, welding, leatherworking, stained glass and other crafts.

Recreation Swimming Pool

Corner of La Rue Road and Hutchison Drive
916-752-2695 or 916-752-1995/1730

The Rec Pool is a large free-form pool with a separate wading pool, a bathhouse, shuffleboard courts and a large grass area for sunbathing. The staff offers swimming lessons to all age groups and arranges for special events, such as "family nights." The pool opens for the season in April and closes in October.

The Games Area

Games Area (located below the UCD Bookstore)
916-752-2580/1730

The Games Area is a recreational facility with a bowling center, billiards room, video arcade, lounge and storage lockers. The Games Area conducts bowling leagues, classes, clinics and tournaments for all ages from beginning through advanced skill levels. The facility is fully accessible to those with disabilities.

The Memorial Union (MU)

MU Campus Information Center
916-752-2222; e-mail: infocenter@ucdavis.edu

The MU complex serves as the community center for the campus. First-floor facilities include the UCD Bookstore, Corral gift shop and the Coffee House. The **MU Campus Information Center's** student staff can refer you to people, places, programs and services on and off campus, maintains an up-to-date database of 1,200 organizations, and takes reservations for the use of tables and display boards in and around the MU.

On the second floor, the **King Lounge** features music listening and periodicals in a comfortable and relaxed atmosphere popular for studying. Adjacent to King Lounge, are the **MU Art Gallery** and **Music and Periodicals Center** (916-752-2885/1730). *(The MU Art Gallery and Music Periodical Center will be closed for seismic renovation until spring of 1998.)* The gallery features a changing series of contemporary and historical art exhibits throughout the school year, sponsors print sales, special programs and lectures, and internships for those interested in career work in an art gallery or museum. The Music and Periodicals Center provides current periodicals for leisure reading and has a large library of music for your listening pleasure. The MU II Conference Center completes the second floor.

Freeborn Hall is a 1,250-seat assembly hall in the MU complex used for performing arts, dances, banquets, lectures and conferences. The Campus Box Office, where you can purchase tickets for campus events and cash checks, is outside Freeborn.

The Memorial Union is undergoing seismic renovation until the spring of 1988. With the tower portion of the complex closed, the Coffee House is best reached by walking around Freeborn Hall and entering from the west or south side. The Freeborn Courtyard allows access to the Games Area, Bookstore, Freeborn Hall, the Campus Box Office and the east corridor. The MU Campus Information Center (752-2222) has up-to-date information about the construction schedule, including temporary room closures and office relocations.

The administrative offices of ASUCD and the Student Programs and Activity Center are temporarily located in South Hall. Student Judicial Affairs is in North Hall and Campus Events and Visitors Services (CEVS) and the MU Business Office are in Lower Freeborn. Four rooms are available for reservation (call CEVS for information): East Conference Room and Room 5 are reservable anytime, while Fielder and Smith are available after 4:30 p.m. and are limited in access and capacity.

The Memorial Union has several facilities that can be rented for group gatherings. With its rustic wood-paneled interior and ceiling-high windows, **Rec Pool Lodge** is an ideal location for meetings, lectures or dances. The covered patio surrounding the lodge offers a lovely, shaded environment for outside dining during the warm weather months. **Putah Creek Lodge,** secluded in the Arboretum, provides a relaxing atmosphere for lectures, banquets, weddings or dances. The spacious lawn surrounding the lodge is suitable for volleyball and games, receptions and picnics. The lodge has kitchens and outdoor barbecues.

Silo Union

The Silo Union offers food services, meeting/conference facilities, lounges and the campus pub. The **South Silo** houses the ASUCD Experimental College (916-752-2568), Student Special Services (916-752-2007), Gradu-

ate Student Association (916-752-6108) and a branch of the Bookstore serving the School of Law (916-752-2961). If you would like to reserve space in the Silo for a meeting, social event or conference, call Campus Events and Information at 916-752-2813.

Recreation Hall

Information:
Entrance 1B
916-752-6074

Recreation Hall is a multi-use facility for intramural and informal recreation play, intercollegiate athletic basketball and women's gymnastics, physical education classes and sports clubs. Numerous special events sponsored each year by the campus and community are held in the 8,400-seat arena. The tri-level facility has locker rooms; a flat running track; an equipment room; racquetball, wallyball and squash courts; two weight rooms with free weights, universals, hydraulic machines, stair machines, rowing machines and bicycles; court areas for basketball, volleyball and badminton; and areas for martial arts, table tennis, gymnastics, aerobics and dance. A state-of-the-art artificial rockclimbing wall is available for climbers of all skill levels under the supervision of Outdoor Adventures. The Special Events Room can be reserved for meetings by calling the Campus Events and Information Office.

Undergraduate students can use Rec Hall facilities by showing their current valid photo ID card. Graduate students must pay a $5.00 per quarter activity fee. Students may also purchase a $6.00 guest pass valid for three people. Non-students may purchase a daily, monthly, quarterly or yearly privilege card at Rec Hall to use lockers, equipment and facilities. Prices are available at the Recreation Hall Equipment Room.

Recreation Hall is surrounded by an outdoor fitness cluster on Orchard Field, the in-line skate facility on La Rue Road just north of the Rec Pool, and the volleyball and basketball courts west of the Segundo residence hall complex. While these courts are primarily for student use, they are also available to the general community. The courts cannot be reserved and are available on a first-come, first-served basis.

Intramural Sports/Sports Clubs and Intercollegiate Athletics

Information:
IM Sports/Sports Clubs
140 Rec Hall
916-752-3500

Intercollegiate Athletics
264 Hickey Gymnasium
916-752-1111

Intramural Sports, Sports Clubs and Intercollegiate Athletics programs provide organized sports competition and physical recreational activities across the broad spectrum of students' physical abilities. Together, these offices offer a coordinated program of sport opportunities to meet student needs at every level of skill and interest.

The Intramural Sports office provides a structured, competitive program involving 36 men's, women's and coed activities with over 13,000 participants. Complementing this highly popular sports arena is the diverse sports club program. A total of 23 recreational and competitive offerings attract approximately 1,000 athletes in activities ranging from archery, badminton, crew, horse polo, and water and snow skiing, to the traditional volleyball, lacrosse, rugby and equestrian events.

Although Intercollegiate Athletics at Davis benefits the campus by creating *esprit de corps*, its primary role is to provide personal development opportunities for as many non-scholarship student-athlete participants as facilities and resources permit. Currently, the program consists of varsity teams in 11 men's sports and 12 women's sports. Membership affiliation is with the Northern California Athletic Conference and Division II of the National Collegiate Athletic Association. Approximately 650 students compete on varsity teams each year.

The Arts

Whether you want to participate, be entertained or be inspired, an abundance of creative, musical, theater, art, design and dance offerings are happening on campus all year long.

UC Davis Presents

Information:
200 B Street, Suite A
916-757-3199
World Wide Web: http://www-presents.ucdavis.edu

UC Davis Presents brings a wide variety of world-class performing artists to UC Davis to serve both the campus and surrounding communities. During the academic year, UC Davis Presents offers concerts and recitals by classical, jazz and folk music artists; drama; classical, modern and ethnic dance; and lectures by eminent public figures.

You'll find annual and quarterly brochures and promotional flyers on all events sponsored by UC Davis Presents at the Campus Box Office and at the UC Davis Presents office. Bulletin boards, kiosks, the student radio station KDVS and the *California Aggie* announce upcoming events. Tickets for UC Davis Presents events may be purchased at the Campus Box Office (Freeborn Hall, 916-752-1915) or any BASS/TM outlet.

Music

Information:
Department of Music
916-752-5537

The Department of Music sponsors the UCD Symphony Orchestra, Chorus, Chamber Singers, Early Music Ensemble, Gospel Choir, Concert Band, Jazz Band and small ensemble groups. Music majors and other interested students can receive credit for participating in these groups, which perform at concerts and recitals open to the university community. The department sponsors, for one quarter each year, an artist-in-residence who gives concerts, recitals and lectures. Free noon concerts featuring individual performers and ensembles—both professional musicians and music students—are a favorite weekly event during the school year. The Empyrean Ensemble and the UCD Wind Quintet are in residence on campus. The Department of Music sponsors nearly 100 public concerts each year.

Drama

Information:
Department of Dramatic Art
916-752-0888

The Department of Dramatic Art has one of the finest theater facilities in California, with an unusually good stock of scenery, props, costumes and state-of-the-art lighting and sound equipment. The excellent faculty, the Granada Artists-in-Residence program (which brings a major British director to the department each quarter), and the graduate students working on Master of Fine Arts (M.F.A.) degrees in acting and Ph.D. degrees in 20th Century Performance and Culture, all contribute to the professional quality of UC Davis drama and dance productions and programs.

Each year's schedule includes University Theatre Season (five major productions of established plays); Dance Collage (a collection of student and faculty choreographed dance numbers); and Studio Season (four to six productions). Studio Season features premiere performances of new plays written at UC Davis, productions of established plays, and performance projects conceived and produced for the first time at UC Davis. Studio Season productions are held in the smaller department theaters and typically are produced entirely by students. The final production each year is the Undergraduate Playwright's Festival, a collection of three or four one-act plays written by undergraduates and produced for the first time. These productions are part of the academic program of the department and serve an important purpose in the study of dramatic art. Participation is open to all students.

Art Galleries

A tour of all the UC Davis art galleries will take you from one corner of the campus to the other. **The MU Art Gallery** (second floor of the MU; 916-752-2885) features a series of changing contemporary and historical art exhibits during the school year. Works by professional artists as well as students are on display for periods of six weeks. (The gallery is closed until spring 1998 due to the MU seismic renovation.)

The **Design Gallery** (first floor of Walker Hall; 916-752-4139) is an innovative space known for its exciting exhibitions of design-related material. Changing presentations and installations of architecture, interiors, graphics, costumes, textiles, folk art and the annual Student Show and Picnic Day Exhibition reflect the interests of the design program. Hours during exhibition periods are noon to 5:00 p.m. Monday through Friday, 2:00 to 5:00 p.m. Sundays, and closed on holidays.

The Art Building houses three galleries. The **Richard L. Nelson Gallery** (first floor; 916-752-8500), named in honor of the first chair of the Department of Art, organizes regularly changing exhibitions of historical and contemporary works of art. The gallery's program reflects and complements the teaching program of the Department of Art and brings art to the university community and the Northern California area at large. Hours during exhibition periods are noon to 5:00 p.m., Monday-Friday, and 2:00 to 5:00 p.m. Sunday.

The **Fine Arts Collection** (adjacent to the Nelson Gallery; 916-752-8500), representing various historical periods and cultures, is the Davis campus's major collection of art. Selected works are available for viewing weekday afternoons.

The **Basement Gallery** (Art Building basement) is a student-directed gallery that exhibits the artwork of advanced UC Davis art majors. The exhibitions change biweekly throughout the academic year. Hours are 9:00 a.m. to 4:00 p.m., Monday through Friday.

Hart Hall is home to the **C.N. Gorman Museum** (first floor; 916-752-6567, Native American Studies). The museum was established in honor of Carl N. Gorman, an artist, advocate and former faculty member of Native American Studies. The museum features changing exhibitions of works by Native American and diverse artists. Selections from the permanent collection of art are also exhibited on a rotating basis throughout the year. Hours are noon to 5:00 p.m., Tuesday through Friday, and by appointment.

STUDENT GOVERNMENT

Associated Students (ASUCD)

Information:
Senate Office
Basement, South Hall
916-752-3632

ASUCD Main Office
Basement, South Hall
916-752-1990

The Associated Students of the University of California, Davis (ASUCD), authorized by the regents and the chancellor, represents all undergraduate students. Graduate and law students also have access to all ASUCD commercial activities. Funds allocated to ASUCD provide activities and services that will make life as a student a little easier, less expensive, or just more fun.

The student government budgets the allocated funds each year through its senate. Based on a modified federal form of government, the Senate consists of 12 elected senate members and the ASUCD president and vice president. The Senate is the policy-making body for ASUCD and supervises all aspects of the association. The ASUCD president is the chief administrative officer for ASUCD and is assisted by the vice president who serves as the executive aide. ASUCD is the liaison for the undergraduate student body and represents the students with other universities, the UC Office of the President and the regents.

Six **commissions** are subordinate advisory bodies of the Senate and assist the governing board with its decisions by researching legislation and making recommendations. Commission chairs are *ex officio* members to the Senate. Each commission also involves itself with various projects that relate to their specific area.

- External Affairs deals with off-campus concerns (the regents, UC Office of the President, etc.).
- Internal Affairs recommends policies to improve the quality of nonacademic student life on campus.
- Academic Affairs acts as an advocate for student rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure and teacher evaluations.

- Business and Finance makes recommendations to the Senate on all financial matters.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UC Davis' ethnic community, for establishing liaison and achieving rapport with on-campus and off-campus bodies affecting ethnic students and their quality of life while at the university.
- Environmental Policy and Planning addresses all issues and concerns that pertain directly to the campus environment.

The **judicial branch** authority is vested in the Supreme Court. The court reviews legislation at the request of any ASUCD member and has the ultimate authority to interpret the ASUCD constitution.

ASUCD operates more than forty activities and services for UC Davis students. Information about these services can be found in the *Student Directory,* which combines details about ASUCD services and organizations with the ASUCD student telephone directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the services operated by the ASUCD for university students include the Unitrans bus system, *California Aggie* newspaper, the Bike Barn repair services, travel service, free legal advice for undergraduate students, convenience store, U.S. Post Office and the Coffee House. The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. A new antenna has been installed on Kerr Hall and Radio KDVS stereo 90.3 FM, the student-run campus radio station, is now broadcasting at 5,000 watts. Other ASUCD activities include Classical Notes and Campus Copies, *Housing Viewpoint,* Homecoming, Student Forums, Entertainment Council, Whole Earth Festival and Picnic Day.

UC Davis Administrative Advisory Committees

Students may become involved in issues affecting the campus community by applying for membership on an administrative advisory committee. Each committee advises on policies affecting campus life in a specific area, such as athletics, child care, disability issues, information technology, or student fees.

The committees respond to requests for advice, identify needs or concerns within the charge of the committee, and recommend action to the administration. As members of an administrative advisory committee, students can assure that student perspectives are well represented in the committee's recommendations and, in turn, learn more about faculty, Academic Federation, and staff views of campus issues. Applications are accepted each winter for service on committees the next academic year.

Graduate Student Association (GSA)

Information:
Room 253, South Silo
916-752-6108; fax: 916-752-5158; e-mail: gsa@ucdavis.edu

The Graduate Student Association (GSA) is the officially recognized student government for UC Davis graduate students. GSA is a representative assembly that provides a forum for addressing the concerns of graduate students and promotes communication with campus administrators. GSA also serves as an advocate at all levels of the university on behalf of graduate students. Funded by graduate student fees, GSA provides services to all academic graduate students and to professional students in the Graduate School of Management. Services include new student orientation, community housing listing service, legal service, fax service, travel awards, newsletters and assorted social events. Other professional students are eligible to join GSA by paying a fee.

GSA is run by graduate and professional students who devote time and expertise to the General Assembly, the Executive Council and committees. GSA General Assembly representatives are designated by other students in their department or graduate group. General Assembly meetings are held once a month and are open to all graduate and professional students. Each year the General Assembly elects the members of the Executive Council, who serve in a variety of positions to carry out the policies and functions of the organization. To find out what GSA can do for you, please call or visit the GSA office.

Student Conduct

Information:
Student Judicial Affairs
3rd Floor, North Hall
916-752-1128
World Wide Web: http://sja.ucdavis.edu/sja/

Student Judicial Affairs supports the standards of the campus by responding to alleged violations of university policies or campus regulations. In addition, the office coordinates the informal resolution process and receives formal complaints for student grievances based on impermissible discrimination or harassment (sexual, racial, religious, handicap, etc.), or on violations of student rights to obtain access to or prevent disclosures from their campus records. The office aids in conflict resolution and can provide interpretations of university policies and regulations.

Student Conduct and Discipline

Students enrolling or seeking enrollment in the university assume an obligation to act honestly, ethically and responsibly in a manner compatible with the university's function as an educational institution. Rules concerning student conduct, student organizations, use of university facilities and related matters are set forth in both university policies and campus regulations. Standards for student conduct are included in the *UCD Code of Academic Conduct,* the *Student Activities Handbook,* the *Guide to Residence Hall Life* and the *University of California Policies Applying to Campus Activities, Organizations and Students*. The operation of the campus student disciplinary system is outlined in the booklet *Administration of Student Discipline.* These policies and regulations are available from the Office of Student Judicial Affairs and on the World Wide Web.

A summary of student conduct expectations is published each quarter in the *Class Schedule and Room Directory.* Misconduct for which students are subject to discipline includes, but is not limited to, plagiarism; cheating; knowingly furnishing false information to the university; sexual or other physical assault; threats of

violence; possession of weapons; harassment, including stalking, sexual harassment or "fighting words"; forgery; theft; vandalism; illegal possession, use or sale of drugs or alcohol; hazing; obstruction or disruption of university activities or functions; and alteration or misuse of university documents, records, keys or identification. Disciplinary sanctions that may be imposed range from a warning to dismissal, and may include restitution and/or assigned community service.

Alleged violations of campus or university standards should be referred to the Office of Student Judicial Affairs. If complaints cannot be resolved informally between Student Judicial Affairs, the accused student and the referring party, the case may be referred to a hearing before the Student Conduct Committee, Campus Judicial Board, or a hearing officer. The president of the university, through the chancellor, has ultimate authority for the administration of student discipline.

Student Responsibilities

You are responsible for complying with the announcements and regulations printed in this catalog and in the *Class Schedule and Room Directory,* and with all policies, rules and regulations of the university and this campus. You will not be able to register or receive transcripts of record or diplomas until you have met all university obligations.

STUDENT ORGANIZATIONS

Information:
Student Programs and Activities Center
3rd Floor, South Hal
916-752-2027

Over 300 registered student organizations at UC Davis, including cultural, social, religious, political, ethnic, academic, international, recreational, performing and service groups, provide students and the entire campus with important educational experiences. The **Student Programs and Activities Center** registers these diverse groups and provides educational programs, advising and support regarding activities, event planning, leadership development, conflict resolution, resources and campus policies. Through participation in these organizations, students have the opportunity to meet friends, clarify values, apply classroom learning, gain a sense of accomlishment, develop role models and learn to work cooperatively with others.

In addition to the subunits described below, the Student Programs and Activities Center administers a number of campus programs: Activities Faire, Club Finance Council, College Bowl, Danzantes del Alma folkloric dance troupe, leadership training programs, campus service awards, and liaison to fraternities and sororities. Center staff assist individual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the Center to explore these "hands-on" experiences that reinforce personal and academic development in college as well as prepare them for future careers.

Cultural Days is an annual series of programs celebrating the diverse ethnic cultures of the university community. Programs include African Continuum, Asian Pacific Cultural Week, La Raza Cultural Days and the Native American Powwow. Everyone is invited to share in these programs featuring speakers, workshops, films, entertainment and family events.

The **Cal Aggie Marching Band** entertains spectators at athletic, campus and community events. As one of the last remaining "student-run" bands in the nation, the band has a style and personality all its own. The UC Davis **Spirit Squad,** a group of talented and enthusiastic dancers, stunt team members and gymnasts, travels and performs with the band.

Cal Aggie Student Alumni Network (CASAN)

Information:
Cal Aggie Student Alumni Network (CASAN)
Walter A. Buehler Alumni and Visitors Center
916-752-0115 or 916-752-0286; e-mail: caaa@ucdavis.edu
World Wide Web:
http://www-caaa.ucdavis.edu/alumni/SP_casan.html

All UC Davis students are encouraged and welcome to become CASAN members. CASAN involves students and alumni in a variety of academic, philanthropic and professional programs which build lasting ties to the university. Students may join any time during the academic year; the annual $15.00 membership fee includes membership in the Cal Aggie Alumni Association. For more information, call CASAN or drop by the Alumni Center.

UC Davis' athletic program was awarded the inaugural Sears Directors' Cup in 1996, recognizing the campus's overall NCAA Division II athletic program as the best in the nation.

ACADEMIC ADVISING & STUDENT RESOURCES

ACADEMIC ADVISING

UC Davis offers many different types of academic advising to help you get the most from your education. College advisers can assist you in meeting degree requirements and taking maximum advantage of the resources available in the university. A conference at least once a quarter is especially desirable for students during their first year and for seniors during the final quarters preceding graduation.

College Advising

College of Agricultural and Environmental Sciences

Information:
Office of the Dean
228 Mrak Hall
916-752-0108

The Dean's Office provides you with

- Staff advisers who can advise on university and College rules, regulations and policies and procedures that affect students.
- Academic advising: in-depth advice regarding probation/dismissal status, admission to the College, readmission, and second bachelor's, limited and regular status.
- Advice and action on petitions.
- Additional services include study plan clearance, College English requirement check, release of holds on registration packets and final evaluation for graduation.

Associate Dean of Undergraduate Academic Programs

Information:
Annie King, Associate Dean
228 Mrak Hall
916-752-0108

The College has an associate dean of undergraduate academic programs and advising staff who welcome the opportunity to become acquainted and to talk informally with individual students. They can also help you with academic problems if you are placed on probation or subject to dismissal.

Academic Advising Center. Coordination of the College's Advising Center and the Summer Advising Program is available in the College's Academic Advising Center, 228 Mrak Hall. Primarily, the Academic Advising Center advises students in the Exploratory Program and the Individual Major.

Faculty Advisers/Staff Advisers. You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The Master Advisers coordinate advising within a major. Staff advisers located in the department can advise you on courses, specific requirements of majors and career opportunities. You are strongly urged to consult with your faculty adviser or staff adviser each quarter before selecting your courses.

As educational objectives evolve, you may, in consultation with the Master Adviser for your major, choose a new faculty adviser whose area of expertise corresponds more directly to your specific objectives.

Exploratory Program (non-degree program)

Information:
College Academic Advising Center
228 Mrak Hall
916-752-0610

Are you unsure what major you really want to pursue? If so, you may want to register in the Exploratory Program. With the assistance of the college's Academic Advising Center and the major advisers, you will be able to explore specialized options, develop your decision-making abilities and ultimately select the major best suited to your needs. For registration purposes, indicate "Exploratory" on your admissions materials. You must declare a major before you complete 120 units (see Declaration of Major, page 60).

Division of Biological Sciences

Information:
Biological Sciences Advising Office
202 Life Sciences Addition
916-752-0410

The associate dean and staff in the Advising Office can assist you with complete academic advising services for the Biological Sciences major and with general advising information about other divisional majors. In addition, the office can help you with a variety of issues including PELP, withdrawal, change of major and some financial aid forms.

This office is also responsible for the academic progress of all students majoring in the division. If you have any problems (personal, medical, financial) that are affecting your academic performance, or if you are on academic probation, make an appointment to see one of the advisers in the division office.

Sections and Advising Centers. Students entering or intending to declare sectional majors in biochemistry; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology and behavior; or plant biology should contact the specific section office for academic advising services. Students selecting the biological sciences major should contact the Division of Biological Sciences Advising Office for academic advising services.

College of Engineering

Information:
Undergraduate Office
1050 Engineering II
916-752-0557

By contacting the Undergraduate Office, you may obtain information and assistance on academic, career and personal matters, either through direct assistance from one of the staff advisers or through referral to other offices on campus. The Undergraduate Office handles student petitions, transfer evaluation, articulation and degree certifications.

Faculty Advisers. Your departmental office will assign you a faculty adviser your first term on campus. Students in engineering usually retain the same faculty adviser throughout the undergraduate program, but you may choose a new adviser whenever you wish. It is necessary only to keep your departmental office informed of your adviser selection.

Mandatory Advising. The College has implemented a mandatory advising system through RSVP, the tele-

phone registration system. You are required to meet with your adviser (faculty or staff) once a year, during a specific quarter, which is determined by the number of units you have completed. When you telephone to enroll in classes for your advising quarter, you will be told that you have an advising hold on your registration. You may enroll in classes for and during this quarter. If you meet with your adviser during this quarter, there will be no difficulties with subsequent registration. If, however, you fail to meet with your adviser during your assigned quarter, you will be dropped from all your classes on the first day of the *following* quarter. Therefore, you have approximately four months to clear an advising hold. For further information on mandatory advising, call the Advising Office at 752-0557.

Departmental Staff Advisers. Faculty advising is supplemented by a system of staff advising especially designed for students in that department. Consult your departmental office for more information.

Peer Advisers. A well-developed peer advising system complements faculty and staff advising. Student advisers are available at Bainer Hall, Engineering II, and at other locations.

College of Letters and Science

Information:
Office of the Deans/Undergraduate Education and Advising Office
200 Social Sciences and Humanities Building
916-752-0392

The associate dean and staff in the Undergraduate Education and Advising Office can assist you with a wide variety of issues relating to your academic goals and experiences. You can consult the Advising Office on matters such as program planning, selection of a major, exceptions to regulations and academic enrichment opportunities. The office also provides a number of additional services:

- Determines how your transfer credits from other institutions apply towards completion of breadth and unit requirements for the bachelor's degree (applicability of transfer credit toward the major is determined by your major faculty adviser)
- Provides degree checks to identify remaining college requirements and certifies graduation
- Acts on petitions requiring the dean's approval
- Reviews the records of students who are subject to disqualification and determines whether such students may continue at UC Davis

Faculty Advisers. New students are assigned to a faculty adviser before their first term of enrollment. If you indicated an interest in a particular program on your application, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

New students are encouraged to see their faculty adviser at least once every quarter during their first year on campus to discuss their educational goals, course program and progress.

Continuing students who have completed three quarters in residence in the College should consult with an adviser at certain important checkpoint stages in their academic careers (explained below). You are urged, however, to maintain regular contact with an adviser in your major to avoid program errors that may delay graduation. Seniors should maintain close contact with their adviser in order to ensure that they are meeting the major requirements.

Academic Options Program. If you did not indicate an initial commitment to a particular major program on your application, you will participate in the Academic Options Program, which provides academic advising to lower division students. You will be assisted by an advising team available at sites in each of the university residence hall complexes. Students living off campus are asked to contact the Letters and Science Undergraduate Education and Advising Office early in the quarter to receive their adviser assignments.

Advising Checkpoints. You should consult with your faculty adviser at two, possibly three, critical stages in your academic career:

- Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and graduation requirements. You must also have declared a major by this time. Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.
- When you complete 135 units of degree credit, including transfer work, you should obtain Degree Check materials from the Letters and Science Advising Office and consult your adviser concerning course selection and satisfaction of requirements in the major.
- Before you complete 195 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a firm study plan, in the form of a quarter-by-quarter program that will satisfy all remaining degree requirements as expedi-

Top biology graduate students come to UC Davis to study under a national Plant Cell Biology training grant, one of the largest such National Science Foundation Awards nationwide.

tiously as possible. This plan will be filed with your adviser. If the plan indicates that you will have to register beyond the 225-unit limit in order to meet degree requirements, you must contact the Undergraduate Education and Advising Office immediately. Exceptions to the 225-unit limit are granted by the dean only rarely. Typically, approval is granted only to allow completion of *minimum* degree requirements.

If you have not met with your faculty adviser before these established checkpoints, a hold may be placed on your registration materials as a reminder.

Peer Advisers. Student-to-student advising is an important part of the university advising services. The College of Letters and Science dean's office peer advisers are available during regular office hours in 200 Social Sciences and Humanities Building and on a weekly basis in the campus residence halls to talk with students about their academic concerns.

Advising Services

Information:
Advising Services
111 South Hall
915-752-3000

Academic Peer Advising (APA) places peer advisers in over 45 departments to help students find the answers to their questions about major requirements, courses and university regulations. The academic peer adviser complements faculty advising by providing a student perspective on the department. The Academic Peer Advising staff is trained to provide information and assistance concerning graduate schools, career opportunities and college requirements.

The **Orientation and Summer Advising Office** coordinates the Summer Advising and Registration Program, fall quarter Orientation activities and many other student assistance and orientation programs for new students. The staff will introduce you to the campus environment, procedures and opportunities, and offers programs relevant to students' changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome.

The **Pre-Graduate School Information and Referral Service** is a program available through Advising Services to assist students interested in M.A., M.B.A., Ph.D. or teaching credential programs. Specific services include help in locating graduate school programs in specific fields, completing application forms and statements of purpose, and planning financial options. This unit also coordinates the Undergraduate Research Conference, an annual event open to all undergraduate UC Davis researchers.

The **Pre-Law Advising Office** offers advising about admission requirements and program planning to students interested in the legal profession. You can learn about preparing for law school and a legal career through the many seminars and workshops held each year. The office maintains a reference library of law school bulletins, legal assistant information, admission test materials and general career information.

The **Health Sciences Advising Office** is an important resource if you are preparing for a profession in the health sciences. Staff and student advisers can provide information on requirements, application procedures, professional school curricula and related options. The office has an extensive library of school catalogs, statistics and books and journals related to health education.

Educational Opportunity Program (EOP)

Information:
228 North Hall
916-752-3472

The Educational Opportunity Program Office serves EOP students by assisting them with their academic, social and personal adjustments to the university environment; coordinates EOP new student orientation programs; and serves as liaison to staff, faculty and administrators. The office's multicultural peer staff is particularly sensitive to differing social, cultural and ethnic concerns. In addition, those students interested in pursuing the helping professions can receive training and experience through the Peer Adviser Counselor training program.

EOP Information Office services are also accessible at various outreach locations throughout the campus, such as the Colleges of Agricultural and Environmental Sciences, Letters and Science and Engineering; Learning Skills Center; The House; and all ethnic studies departments. All students are invited to telephone or stop by the EOP Information Office on the second floor of North Hall or any one of the outreach locations to find out more about the peer counseling services.

The First Resort

Information:
First floor lobby, South Hall
916-752-2807 or 916-752-3323
Hours: Monday through Friday, 9:00 a.m. to 4:00 p.m.

The First Resort is a place to go if you are feeling bogged down by university red tape, registration procedures, course selection, choosing a major or other general advising questions. The student advisers here can either answer your questions or put you in contact with others who can. The staff can give you advice and assistance from the point of view of someone who has "been there." The First Resort maintains a referral service, a listing of courses of 1 to 3 units and other valuable resources. Pregraduate school information is available, and graduate school bulletins and other supplemental materials on hand are useful in selecting a graduate program. If you have a problem, remember—start with The First Resort.

RESOLVING ACADEMIC PROBLEMS

The Grievance Process

Grade Changes. If you believe you received an incorrect grade due to a clerical or procedural error, ask your instructor to file a grade change form with the Registrar's Office. If you believe you received an incorrect grade due to any type of discrimination, consult the office of Student Judicial Affairs (see below).

Other Grievances. If you need a requirement waiver or any other type of variance, contact your faculty adviser or the appropriate dean's office for information on your college's procedures. If you cannot get satisfaction through normal channels, contact the ASUCD Griev-

ance Center or the Committee on Student-Faculty Relationships (see below).

Discrimination/Harassment. If you believe that you have been discriminated against or harassed, you may contact the office of Student Judicial Affairs (see below) or the ASUCD Grievance Center (see below) for information and assistance. Advice is also available from the Sexual Harassment Information Line (916-752-2255). Graduate students may contact Graduate Studies (916-752-0650) and/or the Graduate Student Association (916-752-6108). Mediation sevices are available to resolve student grievances. For information, contact Student Housing (916-752-2491).

ASUCD Grievance Center

Information:
ASUCD Grievance Center
7 South Hall
916-754-4131; 916-752-6101 (ASUCD Academic Affairs);
916-752-3339 (ASUCD Campus Affairs)

The ASUCD Grievance Center advocates students' academic and nonacademic concerns to the faculty and administration. Grievance counselors assist students one-on-one, directing them to appropriate channels through which to state their academic grievances (i.e., student-faculty relations, sexual harassment, grade change problems, prejudicial treatment in the classroom and problems with academic procedure and policy) and nonacademic grievances (i.e., campus facilities, campus safety, ASUCD, and any other nonacademic concerns). All information discussed between counselors and students is completely confidential. Students can get counseling, referrals and support to aid in the resolution of these matters.

Committee on Student–Faculty Relationships

Information:
Academic Senate Office
356 Mrak Hall
916-752-3920

If students with a grievance feel they cannot get satisfaction through normal procedures, they may contact the Committee on Student-Faculty Relationships for assistance. The committee is advisory and can make recommendations to the office having authority to resolve the problem. It may also meet informally with the students involved with the grievance.

Student Judicial Affairs

Information:
Student Judicial Affairs
3rd Floor, North Hall
916-752-1128

Student Judicial Affairs supports the standards of the campus by responding to alleged violations of university policies or campus regulations. In addition, the office coordinates the informal resolution process and receives formal complaints for student grievances based on impermissible discrimination or harassment (sexual, racial, religious, handicap, etc.), or on violations of student rights to obtain access to or prevent disclosures from their campus records. The office also can aid in conflict resolution and provide interpretations of university policies and regulations.

TUTORING AND LEARNING RESOURCES

Learning Skills Center (LSC)

Information:
Third Floor Voorhies Hall
916-752-2013

At the Learning Skills Center you can receive assistance in a wide variety of areas, including: general study skills, math/science study skills, writing essays and term papers, reading efficiency, English as a second language, time-management skills, test-taking skills, test anxiety reduction and more.

Learning specialists can assist you individually, or you may participate in workshops covering specific areas of study. The Learning Laboratory has self-help tapes and films that enable you to work at your own pace. The LSC library contains a variety of programmed instructional materials, reference books, preparation materials for the GRE, MCAT and LSAT exams, and a file of course examinations given in past quarters. Most materials may be checked out.

Under certain circumstances, the center also provides individual tutoring sessions for students on academic probation or subject to dismissal. Group and drop-in tutoring are available to all students. Come in and ask about our services, which are free to all UC Davis students.

EOP Tutoring

Information:
Learning Skills Center
Third Floor Voorhies Hall
916-752-2013

EOP tutoring is a free service for EOP students. If you are having difficulty with your course work, the Learning Skills Center offers tutoring in many course areas. Tutoring is provided in groups and on a drop-in basis. For students in academic difficulty, a limited amount of one-to-one tutoring is also available. Although primary emphasis is on the assignments in your classes, tutorial services may also be used to improve study habits and learning skills. The tutoring program is staffed by students carefully selected for both their knowledge of course content and their sensitivity to the needs of students being tutored.

The $30,000 UC Davis Prize for Undergraduate Teaching and Scholarly Achievement pays tribute to faculty members like geology professor Ken Verosub, the 1996 recipient.

Special Transitional Enrichment Program (STEP)

Information:
Learning Skills Center
Third Floor Voorhies Hall
916-752-2013

New EOP students (freshmen) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected regularly admitted EOP students are encouraged to do so. The program begins in summer and continues through the first academic year, providing preparatory course work and developing academic skills. It helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

Learning Resource Centers

Information:
Student Housing
Lisa Papagni
916-752-1736

Learning Resource Centers are located in the Segundo, Tercero and Cuarto residence hall areas. They offer the following services to all residence hall students: PC computer terminals (IBM clones and Macintosh) and assistance, free computer software tutoring, a reference library, language tapes, an exam file and a quiet place to study.

STUDENT COUNSELING AND SOCIAL SERVICES

Counseling Center

Information:
219 North Hall
916-752-0871

The Counseling Center offers confidential psychological, psychiatric and peer counseling services to students having problems that affect their academic progress and sense of well-being. The staff offer assistance for personal and interpersonal issues such as relationships, family, stress, cultural differences, assertiveness, self esteem and intimacy. Additionally, staff assist with educational/vocational concerns such as coping with university life, academic performance, test anxiety, reentry adjustment and determining life goals. Services for relationship issues are also offered to students and their partners.

Walk-in services are available daily for students needing immediate assistance. Short-term individual counseling, group counseling and assistance with off-campus referrals are provided. Career interest testing, personality testing and information about graduate school admissions tests and the Planned Educational Leave Program are available.

Services are free to all registered students. Confidentiality is strictly maintained in accordance with state laws and ethical standards. Students, faculty or staff who are concerned about a student or desire consultation or assistance in making a referral are encouraged to call the center. To make an appointment, telephone or come to the Counseling Center.

The House

Temporary Building 16 (two-story house by Housing Office)
24-hour hotline: 916-752-2790; business line: 916-752-5665

The House is a professionally managed peer counseling program of the Counseling Center. Students receive confidential support, information and referrals regarding personal or social problems. Well-trained student volunteers assist students through individual peer counseling and a wide variety of workshops and support groups held in an informal setting. No appointment is necessary and services are offered on a drop-in basis from 9:00 a.m. to 11:00 p.m., with 24-hour telephone assistance. The House is open seven days a week and is wheelchair accessible. Volunteers for peer counselor positions at the House are accepted each quarter. Students are trained in basic counseling skills and can receive units for training. Transcript notation is also available for quarters working as a peer counselor volunteer.

Health Education

Information:
Cowell Student Health Center
916-752-9652

The Cowell Student Health Center administers the following health education programs. Because maintaining good health is vital for the successful pursuit of your educational goals, the Health Education Program provides information and services through trained peer counselors, health educators, workshops and resource libraries in four programs.

Campus Alcohol and Drug Abuse Prevention Program (CADAPP) (916-752-6334)—Individual assessments, small group education courses, workshops and support group on alcohol and other drug-related problems as well as issues of dysfunctional families and addiction. CADAPP includes two components: *Peer Counselors in Athletics,* an athlete-to-athlete substance abuse prevention and health education program, and *Health Advocates*.

Peer Counselors in Athletics (916-752-6334)—Presentations and peer counseling by athletes for athletes on alcohol/other drug issues, nutrition, player-coach relationships, steroids, body image issues, tobacco, race and sports, and gender equity issues. PCA's offer mentoring services to fellow student athletes and outreach education and mentoring to area high schools.

Health Advocates (916-752-9651 and 752-DRUG)—Health information, peer counseling and resource referrals are available for dealing with personal substance abuse issues or those of friends/family members; personal nutrition, exercise, stress management and other wellness issues. Free individual computerized dietary analysis and peer nutrition counseling are available by appointment. Group presentations on responsible hospitality and non-alcohol party planning, alcohol/drug physiology, issues of sex under the influence, nutrition, stress management, exercise, massage, bicycle safety and injury prevention, and other topics are available on request.

Peer Counselors in Sexuality (916-752-1151)—Information and peer counseling (in person or by phone) on birth control, pregnancy, sexually transmitted diseases (including HIV/AIDS), safer sex, healthy relationships, partner communication skills, sex roles and other issues related to sexuality and reproductive health.

Lesbian, Gay and Bisexual Resource Center

Information:
University House, Room 105
916-752-2452

The Lesbian, Gay and Bisexual (LGB) Resource Center offers a safe, supportive environment for people to learn more about lesbian, gay, bisexual, and transgender concerns and to meet other members of the Davis community. The center has a wealth of information and resources about lesbian, gay, bisexual, and transgender issues. Students who are studying or researching these issues are also encouraged to use the center's resources. The center also serves as a meeting place for local organizations or support groups. The center's resources include:

- A library of more than 400 books on topics ranging from domestic partnership issues to lesbian humor. Many of these books are available for personal use. Local and national newspapers and magazines are available, including *Curve, Out, Mom Guess What* and *Anything That Moves.*
- A resource database and files on local resources, including health professionals, legal services, clubs, organizations and community contacts.
- A bulletin board exchange, where community members may advertise special events, services, etc.

The LGB Resource Center is staffed by volunteers and serves all members of the Davis community. Open Monday through Friday; call for daily hours.

Rape Prevention Education Program

Information:
Fire and Police Building, Kleiber Hall Drive
916-752-3299

The goal of the Rape Prevention Education Program (RPEP) is to explore myths and expose the realities of sexual assault, focusing on prevention through education. Services include the following:

- Discussions and workshops on topics such as rape prevention, sexual harassment, acquaintance rape, men and rape prevention, media images of women, pornography and dating violence
- Self-defense classes, offered quarterly
- Short-term counseling, referrals and support groups for victims of rape, sexual assault, or incest survivors
- A 24-hour crisis intervention and advocacy for victims of sexual violence accessed through UC Davis Police at 752-1230
- Training for peer counselors and professionals
- A circulating library of books, videos and articles on sexual assault and related issues

Call RPEP for drop-in hours or to make an appointment. RPEP has student work-study positions and a volunteer staff. Contact RPEP if you have questions.

Services for International Students and Scholars (S.I.S.S.)

Information:
Services for International Students and Scholars
916-752-0864

Services for International Students and Scholars assists international students, faculty and researchers throughout their programs of study, teaching and research at UC Davis. S.I.S.S. provides orientation, personal and cultural advising, information and assistance regarding U.S. Immigration and Naturalization Services regulations, serves as a liason with home governments and sponsors, and provides orientation to the U.S. university system.

All new and transfer international students are required to attend a special orientation program that is held just before each quarter registration. The orientation will help new students with registration, class enrollment, making housing arrangements, immigration regulations, and finding campus services and community resources. Orientation for new faculty and researchers is held weekly.

Students and scholars should report to S.I.S.S. as soon as possible after their arrival in Davis.

Women's Resources and Research Center (WRRC)

Information:
North Hall, First Floor
916-752-3372; fax: 752-0222;
World Wide Web: http://wrrc.ucdavis.edu/wrrc/

The Women's Resources and Research Center is a catalyst for acheiving an inclusive and equitable campus community at UC Davis. The WRRC educates the campus community—students, staff and faculty, men and women—about women's issues and concerns, promotes an understanding of the role and impact of gender in our lives and in our society, helps women of diverse backgrounds achieve their intellectual, professional and personal goals, and advocates for women's full inclusion, equality and advancement.

Located at a central, accessible campus site, the WRRC has informal, comfortable areas for groups and individuals to meet, talk and study, and hosts support and discussion groups. Friendly, knowledgeable, accessible staff answer questions, locate resources, or help address personal, academic or work-related concerns. Services and resources include the following:

- Popular and scholarly lectures, skill-building workshops, forums, and other special events
- A large, specialized collection of books, periodicals and other materials focusing on women and gender, staffed by a full-time librarian
- *Women's Writes,* a free monthly calendar of events
- Resource listings of campus and community services such as health care, counseling, child care, women's organizations and legal resources
- Child emergency notification service for student parents
- Assistance to individuals, departments and organizations planning activities on women or gender
- Consultation with campus departments, organizations and individuals to expand awareness of gender dynamics and women's concerns
- Assistance to instructors in developing syllabi and readers and in identifying classroom resources
- Specialized programs, discussion groups and individualized consultation for faculty and graduate students on research, academic, career and personal topics

- Financial and programmatic support for academic departments and groups engaged in gender-related initiatives
- "Gender Equity in the Classroom," a workshop for faculty and teaching assistants that examines gender-based classroom dynamics

Student Special Services

Information:
160 South Silo
916-752-2007

Student Special Services coordinates a variety of programs and services to meet the special needs of students.

Disability Resource Center

Information:
Disability Resource Center (DRC)
160 South Silo
916-752-3184 (voice) or 752-6833 (TTY)

The Disability Resource Center (DRC) provides services and accommodations to students with disabilities. The following resources are available to meet the individual disability-based needs of enrolled students with documented disabilities:

- Alternative educational materials, including large-print and taped textbooks
- Disability management counseling
- Facilitation of access to all campus programs
- Registration assistance
- Reader and notetaker services
- Referral for special parking
- Referral for tutoring
- Referral to on-campus and off-campus resources, services and agencies
- Shuttle service (on-campus)
- Sign language, oral interpreting and transliterating services
- Special adaptive equipment and computers

The campus is flat, with a good network of bicycle paths, curbs cuts and pedestrian walkways. Almost all instructional, recreational and student facilities are wheelchair accessible. Accessible on-campus housing is available and an accessible bus system links the campus and the community of Davis.

Reentry Student Services

Information:
Reentry Student Services
160 South Silo
916-752-2005

The Reentry Student Services Office assists students who have reentered the university after several years of life and work experience. The office provides admissions assistance, information, orientation and peer support. It also provides referral assistance through the Reentry Resource Network composed of representatives from existing student services units, colleges and divisions. The office also sponsors an annual Reentry Day for prospective reentry students on the last Saturday in February.

Transfer Student Services

Information:
Transfer Student Services
160 South Silo
916-752-2200

The Transfer Student Services Office assists students who have transferred from other institutions of higher education. The office coordinates transfer student matters among existing student services units to ensure students an easy and smooth transfer to the university. It also sponsors special receptions and workshops for new transfers and publishes an annual *Transfer Guide* of available campus services.

The Aggie Pack, the undergrad student booster organization, is a visible force at UC Davis athletic events.

Veterans Affairs

Information:
Veterans Affairs Office
160 South Silo
916-752-2020

The Veterans Affairs Office assists veterans, dependents and reservists through a variety of federal, state and campus programs. The office certifies course attendance to the Department of Veterans Affairs, coordinates a tutorial assistance program, provides advice and support, and helps with employment, work study and financial aid concerns.

To initiate a benefit claim, write or drop by with your letter of admission. The office can give you the forms, information and advice to process your claim.

INTERNSHIPS AND CAREER SERVICES

Internship Programs

Information:
The Internship and Career Center
2nd floor, South Hall
916-752-2855

You can take advantage of one of the hundreds of organized internships through the Internship and Career Center or initiate your own.

An internship may be full time or part time, credit or non-credit, voluntary or involving a stipend—depending on your needs and interests and the availability of openings. Internship experiences must emphasize learning rather than routine activities, include field supervision by a qualified professional and, where appropriate, the faculty member responsible for giving credit. Academic credit is awarded only for experiences planned and approved in advance by the sponsoring faculty member.

The Internship and Career Center

Information:
2nd floor, South Hall
916-752-2855
World Wide Web: http://icc.ucdavis.edu/

If you are an undergraduate, graduate or alumnus, ICC can assist you to identify your abilities and interests and relate them to jobs; gain access to practical experience to increase your competitiveness in the job market; and find out how and where to look for the jobs you want. If you are considering dropping out of the university for a term or longer, an adviser can also give you information about internships and employment opportunities.

The Career and Graduate Study Resource Room (1st floor, South Hall) contains material that can aid you in learning how your major field of study can be translated into job opportunities, as well as data concerning types of employment graduates have obtained (summarized by academic major). Useful to job-seekers—and available free of charge—is ICC's *Career Resource Manual,* which provides guidelines for preparing a resume, tips on being interviewed and information on employment in government, business and education.

To assist students in finding jobs after graduation, the office solicits and maintains job vacancy listings, arranges employment interviews and schedules on-campus recruiting by employers.

UC Davis boasts nearly a dozen instrumental and vocal ensembles, and the dramatic art and dance department stages numerous productions and special projects throughout the academic year.

Education and Graduate Placement Services

Information:
The Internship and Career Center
2nd floor, South Hall
916-752-0724

Any student enrolled in the teaching credential program or pursuing a master's or doctoral degree in order to teach should register with the Education and Graduate Placement Office.

Services include teaching job vacancy listings, placement files (professional dossiers), special workshops on writing teaching resumes and curriculum vitae, and on preparing for interviews, and individual advising.

Advisers maintain contact with school district personnel and work with undergraduate students to explore teaching through internships. The office sponsors the Graduate Career Options Program for advanced degree candidates originally planning a teaching career and now considering other career options.

Human Corps Program

Information:
The Internship and Career Center
126 South Hall
916-752-3813

Human Corps is the student community services program at UC Davis. Public service work can be a rewarding and satisfying experience that may also improve a student's qualifications for the job market. Community service may or may not be compensated through wages, academic credit or transcript notation and can take many forms, from a one-day activity to a long-term commitment.

The Human Corps is a referral center for students wishing to perform community service and as a resource for agencies and campus units with service opportunities. The office contains a database and directories with information about non-profit agencies in California, community service opportunities throughout the world and employment in the non-profit or public sectors after graduation.

ACADEMIC INFORMATION

REGISTERING AT UC DAVIS

Registration

Information:
Office of the Registrar
12 Mrak Hall
916-752-2973
World Wide Web: http://registrar.ucdavis.edu

Registration is the way in which you become a student at the university. Every UC Davis student must register each quarter. Registration includes enrolling in classes via RSVP, the telephone registration system; paying fees and other financial obligations; filing your current address with the Office of the Registrar; and completing and filing other information forms.

If you are a *new* or *reentering* student you must also:

- Have a photo ID picture taken.
- Submit a Statement of Legal Residence (see Appendix).
- Return the completed Medical History form, evidence of rubella immunity, results of a tuberculin skin test and the Insurance Information Request form. These forms are mailed to each new student from the Student Health Center.

New graduate students who have been registered previously at UC Davis as undergraduates are considered to be new students.

Change of Name. Petitions to change your name on official university records may be obtained from the Office of the Registrar. (Students planning to graduate should file this petition no later than the fifth week of the quarter in which they intend to graduate.)

Change of Address. Be sure to inform the Office of the Registrar of any change of address. Important registration materials, information and announcements are mailed to students throughout the year, so keep your campus/local mailing address, your billing address and your permanent address up to date. Failure to file your current address can result in a hold on your registration.

Researcher Peter Connors and a colleague at UC Davis Bodega Marine Reserve and Laboratory rescued a native clover from the brink of extinction.

You can update your address in three ways:

- Complete a Change of Address form, available at the Office of the Registrar.
- Call our Voice Mail Form at 754-9427.
- Correct your information on the "Student Data" section of your RSVP registration form and turn it in to the Office of the Registrar.

Late Registration

Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of $50 to defray the extra clerical costs of late registration. Registration after the deadline will be allowed only under conditions where action or inaction on the part of the university delays registration. A recommendation from an appropriate administrative unit will be required, and the registration fee must be paid with cash, cashier's check, credit union check, university check or fee credit.

Online Services for Registered Students

RSVP (telephone registration): 916-752-7787
World Wide Web:
UC Davis home page: http://www.ucdavis.edu
Office of the Registrar: http://registrar.ucdavis.edu

Registered students can access their class schedule, grades, and other information by telephone using RSVP (Register Students Via Phone, the UC Davis telephone registration system). They can also use the Office of the Registrar Kiosk in Mrak Hall lobby to view and print their class schedule and grades.

Each year, more services and information are available to registered students through e-mail, news groups and the Internet. New undergraduate students will find a personal computer very useful in their studies. Campus computing accounts are available to all registered students through the Division of Information Technology. You can activate your account at I.T. Express at the copy services desk on the first floor of Shields Library, and then use the microcomputers in computing laboratories on campus. For your personal computer, you can purchase the Bovine Online installation program at the UCD Bookstore or I.T. Express and use it to open your computer account, send e-mail and surf the Internet.

Many departments and offices have information on the World Wide Web that students will find useful. The Office of the Registrar World Wide Web site includes the each quarter's "Schedule of Classes," RSVP information, the "Open Courses" list, *General Catalog,* academic calendar and other general information, and a link to WIRES (WIRES allows registered students to check their grades, current schedule and account balance).

Enrolling in Courses

Students enroll in courses using RSVP (916-752-7787). The *Class Schedule and Room Directory,* available several weeks before the start of each quarter, explains registration procedures, gives class meeting times and locations, changes to the *General Catalog,* and the most up-to-date information on fees and RSVP.

Registration Priority. Access to RSVP is by priority groups. The groups are established according student class level, as determined by the number of units com-

pleted. Undergraduate classification is determined by the number of quarter units you have completed:

Class Level	Units
Freshman	0.0 — 44.9
Sophomore	45.0 — 89.9
Junior	90.0 — 134.9
Senior	135.0 —

Study List. You are officially registered in all courses listed on your individual study list. You are responsible for completing each of the courses. To confirm the courses on your official study list, call RSVP.

A course that is on your study list and for which you did no work that could be graded is reflected on your official transcript by the notation"ENW" (Enrolled–No Work Submitted).

Adding and Dropping Courses

You may adjust your schedule by adding or dropping courses using RSVP until the published deadlines. The last day to drop a course via RSVP is the tenth day of instruction. The last day to add a course via RSVP is the 15th day of instruction. The *Class Schedule and Room Directory* for each quarter lists the add and drop deadlines and explains how to use RSVP to adjust your schedule and what add/drop procedures and fees apply after the published deadlines. The academic calendar in the front of this catalog also lists the deadlines each quarter to add or drop courses.

Late Drop

To drop a course after the deadline (but before the day of the scheduled final examination), you need approval of the dean of your college or school. Graduate students must have their adviser's approval in order to drop courses. A $3.00 fee applies to late drops. Permission to drop courses after the deadline may be granted only in exceptional circumstances.

Late Add

To add a course after the deadline (but before the day of the scheduled final examination), you need approval of the department. A $3.00 fee applies to late adds.

Retroactive Drop

Occasionally, in exceptional circumstances, students are allowed to drop a course after the course is completed. Reasons for seeking a retroactive drop are very specific: medical problems, severe emotional difficulties, or recent death or severe illness in the immediate family. Petitions are available from the Office of the Registrar and should include a detailed account of the problem, appropriate documentation and an adequate explanation of why an "I" grade or late drop was not taken during the quarter in which the problem occurred. The instructor's signature is required on the petition. A $3.00 fee is applicable on all retroactive drops.

Retroactive Add

In some rare circumstances, students are allowed to add a course after the course is completed. Petitions for retroactive adds are available from the Office of the Registrar. Each petition must include the reason for the student's failure to add the course during the quarter in which it is offered. The petition must be supported by the instructor's signed approval, together with a statement from the instructor indicating knowledge of the student's participation and performance during the presentation of the course in question and the instructor's understanding as to the reason for the student's failure to add the course before the end of the quarter. A course grade must be assigned by the instructor. A $3.00 fee is applicable on all retroactive adds.

COURSE LOAD

Students are normally expected to graduate in 12 quarters (four years). To do this, **students should plan to complete an average of 15 units per quarter** (15 units per quarter for 12 quarters totals 180 units). It is understood that for various reasons students will occasionally need to take fewer than 15 units per quarter. However, students must meet the campus's minimum progress requirements.

Minimum Progress Requirements. Minimum progress is defined as an average of 12 units (including workload units) passed per quarter, calculated at the end of every quarter for the preceding three quarters of enrollment. Undergraduate students falling below this required average may be subject to academic disqualification. Under minimum progress, a student will earn the 180-unit minimum degree requirement within 15 quarters (5 years) of enrollment. Normal progress would achieve 180 units in 12 quarters.

Minimum progress requirements do not apply to students who have been granted part-time status or to students who have their dean's approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a recent death in the immediate family, or a serious accident involving the student.

Certification of Full-Time Status. Undergraduate students must carry a study load of at least 12 units (including workload units) each quarter in order to be certified as full-time students for insurance and financial aid purposes or to compete in intercollegiate athletics. Graduate students must carry a study load of at least 8 units each quarter in order to be certified as full-time students for insurance and financial aid purposes.

Course Load Limits in the College of Letters and Science. Freshman students in their first year and transfer students in their first quarter of residence may not take more than 17 units each quarter. For all other Letters and Science students, the study list may not exceed 21 units each quarter. These unit limitations include noncredit remedial courses and repeated courses, but not make-up work to remove incomplete grades.

Part-Time Student Status

If, for reasons of occupation, family responsibility, health or, for one term only, graduating senior status, you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Students may change status between full-time and part-time as their circumstances change. To be considered eligible, undergraduate students must be registered in 10 units (including workload units) or fewer by the tenth day of instruction that quarter, and graduate students must be registered in 6 units or fewer by the tenth day of the instruction. Minimum progress requirements are waived

for part-time students. Undergraduate petitions are available at the Office of the Registrar and require approval by the Registrar. Graduate petitions are available at Graduate Studies and approved by the Dean of Graduate Studies. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Services, as full-time students.

THE MAJOR

You'll find a complete list of the majors offered at UC Davis in a chart at the front of this catalog.

Declaration of Major

College of Agricultural and Environmental Sciences. Students must declare a major by the time they have completed 120 units. Failure to declare a major at this point may result in a hold on further registration. In order to declare a major, you must meet with your faculty adviser and/or advising associate, fill out a Change of Major petition obtainable at the Office of the Registrar or dean's office and file the petition with the dean's office. If you have completed 120 units you must prepare a study plan with your adviser and/or advising associate at the same time. You are accepted into a major only after your major department and the dean's office have approved the Change of Major petition.

College of Engineering. Students must declare a major when they apply to the College of Engineering. Their freedom to change majors thereafter may be limited.

College of Letters and Science. Students must declare a major by the time they have completed 90 units. If you have not declared a major by this point, a hold may be placed on your registration materials. Such a hold would be removed only when your Declaration of Major petition is filed in the dean's office. Petitions can be obtained from faculty advisers, department offices or the Office of the Registrar. As a part of the declaration procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the dean have approved the petition.

To be accepted into a major, you must have a C average in all courses you have completed that are a requirement for that major, as well as a C average in the upper division courses you have taken toward the major. With the approval of the College Executive Committee, additional requirements, such as completion of a particular set of required courses with a specified grade point average (usually well above a C average), may be introduced as conditions for acceptance into any major at any time.

If your performance is unsatisfactory after you have declared a major program, you may be required to withdraw from that major by the dean, upon written recommendation from the chair of the department or the curriculum committee that administers the major.

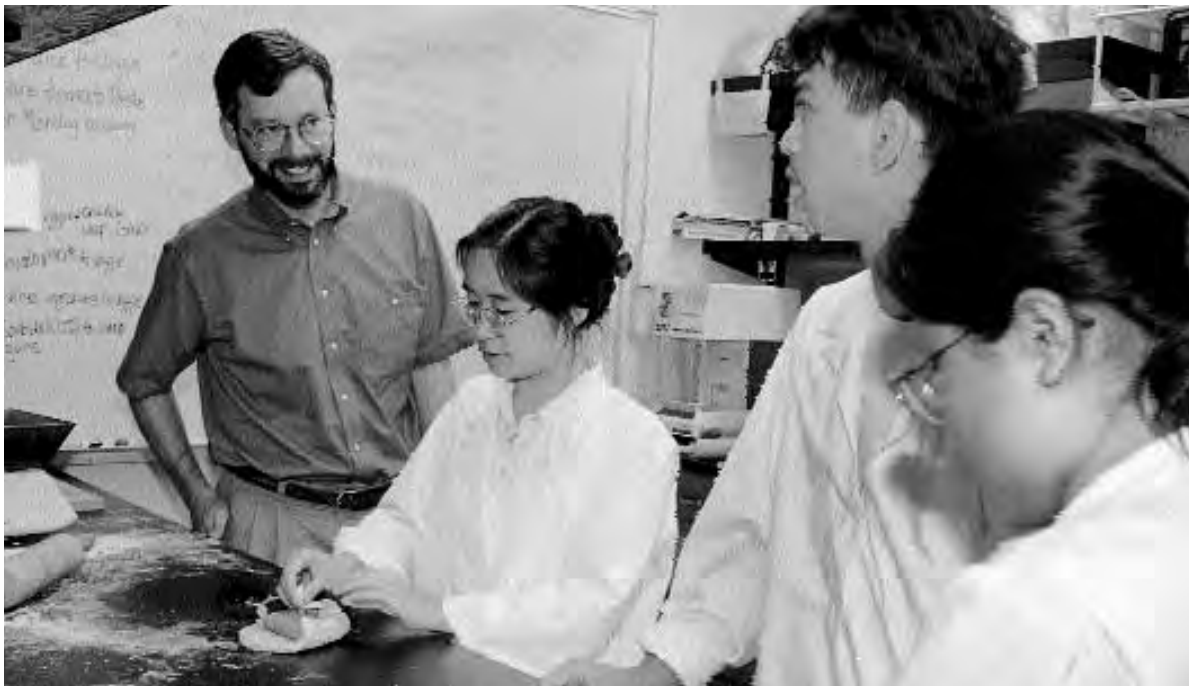
Change of Major Within a College

To change from one major to another within a college, you will need the consent of the department or committee in charge of your proposed new major. Admission into a major program may be denied by the program or by the dean if your grade point average (GPA) in courses required for the selected major is less than 2.0.

Procedures for change of major within a college are the same as for declaration of major and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). It is not possible to change or declare a major in the quarter in which you file to graduate.

College of Engineering. The above provisions may not apply to students in the College of Engineering, whose freedom to change majors is limited. Please contact the Engineering dean's office for specific change-of-major requirements.



Care for a Bagelrrito? UC Davis students in a food-product-ideas class invented a salsa-filled bagel and made the semi-finals in a national competition for new academic food creations.

Change of Major Accompanied by Change of College

A change petition, available at the dean's office and Office of the Registrar, must be endorsed by a faculty adviser of the new major you are selecting and signed by the dean of the college from which you wish to transfer. In addition, admission to the new college will require that dean's approval. Permission to transfer from one college to another may be denied or deferred if you are in academic difficulty or have a GPA of less than 2.0 in courses that are required by the new major.

College of Engineering. You must submit your petition for change of major by the tenth day of instruction and declare a specific major at this time. You may submit petitions for transfer into the College of Engineering from another UC Davis college only if you are in good academic standing and are making minimum progress towards a degree. If you have completed more than 120 units (excluding AP units), you will not be allowed to file a change of major petition, except by appeal. Your appeal must include a quarter-by-quarter plan of study before a review of your appeal will be considered.

Requirements for students changing their majors to Aeronautical Engineering, Biological Systems Engineering, Chemical Engineering, Civil Engineering, Food Engineering, Materials Science, or Mechanical Engineering or double majors within these fields: You must have completed at least 40 units as a registered student on the Davis campus; have successfully completed Mathematics 21A, 21B, and 21C and Physics 9A (or their equivalents); have and maintain a minimum GPA of 2.5 in all mathematics and physics course work in the Mathematics 21 and 22 series and in the Physics 9 series; and have a minimum UC GPA of 2.5. (Petitions submitted for a change of major to the Department of Civil and Environmental Engineering will be accepted on a first-come, first-served basis, subject to available space. If you transfer to a major in the College of Engineering other than Civil Engineering, you may not later change into the Civil Engineering major.)

Requirements for students changing their majors to Electrical Engineering, Electrical Engineering/Materials Science and Engineering, or Computer Engineering, or double majors that include any of these fields: You must be a registered student at UC Davis for at least one quarter before petitioning for a change of major; be in good academic standing; be making minimum progress towards a degree with an overall UC GPA of at least 2.5; and have completed Mathematics 21A, 21B, and 21C; Engineering 5 or Computer Science Engineering 30, Physics 9A, and Chemistry 2A with a GPA of at least 2.75 in these courses and have and maintain a GPA of 2.75 in all technical course work.

Requirements for students changing their majors to Computer Science and Engineering or a double major that includes Computer Science and Engineering: You must be a registered student at UC Davis for at least one quarter before petitioning for a change of major; be in good academic standing; be making minimum progress towards a degree with an overall UC GPA of at least 2.5; and have completed Mathematics 21A, 21B, and 21C; Computer Science Engineering 30 and 40, and Physics 9A with a GPA of at least 2.75 in these courses. If you have completed the equivalent course work at another institution, you must have a GPA of 3.0 in the equivalent course work and have a minimum of two UC Davis Computer Science Engineering (ECS) courses (with the exceptions of ECS 10, 15, 15AT, and 167) with a GPA of at least 2.75 in all ECS courses and have and maintain a GPA of 2.75 in all technical course work.

Multiple Majors

College of Agricultural and Environmental Sciences. Because of similarity in course requirements for many of the major programs in the college, requests for multiple majors are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major, or of adopting one or more of the minor programs offered by the college to complement your major. If you complete two majors, you may also petition for recognition that you have completed all the requirements for study of a major in addition to your selected major. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of the other major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

College of Engineering. Engineering has several established double majors. Enrollment in combinations of engineering majors other than the established double majors or in an engineering major and a non-engineering major may be possible. A change of major petition is required; this should be filed in the Undergraduate Office and is subject to approval. Double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

If you want to double major in any of the over-subscribed majors listed above, you will be subject to the additional restrictions for transferring into those majors and must satisfy the requirements of both majors.

College of Letters and Science. Students choosing to major in multiple subjects must notify the dean's office of their decision by submitting for approval a petition endorsed by faculty advisers in the majors. The dean's approval of the declaration of more than one major is subject to the following conditions:

1. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and may not be counted toward the upper division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

   If the major programs differ in the number of upper division units required, the major program requiring the smaller number of units will be used to compute the minimum number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter and at least two upper division courses in each major must have been successfully completed.

All degree requirements must be completed within the 225-unit limit.

Combination proposals that *cannot be approved* are two or more majors

1. in the following group: biochemistry; biological sciences; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology and behavior; and plant biology; or,
2. offered by the same discipline, *except* art history and art studio.

A student who completes all requirements for approved multiple majors in which one major normally leads to an A.B. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

Cross-College Majors

College of Agricultural and Environmental Sciences. The College does encourage multiple majors between colleges whenever your academic interests and abilities indicate this to be the best route. After endorsement of the Change of Major petition by the appropriate faculty in the colleges involved, each dean may approve the petition if there are sufficient differences between the requirements for the major programs you wish to study. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of the other major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

College of Engineering. Enrollment in a combination of an engineering major and a non-engineering major may be possible. A change of majors petition must be filed in the Undergraduate Office and is subject to approval. Such double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

College of Letters and Science. The same conditions apply for cross-college majors as for multiple majors. Cross-college programs will not be approved if the majors involved are available within a single college as well. For example, cross-college programs between the Colleges of Letters and Science and Agricultural and Environmental Sciences will not be approved if one of the majors is biochemistry; biological sciences; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology and behavior; or plant biology.

Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. Such a major requires the selection of interrelated courses totalling a minimum of 45 upper division units from two or more areas of study. If you choose this option you will work closely with faculty advisers to develop a coherent and rigorous academic program. This program is then submitted to a faculty committee for review and approval. Submit the proposed program to the committee **by the fourth full week of the fifth quarter before graduation.** If you wish to undertake an individual major, request the appropriate forms from your dean's office. Program requirements are outlined under Individual Major in the Programs and Courses section of this catalog. The College of Engineering does not offer an individual major.

THE MINOR

If you are interested in two or more areas of study, you should consider completing one or more minor programs. Minor program requirements are listed in the Programs and Courses section of this catalog under the department that offers them. You will find a complete list of the minors offered at UC Davis in a chart at the front of this catalog.

A minor consists of 18 to 24 units in upper division courses specified by the department or program offering the minor. Courses used to satisfy the requirements of a minor, including those completed elsewhere, must be approved by an adviser in the sponsoring department or program. **For minors offered by the College of Agricultural and Environmental Sciences, at least half of these units and courses must be completed in residence on the Davis campus.** You are also expected to complete all courses that are prerequisite to the upper division courses required for the minor. Minors offered by the College of Letters and Science do not require that a portion of the units be completed at UC Davis.

To request certification of a minor, **you must have a grade point average of 2.0 in all courses required for the minor.** At most, one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, these minors may not have any courses in common.

If you want to have completion of a minor certified on your transcript, you must obtain a minor petition from your dean's office and file it no later than the deadline for filing for graduation. You can elect only one minor in a subject area. Requirements for the minor must be met by the time of graduation.

No minors are available in the College of Engineering, although students in Engineering may, with the approval of the Engineering dean's office *and* the adviser in the minor department, elect a minor in either the College of Letters and Science or in the College of Agricultural and Environmental Sciences. You must pick up a minor petition in the office of the college that offers the minor you want and have the completed petition approved by the minor adviser and then certified by the Undergraduate Office of the College of Engineering. A minor is not required and may not be used to substitute for approved Humanities and Social Sciences (HSS) electives. The Undergraduate Office in the College of Engineering has the primary responsibility for certifying minors for engineering students and should be consulted before you begin the minor sequence.

ACADEMIC CREDIT

Units of Credit

Academic work at the university is measured by "units of credit." In conjunction with the letter grade you receive from the course instructor, units of credit give a fairly accurate evaluation of the amount of time you have devoted to a given subject. Units of credit also

make it possible to anticipate the amount of work involved in a particular course and enable you to transfer from one campus or university to another without undue difficulty. (To convert quarter units to semester units, multiply by 0.66; from semester to quarter units, multiply by 1.5.)

Units of credit are assigned to courses based on the "Carnegie unit," which assigns 1 unit of credit for three hours of work by the student per week. Usually this means one hour of lecture or discussion led by the instructor and two hours of outside preparation by the student. In laboratory courses, two or three hours of work in the laboratory are normally assigned 1 unit of credit.

In most courses at UC Davis the standard procedure prevails, so that a 3-unit course meets for three hours a week, a 4-unit course for four hours, and so on. Courses that are an exception to this pattern may require additional class time or give more demanding assignments. If you have questions about the number of units assigned to a course, you should check the expanded course descriptions (if your college or department provides them) or ask the instructor what is required in terms of outside reading, term papers, problem sets or field trips. These are not always spelled out completely in the *General Catalog.* By knowing the amount of work that will be required, you can plan your course load more systematically and realistically.

Credit by Examination

Under certain prescribed conditions, currently registered students in good standing may receive course credit by taking an examination without formally enrolling in a course. You may obtain a petition and a copy of the prescribed conditions from the Office of the Registrar. The petition is subject to the approval of the instructor giving the examination and the department involved.

The completed petition, accompanied by a fee of $5.00, must be presented for final approval to the dean of your college or school, or if you are a graduate student, to the dean of Graduate Studies.

The credit received for the examination may not duplicate any credit you have already earned toward your degree. You may not use credit by examination to repeat any course you have taken previously, regardless of the grade you received in that course. The final results will be reported to the Office of the Registrar, which will assign you the appropriate grade and grade points. Since failure to pass the examination will be recorded as an F, you are encouraged to prepare fully for such an examination before attempting it.

You may also receive credit for learning in nonacademic settings through credit by examination.

To earn credit through the credit by examination process, the examination must be given by a UC Davis instructor and be for a course listed in the current *General Catalog.* Students are not eligible to take a credit by examination in a quarter in which they are not currently enrolled.

Concurrent Credit from Another Institution

A student may not obtain transfer credit for courses taken at a non-University of California campus in a term during which the student is registered as a full-time student at UC Davis. A variance can be obtained only by petitioning the dean of your college well in advance of the desired registration. When a variance is granted, units earned are counted toward minimum progress for the term in which the dual registration occurs. Summer session courses are exempt from this regulation.

Students may gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. Assurance that such credit will be accepted, however, can be given only after the courses have been completed. You should arrange to have the transcripts of your summer session grades sent to Undergraduate Admissions and Outreach Services for evaluation. See the Summer Sessions bulletin for detailed information.

Intercampus Visitor Program

Qualified undergraduates may take advantage of educational opportunities on other University of California campuses as an Intercampus Visitor (ICV). This program enables students who have completed at least one year in residence on their home campus and have maintained a grade point average of at least 2.0 to take courses not available on their home campus, to participate in special programs, or to study with distinguished faculty members on other campuses of the university. Students who meet the above requirements should complete an application available in the Office of the Registrar.

Summer Sessions

44 Mrak Hall
Davis, CA 95616-8715
916-752-1641 or 1-800-VIP-2738;
e-mail: summer-sessions@ucdavis.edu
International programs: 1-800-SUMMER6
Summer Humanities Institute: 916-752-1641
World Wide Web:
http://www.mrak.ucdavis.edu/SSessions/UCDsummer.html

Every summer, several thousand students earn units, complete their undergraduate degrees, expand their knowledge, do research, take special study courses, meet prerequisites or take courses that are often overenrolled during the academic year by participating in Summer Sessions at UC Davis. Nearly 6,500 students enrolled in 1996.

Summer Sessions offers more than 200 lower and upper division courses in a wide range of subject areas that provide full university credit transferable to most campuses. Since admission is open to virtually all adults, Summer Sessions traditionally attracts students from universities and colleges, high school graduates and many other qualified applicants. Admission to a summer session, however, does not guarantee or imply admission to the university's regular academic quarters.

In 1998, the Office of Summer Sessions will offer two six-week sessions, which will run from June 29 to August 7 and from August 10 to September 18. All UC Davis undergraduates will automatically receive our 1998 Summer Sessions Catalog and application materials by the end of April; non-UC Davis undergraduates should contact us by phone, e-mail or in writing to the the address above.

International and special programs offered in 1997 included the Summer Humanities Institute: An Honors

Program for High School Juniors; the Summer Institute of Fine Arts; Literature of Northern California; Literature of the Wilderness, in McCall, Idaho; the study of volcanoes in Hawaii; and other special topic programs of different lengths. In 1997, students had the opportunity to study in England, France, Italy, Jamaica, Japan and Peru.

UC/CSU/Community College Cross Enrollment

If you are interested in taking a particular class a nearby CSU or Community College campus, you may now do so through the Intersegmental Cross Enrollment program. Enrollment is limited to one course per term and participating students need the approval of both the home and the host campus. (Please note that the Los Rios Community College district is NOT participating in the program.)

Senate Bill 1914, also known as the Killea Bill, requires that UC, CSU and the California Community Colleges permit students to enroll in one course per term at a campus of either of the other two systems on a space available basis at the discretion of the two campuses. This program aims to encourage community college students to enroll concurrently in courses offered at local universities, potentially increasing the number of community college transfers, including students from underrepresented groups.

Students must meet certain qualifications and be certified by their home campus as to eligibility, residence, fee, financial aid and health status. Generally, students will be allowed to add a class, if space is available, after the add/drop period on the host campus. To add a course, students must obtain the faculty member's approval and signature on a Cross-Enrollment form, available at their home campus Registrar's Office. The student takes the signed form to the Office of the Registrar at the host campus for processing. If you are interested in participating, come to the service counter at the Office of the Registrar, 12 Mrak Hall, for information.

University Extension

Credit for a limited number of units may be granted for specified University Extension courses, subject to the regulations of the individual colleges (see Bachelor's Degree Requirements section). No grade points are assigned for courses completed through University Extension.

EXAMINATIONS

Midterms

In undergraduate courses for which a midterm examination is required, each student has the right to take the midterm (or submit the take-home examination as opted by the instructor) during one of the regularly scheduled meetings of the class as published in the *Class Schedule and Room Directory.* The scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual consent of the instructor and each student registered in the course. A student who does not consent in writing to the different time must be permitted to take the examination (or submit the take-home examination) at the officially scheduled time. A student who consents in writing to the change of examination time waives the right to take the midterm at the officially scheduled time.

Final Examinations

Scheduling. The *Class Schedule and Room Directory* lists the times that final examinations are to be held. These are set up according to the day-and-hour periods in which the classes are given during the quarter. This information is available in the *Class Schedule and Room Directory* each term so that you can avoid final examination conflicts.

The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student involved in the change. Any student who does not consent in writing to a different time must be permitted to take an examination (or submit the instructor-opted take-home examination) at the officially scheduled time. A student who consents in writing to a change in the final examination time waives the right to take the examination as originally scheduled. Departures from the published examination schedule should be carried out so as not to disadvantage students who are unable to accept the alternate schedule. An in-class final examination may not be rescheduled for a date earlier than the first day of finals week. The due date for a take-home final examination may not rescheduled for a date earlier than the first day of finals week. A student who is improperly denied the right to take a required final examination on the published date (or submit the take-home examination as opted by the instructor) may file a petition with the Executive Council of the Davis Division of the Academic Senate by the end of the next regular term for appropriate action.

Requirements. Except under certain specified circumstances, Academic Senate Regulations require that final examinations be given in all undergraduate courses. Final examinations may be given in graduate courses. Exceptions to the regulation would be independent study courses, courses that consist of laboratory work only, and courses in which the examination has been waived (course descriptions will include the statement, "no final examination").

At the instructor's option, the final examination may be completely or in part a take-home examination. The writing time (in undergraduate courses) of a take-home and an in-class final examination together should not exceed three hours. In each course in which a final examination is required, the students have the right to take the final examination (and/or submit the take-home examination) at the time published in the *Class Schedule and Room Directory.*

An instructor may release each student's original examination, or a copy, at any time. Otherwise, the instructor will keep the exams, or copies thereof, until the end of the next quarter and students may pick up their exams during this period.

Disabilities. Students with documented disabilities may be entitled to in-class accommodations. The student shall provide the instructor with a letter from the Disability Resource Center (DRC) recommending those academic accommodations that the instructor is respon-

sible for providing. Students must request accommodation as soon as possible, to allow the university reasonable time to evaluate the request and offer necessary adjustments. No accomodations shall alter the nature of the academic demands made of the student nor decrease the standards and types of academic performance, nor require facilities or personnel that cannot reasonably be provided. The instructor should consult with the student and DRC on any questions or concerns.

Religious observances. UC Davis seeks to accommodate any student who, in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. The student is responsible for providing, in writing and at the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the examination and requesting accommodation. Instructors will consider such requests on a case-by-case basis and determine whether such conflicts can be resolved without imposing on the instructor or the other students in the class an undue hardship which cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the test or examination without incurring a penalty or violation to the student's religious creed.

GRADES

Every instructor is required to assign a grade for each student enrolled in a course. The following grades are used to report the quality of a student's work at UC Davis:

A	*excellent*
B	*good*
C	*fair*
D	*barely passing*
F	*not passing (work so poor that it must be repeated to receive recognition)*
P	*passed (grade C– or better)*
NP	*not passed*
S	*satisfactory*
U	*unsatisfactory*
I	*incomplete (work is satisfactory but incomplete for a good cause)*
IP	*in progress*
ENW	*enrolled–no work submitted*

The grades A, B, C and D may be modified by a plus (+) or minus (–).

The notation"ENW" (Enrolled–No Work Submitted) will be recorded on a student's official transcript for any course on the student's study list for which, to the best of the instructor's knowledge, the student did not present any work subject to grading.

Grade Points

Grade points are assigned each letter grade as follows:

4.0 = A+	2.3 = C+	0.0 = F
4.0 = A	2.0 = C	0.0 = I
3.7 = A–	1.7 = C–	0.0 = P/NP
3.3 = B+	1.3 = D+	0.0 = S/U
3.0 = B	1.0 = D	
2.7 = B–	0.7 = D–	

Grade Point Average (GPA)

The grade point average is computed on courses taken at the University of California, with the exception of courses taken in University Extension. The value of grade points over units attempted determines your grade point average. The grade point balance represents the number of grade points above or below a C average. The grades IP, P, S, NP and U carry no grade points and are not included in grade point computations. Incomplete (I) grades are not included in the GPA at the end of the quarter, but are counted as F in determining if a bachelor's degree candidate has earned the minimum 2.0 GPA required for graduation.

A student at Davis is expected to maintain a C (2.0 GPA) or better in all work undertaken in the university. If you fall below a C average, you are considered "scholastically deficient" (see Probation and Dismissal).

Passed/Not Passed (P/NP) Grading

Subject to regulation by the faculties of the colleges and schools, an undergraduate student **in good standing** may request to take specific courses on a Passed/Not Passed basis. Such requests must be submitted and confirmed before the 25th day of instruction.

The grade P is assigned for a grade of C– or better. Units thus earned are counted in satisfaction of degree requirements but are not counted in determining your grade point average.

The intent of this option is to encourage exploration in areas in which you have little or no previous experience by alleviating grading pressures. **The maximum number of units graded P that will be accepted for degree credit is one third of the units completed in residence on the Davis campus.** Consequently, at least two thirds of the units completed in residence at Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade.

In specific approved courses instructors will assign only Passed or Not Passed grades. Such courses count toward the maximum number of units graded P allowable toward the degree. If you are planning to take courses on a P/NP basis, you should also familiarize yourself with the requirements of your particular school or college, which may have placed conditions or restrictions in addition to the university requirements. If you plan to attend graduate or professional school, you should consult with Advising Services regarding Passed/Not Passed grading.

If you elect the P/NP grading option for courses graded upon completion of a two- or three-quarter sequence (In-Progress grading), a petition must be submitted before half of the time covered by the IP grading has elapsed. The P/NP grading will then be in effect for the entire course sequence.

If you receive a D or an F in a course you may not repeat it using the P/NP option. If you receive an Incomplete in a course you took for a letter grade, you may not complete the course on a Passed/Not Passed basis.

College of Agricultural and Environmental Sciences: The Passed/Not Passed option should be used only for elective courses, not for courses taken to fulfill major requirements. An NP grade in a course required by the

major could prevent graduation. When in doubt, check with your faculty adviser before electing to take a course on a Passed/Not Passed grading basis.

College of Engineering: Students enrolled in any undergraduate major within the College of Engineering may **not** exercise the Pass/Not Passed grading option for any course work used toward satisfaction of course or unit requirements for the degree. Courses offered only on a P/NP basis are acceptable for specific program area degree requirements.

College of Letters and Science: Students enrolled in the College of Letters and Science are subject to an additional limitation on the number of units that may be completed employing the Passed/Not Passed grading option (see the "Bachelor's Degree Requirements" section). Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before electing for Passed/Not Passed grading in courses required for the major program.

Satisfactory/Unsatisfactory (S/U)

The grade of S is awarded to graduate students for work in graduate courses that otherwise would receive a grade of B– or better, and in undergraduate courses for work that otherwise would receive a grade of C– or better.

Graduate students, under certain circumstances, may be assigned grades of S or U, but units earned in this way will not be counted in calculating the grade point average. Petitions to elect S/U grading are available from the Graduate Studies Office and must be signed by your graduate adviser. Graduate students may petition to take no more than one course per quarter on an S/U grading basis. A graduate course in which a C, D or F grade is received may not be repeated with the S/U option.

In specific approved courses, instructors will assign only Satisfactory or Unsatisfactory grades. Such courses count toward the maximum number of units graded S allowable toward the degree, as specified by each degree program.

In-Progress (IP) Grading

For a course extending over more than one quarter (designated "deferred grading only, pending completion of sequence" in course descriptions), evaluation of student performance is deferred until the end of the final quarter. Provisional grades of IP are assigned in the intervening quarters and are replaced with the final grade at the completion of the sequence. In order to gain credit toward graduation, a student must successfully complete the entire sequence. (See above for electing P/NP grading for a course graded in-progress.)

Incomplete Grades

The grade of I may be assigned when a student's work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause as determined by the instructor. (Good cause may include current illness, serious personal problems, an accident, a recent death in the immediate family, a large and necessary increase in working hours or other situation of equal gravity.)

You may replace an I grade with a passing grade and receive unit credit (and grade points if the instructor assigns a letter grade) provided you satisfactorily complete the course work as specified by the instructor. In order to change your records, you must obtain a petition from the Office of the Registrar and present it to your instructor for completion and mailing.

An I grade must be replaced with a letter grade (or P or S grade) before the end of the third succeeding quarter (excluding summer sessions) of the student's academic residence, or the grade will revert to an F (or NP or U). If a student's degree is conferred before the expiration of the time limit for an I-grade conversion, the graduated student shall have until the end of the third quarter succeeding the quarter in which the I grade was assigned to replace the I grade. If the grade is not replaced by then, the I grade will remain on the student's record.

You may not re-enroll for credit in a course for which an I grade has been assigned. An undergraduate student whose record shows more than 16 units of I grades will be subject to disqualification. A graduate student who accumulates more than eight units of I grades will be subject to probation.

Incomplete grades will not be included in your grade point average at the end of a quarter. At the time of graduation, however, any remaining I grades are included when your grade point average is computed, in order to determine whether you have achieved the 2.0 average required for the bachelor's degree. An Incomplete grade, in these computations, has the same effect as a grade F, NP or U, depending on which option you have exercised. Therefore, it is recommended that students not delay the clearance of incomplete grades so as not to jeopardize graduation.

Retroactive Grade Changes

All grades except I and IP are final when filed by an instructor at the end of the quarter. No final grade except I may be revised by examination or the submission of additional work after the close of the quarter.

If, however, a clerical or procedural error in the reporting of a grade by the instructor can be documented, you may request a change of grade with a petition available from department offices. The request must be made by the fifth week of the following quarter.

Grade changes for "clerical" errors (such as incorrect addition of points), upon documentation, are automatically granted. Requests to interchange "P," "NP," "S," or "U" grades with normal letter grades based upon student need (such as to allow graduation or to meet entrance requirements for professional school) do not involve clerical or procedural errors and are automatically denied. Thus, students should exercise the Passed/Not Passed or Satisfactory/Unsatisfactory grading options with caution.

Students are reminded of their reponsibility to to be aware of the procedures and regulations contained in this catalog and the *Class Schedule and Room Directory*, to verify their schedules via RSVP, and to familiarize themselves with the expectations of their instructors. No changes, except completion of an I grade as noted above, can be made to the student's record once he or she has graduated.

The newly retrofitted language lab houses 22 PowerPC computers loaded with language software and wired into cyberspace.

Repeating Courses

Undergraduate students may only repeat courses in which they received a D, F or NP. Courses in which students received a grade of D or F may not be repeated on a P/NP grding basis. (Courses in which a grade of NP was received may be repeated on a P/NP grading basis.)

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of undergraduates who have received a grade of D, F or NP, only the grade and corresponding grade points earned the second time a course is taken will be used, up to a maximum of 16 units for all courses repeated. After the 16-unit maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

Repeating a course more than once requires approval by the appropriate college dean. Departments may restrict the repetition of a course if it is a prerequisite to a course the student has already completed with a grade of C– or better.

Graduate students, with the consent of the appropriate graduate adviser and the dean of Graduate Studies, may repeat any course in which they received a C, D, F or U, up to a maximum of 9 units for all courses repeated. Courses in which a grade of C, D or F has been earned may not be repeated on a S/U basis. (Courses in which a grade of U was received may be repeated on a S/U basis.)

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of graduate students who have received a grade of C, D or F, only the most recently earned grade for each course and corresponding grade points will be used, up to a maximum of 9 units for all courses repeated. After the 9-unit maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

Mid-Term Grade Standing

Students wishing to know their grade at the mid-quarter should ask the instructor. Those who have deficient grades (D, F or Not Passed) are urged to confer with their advisers.

Final Grades

Grades are generally available about three weeks after a quarter has ended. You can check your grades in a number of ways:

- Call RSVP to hear your grades, available at the dates published by the Office of the Registrar
- Check your grades using a Web browser by accessing WIRES at: http://www.ucdavis.edu/wires
- Use the Office of the Registrar Kiosk, Mrak Hall lobby
- Have your grades mailed to you, by bringing a stamped, self-addressed envelope with your student photo ID card to the Office of the Registrar before the end of the quarter

Transcripts

A record of each student's academic work at UC Davis is retained permanently by the Office of the Registrar. Copies of your official transcript may be obtained from that office for $4.00 a copy. Application for a transcript of record should be made at least two weeks in advance of the time needed.

Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University Extension Office, 1333 Research Park Drive. Transcripts of work completed at another campus of the university or at another institution must be requested directly from the campus or institution concerned.

PROBATION AND DISMISSAL

The following provisions apply to all undergraduates. Graduate and professional students with scholarship deficiencies are subject to action at the discretion of their respective deans.

Scholastic Deficiencies

A student will be placed on probation or subject to disqualification for failure to meet qualitative or quantitative standards of scholarship.

The **qualitative standards** of scholarship require that a student maintain a C average (2.0) or better for all work undertaken in the university and for the work undertaken in any one quarter.

A student will be placed on **probation for qualitative reasons** if, at the end of any quarter, the student's grade point average (GPA):

- is less than 2.0, but not less than 1.5, for the quarter,

or

- is less than 2.0 for all courses taken within the University of California.

A student will be subject to **disqualification for qualitative reasons** if, at the end of any quarter,

- the student's grade point average is less than 1.5 for the quarter,

or

- the student's grade point average is less than 1.5 for all courses taken within the University of California.

or

- the student has attempted more than 16 units graded I (Incomplete),

or

- the student has spent two consecutive quarters on academic probation.

In the case of probation or disqualification the official transcript will state "not in good standing." Once a student has met qualitative standards for scholarship, the notation will be removed from the transcript.

The **quantitative standards,** referred to as minimum progress requirements, define scholarship in terms of the number of units that you must satisfactorily complete. It is assumed that a student will earn the 180-unit minimum degree requirement within 12 quarters (four years). This means students must plan to complete, on average, 15 units per quarter. Because occasions arise which prevent students from achieving normal progress towards the degree, the campus has established minimum progress requirements, to which students must adhere. Minimum progress is defined as an average of 12 units passed per quarter, calculated at the end of every quarter for the preceding three quarters.

A student will be placed on **probation for quantitative reasons** if the student fails to make minimum progress for that quarter. The notation "warning—minimum progress" will be noted on the grade report for a quarter in which the student has passed less than 12 units. Students calling RSVP to check their grades will hear a warning that they are not in good academic standing; if they print their grades from the Office of the Registrar Kiosk, they will see the same warning on their printout.

A student will be subject to **disqualification for quantitative reasons** if the total number of units passed at UC Davis is **less than 36,** calculated at the end of every quarter for the preceding three quarters of enrollment. The notation "minimum progress—subject to academic disqualification," will be noted on the grade report the first time the total number of units passed at UC Davis is **less than 36,** calculated at the end of every quarter for the preceding three quarters of enrollment.

Quantitative standards are not reflected on the official transcript.

The following courses may be counted toward unit minimum progress:

- Required non-credit courses, e.g., Mathematics B, will be evaluated according to the "Carnegie unit" rule and counted as units passed
- Repeated courses passed to improve D or F grades
- Courses passed in Summer Sessions at UC Davis or at another accredited school and transferred to UC Davis will be counted as units passed (applied to the quarter of registration just preceding the summer session)
- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to quarter in which exam is taken)
- Courses that are IP (in progress) will be counted as units passed
- Courses graded I will be counted as units passed when replaced by a passing grade (applied to the quarter in which the I grade is received)

The dean of the student's college may grant a student a minimum progress variance of one or more quarters for an acceptable reason.

Minimum progress requirements do not apply to students who have part-time status or to students who have their dean's approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a recent death in the immediate family, or a serious accident involving the student.

Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which you are enrolled. Such dismissal is from the University of California system and not simply the college or the Davis campus. Should a former Davis student later wish to be readmitted on the Davis campus, the authority to do so rests with the dean of the college from which the student was dismissed. If you are dismissed from your college, you will automatically receive a full refund of registration fees paid.

See your faculty adviser or go to the dean's office of your college if you need academic advising about probation and dismissal.

Transfer with Scholastic Deficiencies

To transfer from one University of California campus to another, or from one college or school to another on the same campus, a disqualified or probational student must obtain the approval of the dean whose jurisdiction is being sought. Following the transfer, the student is subject to supervision by the faculty of the new college, school or campus.

HONORS AND PRIZES

Scholarships

Information:
Scholarship Office
207 Third Street, Suite B
916-752-3153

By mail:
Scholarship Office
University of California
Davis, CA 95616-8696

Students with outstanding academic records who show promise of continued scholarly achievement are encouraged to apply for scholarship recognition and awards. Awards are accompanied by a financial honorarium or stipend.

Deans' Honors Lists

According to Davis campus regulations, the quarterly Dean's Honors List includes names of students who have completed, for a letter grade, a minimum of 12 units in a specific quarter with a grade point average equal to or higher than the minimum grade point average attained by the upper 16 percent of those registered in the same class level and college during that quarter. Honors lists will be posted quarterly outside deans' offices, and a

notation of these honors will be placed on each student's permanent record by the Office of the Registrar.

Graduation Honors

Honors at graduation are awarded to students who have a grade point average in the top percent of their college as shown in the table below. (The College of Letters and Science requires that additional criteria be met for high and highest honors—see explanation below.)

Total Quarter Units Completed at UC	Highest Honors	High Honors	Honors	Total
45-89	2%	2%	4%	8%
90-134	3%	3%	6%	12%
135+	4%	4%	8%	16%

Grade point averages from the winter quarter previous to graduation are used to determine the averages that will earn an honors designation. Following are the averages for winter quarter 1997. These averages will be used through winter 1998.

Grade Point Average by College

Percent Determining Cut-Off Point	Agricultural and Environmental Sciences	Engineering	Letters and Science
2%	3.872	3.898	3.890
3%	3.831	3.840	3.838
4%	3.792	3.802	3.802
6%	3.711	3.728	3.736
8%	3.646	3.656	3.675
12%	3.525	3.537	3.583
16%	3.428	3.434	3.500

An honors notation is made on students' diplomas and on their permanent records in the Office of the Registrar.

College of Letters and Science. Graduation with honors requires that a student meet the appropriate grade point requirement described in the above table for all UC courses completed. Students who meet the grade point requirement for graduation with honors and who complete the Honors Program of the College of Letters and Science may be recommended by their departments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. A notation shall appear on the student's official transcript indicating that the 194H Honors Thesis was completed. Graduating students will not be awarded honors with the bachelor's degree if more than eight units of grade I (Incomplete) appear on their transcripts. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the dean's office.

The Honors Program of the College of Letters and Science

The Honors Program in the College of Letters and Science permits students to pursue a program of study in their major at a level significantly beyond that defined by the normal curriculum. It represents an opportunity for the qualified student to experience aspects of the major that are representative of advanced study in the field. Successful completion of the College Honors Program is a necessary prerequisite to consideration for the awarding of high or highest honors at graduation.

Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.5 in courses counted toward the major. Other prerequisites for entrance into the program are defined by the major. The program consists of a project whose specific nature is determined by consultation with the student's major adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment depending on the major. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of six units of credit be earned in course work for the project.

Davis Honors Challenge

Information:
916-752-9797

The Davis Honors Challenge (DHC) is a campuswide program for highly motivated students interested in enhancing their education through special courses, closer contact with faculty and dynamic interaction with academic peers.

DHC participants take two honors courses and one problem-oriented interdisciplinary seminar per academic year. Eighteen seminars are offered each year. The seminars are designed to foster critical thinking and analytical interpretation, improve oral and written communication skills, enhance research skills, provide experience with group dynamics and collaborative exploration of problems, and develop familiarity with electronic communication and visual presentations.

DHC seminars are limited in size so that participants receive substantial individual attention from faculty. In return, students are expected to participate actively in analyzing real-world problems that require the best intellectual efforts of us all. Honors courses and small honors sections of regular courses also encourage individual student participation and self-challenge. Students satisfactorily completing the Davis Honors Challenge will receive transcript notation for each academic year of participation.

First-year students filing a "Statement of Intent to Register" at UC Davis will receive an application for one of the 120 places in the program. Students interested in applying for one of the 240 places available for second-year students should contact DHC. In addition, 60 third-year students will be admitted to a new, upper division pilot program.

Integrated Studies

Information:
916-752-9797

Integrated Studies is a campuswide invitational first-year residential honors program associated with the Davis Honors Challenge. Integrated Studies offers theme-oriented, specially designed, interdisciplinary honors courses that satisfy General Education requirements. Approximately 70 students live in an Academic Residential Community on campus and take three limited-enrollment honors courses open only to Integrated Studies students.

Holders of Regents Scholarships, the university's most prestigious scholarship awards, are guaranteed places

in Integrated Studies. Other highly qualified scholarship holders are also invited to participate and are selected to create a balanced community of students from all three undergraduate colleges and the Division of Biological Sciences.

Prizes and Awards

The University Medal is the highest campus honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College or School Medal is given to the outstanding graduating student in each of the colleges and professional schools.

Departmental citations, special awards and prizes are also awarded to students for superior achievement and scholarship.

College of Agricultural and Environmental Sciences. Each year the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient. The Mary Regan Meyer Prize is awarded to an outstanding graduate who has demonstrated expertise and an interest in serving humanity. The Kinsella Memorial Prize, in honor of John E. Kinsella, is awarded annually to an outstanding individual who submits his or her Ph.D. dissertation during the spring, fall or winter quarter immediately preceding the due date for nomination.

College of Engineering. Each year outstanding senior students in engineering are recommended by the faculty of the College as nominees for the M.S. Ghausi Medal. Academic excellence is the primary basis for selecting the recipient of the award.

College of Letters and Science. Graduating seniors with a distinguished academic record may be recommended by the faculty as nominees for the College's Herbert A. Young Medal. Each June, one medalist is selected from among the graduates of the current academic year. The Leon H. Mayhew Award is conferred upon the outstanding graduate from a disciplinary area other than that of the College medalist. Academic excellence is the primary basis for selecting the recipients of these awards. The Lawrence J. Andrews prize is awarded to a student entering the senior year who not only has achieved academic excellence but who also has demonstrated interests outside of pure scholarship.

Chancellor's Award

This award recognizes students who have distinguished themselves through their excellence in and contribution to undergraduate research and encourages others to become involved in these types of efforts. Recipients of the award receive a certificate of commendation and inscribed plaque from the president of the university.

In conjuction with the Chancellor's Award, Professor Dean Simonton of UC Davis' Department of Psychology established an endowment for funding a cash prize of $500 for each year's student recipient.

Honorary Societies

Election to an honorary society is one of the most prestigious awards a student can receive. At UC Davis, the following honorary societies are represented:

Alpha Kappa Delta (Sociology)
Alpha Omega Alpha (Medicine)
Alpha Zeta (College of Agricultural and Environmental Sciences)
Delta Phi Alpha (German)
Golden Key (All colleges and schools)
Kappa Omicron Nu (Family and Consumer Sciences)
Omicron Delta Epsilon (Economics)
Order of Omega (Fraternities–Sororities)
Order of the Coif (Law)
Phi Alpha Theta (History)
Phi Beta Kappa (College of Letters and Science)
Phi Kappa Phi (All colleges and schools)
Phi Sigma (Biological Sciences)
Phi Zeta (Veterinary Medicine)
Pi Delta Phi (French)
Pi Mu Epsilon (Mathematics)
Pi Sigma Alpha (Political Science)
Prytanean Honor Society (All colleges—undergraduate women only)
Psi Chi (Psychology)
Sigma Pi Sigma (Physics)
Sigma Xi (All colleges and schools—research)
Tau Beta Pi (Engineering)

LEAVING UC DAVIS

Graduation

Each candidate for an undergraduate degree must file an **Announcement of Candidacy** with the Office of the Registrar for the quarter in which the candidate plans to receive the degree. The dates for filing are published in the Academic Calendar at the front of this catalog and the quarterly *Class Schedule and Room Direcory*.

Students in the College of Agricultural and Environmental Sciences must have their Major Certification form evaluated by the dean's office before their candidacy for a degree can be finalized (see the "Bachelor's Degree Requirements" section for the college).

Leave of Absence: Planned Educational Leave Program (PELP)

The Planned Educational Leave Program allows students to suspend academic work at UC Davis, leave the campus and later resume studies at UC Davis with a minimum of procedural difficulties.

Any registered student on the Davis campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program. To apply for PELP, file an application, including a brief written explanation of the reason for leaving the campus and stating when you intend to resume academic work at UC Davis. Applications for PELP are available at the Office of the Registrar and should be filed with the Office of the Registrar no later than the tenth day of instruction.

Freshmen and transfers who have been admitted but have not yet registered or attended classes are also eligible, providing an opportunity for beginning students to pause between high school or community college and

the university. Contact Undergraduate Admissions and Outreach Services for enrollment into the program (916-752-3710).

An application fee of $40 is charged, payable when you enroll in the PELP program. This fee is identical to that paid by a student who withdraws and is required to pay a readmission fee upon return.

The minimum Planned Educational Leave is one full quarter; the normal maximum leave is one full academic year. You may, however, request an extension of your leave. For purposes of this program, leave of one full quarter is defined as a leave beginning no later than the tenth day of instruction in a quarter. You should be entitled to a partial refund of fees paid. The number of days elapsed is determined from the date the completed PELP form is returned to the Office of the Registrar. (See Fee Refunds.)

While students may receive academic credit at other institutions and transfer this credit to UC Davis (subject to rules concerning transfer credit), participants are reminded that the intent of the program is to "suspend academic work." Therefore, students should carefully evaluate the desirability of taking academic work while away from the campus during PELP.

Readmission is guaranteed assuming you resume regular academic work at the agreed-upon date and satisfy any holds that may have been placed on your registration. Students who do not return at the agreed-upon date and who do not officially extend their leave will be automatically withdrawn from the university.

You will not be eligible to receive all normal university services during the planned leave. Certain limited services, however, such as placement and student employment services, counseling and faculty advising are available. Students on Planned Educational Leave may purchase a health care card from the Student Health Service and may retain library privileges by purchasing a library card. International students should consult Services for International Students and Scholars to find out what effects the Planned Educational Leave will have on their status. Grants and other financial aids will be discontinued for the period of the leave, but every effort will be made, where legally possible, to allow you to renegotiate loan payment schedules and to ensure the availability of financial aid upon your return.

Withdrawal

Withdrawals may be granted by the university for emergency reasons or for good cause. In order to withdraw, you must first obtain approval from the dean of your college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades. Petitions for Withdrawal are available at the Office of the Registrar. Information on fee refunds can be found under "Schedule of Refunds" in the Fees and Financial Aid chapter of this catalog. The following signatures are required on withdrawal petitions: laboratory or course instructor; dean of your college or graduate faculty adviser; Student Aid Accounting Office.

If you are receiving financial aid, you must report your change of status immediately, in person or by mail, to the Financial Aid and Student Aid Accounting Offices. If you are receiving veterans benefits, you must also report your withdrawal to the Veterans Affairs Office.

Retroactive Withdrawals. Petitions for retroactive withdrawals may be obtained from the Office of the Registrar. Reasons for seeking such are medical problems, severe emotional difficulties, or death or severe illness in the immediate family. Petitions should include a detailed account of the problem, appropriate documentation and an adequate explanation of why withdrawal was not taken during the quarter in which the problem occurred.

June brings commencement and celebrations of academic and personal achievement.

UNDERGRADUATE EDUCATION

UNDERGRADUATE EDUCATION

Students may choose from over 150 major programs in a wide variety of disciplines offered by the three undergraduate colleges. Minor programs, more than 60 in all, are offered by the College of Agricultural and Environmental Sciences and the College of Letters and Science.

College of Agricultural and Environmental Sciences

Office of the Dean, Academic Advising Center
228 Mrak Hall
916-752-0108

Major programs in the College of Agricultural and Environmental Sciences highlight the multiple connections among the environment, plant and animal systems, and human health and development, all within the larger context of the quality of life in the global economy. The majors fall into four broad areas of study described below. Majors in a fifth area of study, the biological sciences, are offered through both the College of Agricultural and Environmental Sciences and the College of Letters and Science and are administered by the Division of Biological Sciences. Refer to the following section, "Division of Biological Sciences," for more information. The College of Agricultural and Environmental Sciences also offers two collegewide degree programs and two collegewide non-degree programs.

The Undergraduate Programs

Animal Biology

These majors prepare students in animal biology and the management of environmental resources as needed to develop sustainable animal production technologies. Also considered is the impact of production and management processes on animal health and welfare, human diet and health, and the natural environment.

Majors:
Animal Biology, B.S.
Animal Science, B.S.
Animal Science and Management, B.S.
Avian Sciences, B.S.
Entomology, B.S.
Wildlife, Fish and Conservation Biology, B.S. (see also Environmental and Resource Sciences and Policy)

Minors:
Agricultural Entomology (Entomology)
Animal Science
Apiculture Entomology (Entomology)
Avian Sciences
Entomolovgy
Insect Ecology (Entomology)
Medical-Veterinary Entomology (Entomology)
Nematology

Environmental and Resource Sciences and Policy

These majors focus on the broad facets of the human and natural environments and their interactions. They draw on the social, physical and biological sciences as needed to prepare students for leadership and advanced studies in the areas of natural resource management, environmental quality and stewardship, community planning and design, and public policy decision making.

Majors:
Atmospheric Science, B.S.
Community and Regional Development, B.S.
Environmental and Resource Sciences, B.S.
Environmental Biology and Management, B.S.
Environmental Horticulture and Urban Forestry, B.S.
Environmental Policy Analysis and Planning, B.S.
Environmental Toxicology, B.S.
Hydrology, B.S.
Landscape Architecture, B.S.
Soil and Water Science, B.S.
Wildlife, Fish and Conservation Biology, B.S. (see also Animal Biology)

Minors:
Applied Biological Systems Technology (Biological and Agricultural Engineering)
Atmospheric Science (Land, Air and Water Resources)
Energy Policy (Environmental Studies)
Environmental Policy Analysis (Environmental Studies)
Environmental Toxicology
Geographic Information Systems (Biological and Agricultural Engineering)
Hydrology (Land, Air and Water Resources)
Soil Science (Land, Air and Water Resources)

Human Health and Development

These majors foster a deeper understanding of the multiple connections between scientific and cultural issues in the context of human health and the quality of life. Basic physical and biological science, social science, design, and economic priniciples are taught in this context, linking food and fiber production to consumption, emerging knowledge to societal applications and policy, and human development to active, informed citizenship. Emphasis is on linking resources for humans with humans as resources. Physiological, social, and aesthetic dimensions of the human experience are explored.

Majors:
Agricultural and Managerial Economics, B.S.
Community Nutrition, B.S.
Design, B.S.
Dietetics, B.S.
Fermentation Science, B.S.
Fiber and Polymer Science, B.S.
Food Biochemistry, B.S.
Food Science, B.S.
Human Development, B.S.
Nutrition Science, B.S.
Textiles and Clothing, B.S.
Viticulture and Enology, B.S.

Minors:
Aging and Adult Development (Human and Community Development)
Agricultural and Managerial Economics (Agricultural and Resource Economics)
Community Development (Human and Community Development)
Community Nutrition (Nutrition)
Fiber and Polymer Science (Textiles and Clothing)
Food Service Management (Nutrition)
Human Development (Human and Community Development)
Nutrition and Food (Nutrition)
Nutrition Science (Nutrition)
Textiles and Clothing

Plant Science

These majors provide a strong background in plant biology in the context of agricultural and environmental systems and societal needs. The Agricultural Systems and Environment major couples a strong background in plant biology with an ecological understanding of food and fiber production systems. The Crop Science and Management major provides a foundation in both the biological and economic principles that underlie management decisions in agribusiness. The Plant Biology major provides a basic background in all areas of plant biology, including plant development, plant protection, biotechnology and postharvest physiology.

Majors:
Agricultural Systems and Environment, B.S.
Biotechnology, B.S.
Crop Science and Management, B.S.
Plant Biology, B.S.

Minors:
Agricultural Computing and Information Systems (Agronomy)
Environmental Horticulture

Collegewide Programs

The collegewide programs cut across all of the above areas, providing students in a variety of majors with a background in such areas as public policy, economic principles in a global context, and the intersections among environmental, agricultural and socio-economic issues. Collegewide programs also include non-degree, lower division curricula aimed at providing students with a foundational knowledge base and the potential for developing individualized programs.

Majors:
Individual Major, B.S.
International Agricultural Development, B.S.

Minors:
International Agricultural Development
Science and Society

Non-degree programs:
Exploratory
Science and Society

Division of Biological Sciences

(College of Agricultural and Environmental Sciences and College of Letters and Science)

Division Office, Undergraduate Academic Programs
202 Life Sciences Addition
916-752-0410

The Division of Biological Sciences is an intercollege unit that coordinates campuswide programs in basic biology and administers undergraduate programs in the core disciplines of biology on behalf of the College of Agricultural and Environmental Sciences and the College of Letters and Science.

The division is organized into five sections that represent major themes of modern biology: Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology. The individual sections offer seven specialized majors, each focusing on one of the core disciplines of basic biology. The major in Biological Sciences and the Bodega Marine Laboratory Program are offered by the entire division.

The Undergraduate Programs

Biological Sciences

This major is broad in concept, designed to span the numerous core disciplines of biology. The Biological Sciences major covers most dimensions of the study of life, ranging from molecules and cells to populations of organisms. While emphasizing breadth, the Biological Sciences major also requires the student to select an area of emphasis that provides concentrated attention to one facet of biology at the upper division level. Each area of emphasis coincides with one of the divisional sections.

Major:
Biological Sciences, A.B., B.S.

Minor:
Biological Sciences

Evolution and Ecology

The major in evolution and ecology offers the student a broad background in the theoretical and empirical basis of our understanding of evolution and ecology of living organisms. The program of study begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in evolution and ecology and more specialized courses that allow the student to focus his or her studies.

Major:
Evolution and Ecology, A.B., B.S.

Microbiology

Microbiology deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology.

Major:
Microbiology, A.B., B.S.

Molecular and Cellular Biology

The Section of Molecular and Cellular Biology offers three majors. The biochemistry major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find biochemistry a rewarding field of study.

The cell biology major provides a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms. The major emphasizes principles that govern how biomolecules interact with one another to organize themselves into higher order structures that comprise cells and how cellular organization and function contribute to the development, maintenance, and reproduction of adult organisms.

The genetics major provides a broad background in the biological, mathematical, and physical sciences basic to

the study of heredity and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

Majors:
Biochemistry, B.S.
Cell Biology, B.S.
Genetics, B.S.

Neurobiology, Physiology and Behavior

All animals perform certain basic functions—they grow, reproduce, move, respond to stimuli and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated through the actions of the nervous and endocrine systems to determine behavior and the interaction between organisms and their physical and social environments. Students in this major will study functional mechanisms; the control, regulation, and integration of these mechanisms; and the behavior which relates to those mechanisms at the level of the cell, the organ system, and the organism.

Major:
Neurobiology, Physiology and Behavior, B.S.

Plant Biology

Plant biology is the study of plants as organisms. It includes the newer disciplines of cellular and molecular plant biology and the traditional areas of botany, such as anatomy, morphology, systematics, physiology, mycology, phycology, ecology, and evolution.

Major:
Plant Biology, A.B., B.S.

Minor:
Plant Biology

Divisionwide Program

Bodega Marine Laboratory Program

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory (BML) located in Bodega Bay, CA. Course offerings include lecture and laboratory instruction in the developmental biology of marine invertebrates, physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses 120, 120P, 122, 122P, 123; Neurobiology, Physiology and Behavior 141, 141P). The program is residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees.

College of Engineering

Undergraduate Advising Office
1050 Engineering II
916-752-0557
World Wide Web: http://www.engr.ucdavis.edu

Engineering is the profession in which the physical and biological sciences are applied in a practical way for the benefit of society. As an engineering student, you will learn to observe and describe technological problems and to seek useful solutions to them. Your skills upon graduation will be useful to you not only as an engineer, but also as a professional in management, sales, operations, manufacturing, and other fields.

Fifteen undergraduate engineering curricula, including five formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. Ten programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), the nationally recognized accrediting body for engineering curricula: Aeronautical Science and Engineering, Biological Systems Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Computer Science and Engineering, Electrical Engineering, Electrical Engineering/Materials Science and Engineering, Materials Science and Engineering, and Mechanical Engineering.

The four-year undergraduate program is divided into two parts: the Lower Division Program and the Upper Division Program.

Lower Division Programs. If you enter the College of Engineering with fewer than 90 quarter units of credit, follow the lower division program specified for your major. If you enter the College with 90 or more quarter units of credit, you must fulfill the requirements outlined in this chapter under "College of Engineering, Unit Requirements."

Upper Division Programs. If you have completed the requirements for the lower division program or have entered the College of Engineering with more than 90 quarter units of credit, you should follow the upper division requirements for the major you have selected from the programs that follow.

Minor Programs: The College of Engineering does not offer minor programs.

The Undergraduate Programs

Biological and Agricultural Engineering

The Department of Biological and Agricultural Engineering offers two majors. Biological Systems Engineering majors combine traditional engineering studies with a study of modern biological science. They are concerned with the production and use of biological materials and with the corresponding environmental impact. Specializations within the major prepare students to work in industries involved with aquaculture, food, forestry, agriculture, medicine, and biotechnology.

Food Engineering majors learn to apply biological and engineering principles to the food industry. Specific objectives include the development of equipment and processes for the handling, storing, processing, packaging, and distributing of food products.

Majors:
Biological Systems Engineering, B.S.
Food Engineering, B.S.

Chemical Engineering and Materials Science

The Department of Chemical Engineering and Materials Science offers four majors, including two approved double majors.

Chemical Engineering majors learn to apply chemical and engineering principles to create useful products ranging from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals to plastics. Specific objectives include improvement of the environment, production of foods and pharmaceuticals, and design of processes as diverse as integrated circuit materials production and integrated waste management.

Chemical/Biochemical Engineering majors combine chemical engineering studies with studies in the life sciences and bioprocess engineering. Bioprocess engineering is the application of engineering principles to develop, optimize, and commercialize manufacturing processes. Specific objectives include pharmaceuticals production, environmental repair, industrial chemical production, and food production.

Materials Science and Engineering majors learn to understand the structure, properties, and behavior of materials in order to produce new and improved materials with capabilities far superior to common metals, alloys and ceramics. Specific objectives include the development of materials for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communications technology.

Majors:
Chemical Engineering, BS
Chemical Engineering/Materials Science and Engineering, B.S.
Chemical/Biochemical Engineering, B.S.
Materials Science and Engineering, B.S.

Civil and Environmental Engineering

Civil Engineering majors learn to apply the principles of the physical and biological sciences and engineering to plan and design systems to improve the human environment. Specific objectives include providing potable drinking water and freedom from disease-carrying wastes; mitigating the effects of earthquakes and other natural disasters; designing land-, water-, and air-transportation systems; and building roads and structures.

Majors:
Civil and Environmental Engineering, B.S.
Civil Engineering /Materials Science and Engineering, B.S.

Computer Science and Engineering

This major combines study of physical sciences and electronic circuits and systems with the computer hardware and software courses that are the focus of the curriculum. Specific objectives are the study of the interaction between hardware and software in computer system design and the organization, design, analysis, theory, programming, and application of digital computers and computer systems. Compared to the Computer Engineering and Electrical Engineering curricula, the Computer Science and Engineering curricula requires a more specific mix of computer hardware and computer software courses, along with additional humanities and social science electives to produce the verbal and intellectual skills demanded by employers.

Major:
Computer Science and Engineering, B.S.

Electrical and Computer Engineering

Electrical Engineering majors learn to apply the principles of the physical sciences and engineering to the design, analysis, and effective use of electrical systems. Specific objectives include provision of systems for home entertainment, space exploration, medicine, communications, transportation, energy, industrial automation, defense, commerce and education.

Computer Engineering majors study the design, development, analysis, organization, theory, programming, and application of digital computers. Specific objectives include developing the student's ability to design either computer software or computer hardware. In comparison to the Computer Science and Engineering major, the Computer Engineering major has more flexibility in choosing to specialize in computer software, computer hardware, or computer electronics. In comparison to the Electrical Engineering major with a specialty in computers, the Computer Engineering major has considerably fewer required electronics courses.

Majors:
Computer Engineering, B.S.
Electrical Engineering, B.S.
Electrical Engineering /Materials Science and Engineering, B.S.

Mechanical and Aeronautical Science Engineering

Aeronautical Science and Engineering majors learn to apply the principles of the physical sciences and engineering to bodies and vehicles whose applied loads are influenced by aerodynamic forces. Specific objectives include the design, development, and manufacture of aircraft, automobiles, and sports equipment, and the design of energy and transportation systems.

Mechanical Engineering majors learn to apply physical and mechanical principles to the design and manufacture of complex machines, energy conversion systems, and equipment for guidance control. Specific objectives include provision of intelligent manufacturing systems, biomechanical systems, power generation systems, propulsion for transportation, integration of vehicles and automated highways, and biomedical equipment.

Majors:
Aeronautical Science and Engineering, B.S.
Mechanical Engineering, B.S.
Mechanical Engineering/Materials Science and Engineering, B.S.

College of Letters and Science

Office of Undergraduate Education and Advising
Room 200, Social Sciences and Humanities Building
916-752-0392
World Wide Web: http://www-lsdo.ucdavis.edu/

Major programs in the College of Letters and Science provide students systematic exposure to the key principles, methods, findings and representations of a selected area of study. In pursuing a major, students gain intellectual depth and competency in that subject matter, explore

important linkages with collateral fields of inquiry, and are encouraged to engage in independent study.

Most of the academic programs offered through the college are grouped in three divisions: Humanities, Arts, and Cultural Studies; Mathematical and Physical Sciences; and Social Sciences. One collegewide degree program, the individual major, also is available. A set of majors in the basic biological sciences are offered through both the College of Letters and Science and the College of Agricultural and Environmental Sciences and are administered by the Division of Biological Sciences. Refer to the earlier section, "Division of Biological Sciences," for more information.

The Undergraduate Programs

Division of Humanities, Arts, and Cultural Studies

These majors focus centrally on the artifacts, expressions and concerns of humankind in various cultures and times. They provide students the opportunity to explore the creation, performance and analysis of works of art, the language and customs of non-English speaking societies, the theory and criticism of literature, and the peoples and cultures of this nation and its hemisphere. Students interested in studying these types of issues may select from more than 20 different majors.

Majors:
African American and African Studies, A.B.
American Studies, A.B.
Art History, A.B.
Art Studio, A.B.
Chicana/Chicano (Mexican-American) Studies, A.B.
Chinese, A.B.
Classical Civilization, A.B.
Comparative Literature, A.B.
Dramatic Art, A.B.
East Asian Studies, A.B.
English, A.B.
French, A.B.
German, A.B.
Italian, A.B.
Japanese, A.B.
Medieval Studies, A.B.
Music, A.B.
Native American Studies, A.B.
Nature and Culture, A.B.
Religious Studies, A.B.
Russian, A.B.
Spanish, A.B.
Women's Studies, A.B.

Minors:
African American and African Studies
American Studies
Art History
Art Studio
Asian American Studies
Chicana/Chicano (Mexican-American) Studies
Chinese
Classical Civilization
Comparative Literature
Dramatic Art
East Asian Studies
English
Film Studies
French
German
Greek
Italian
Japanese
Jewish Studies
Latin
Medieval Studies
Music
Native American Studies
Nature and Culture
Religious Studies
Russian
Social and Ethnic Relations
Spanish
Women's Studies

Division of Mathematical and Physical Sciences

These majors focus primarily on the description and interpretation of the structure, processes and events of the physical universe. They provide students the opportunity to explore in depth the structure, properties and reactions of substances; fundamental mathematical techniques and models and their application to the interpretation and explanation of phenomena; studies of matter and energy and their interconversions; the nature and development of computer languages; and earth and environmental processes. Students interested in studying these types of subjects may select from seven different majors. The division strongly encourages undergraduates to enroll in undergraduate research projects with one-on-one instruction by faculty scholar/researchers.

Majors:
Applied Physics, B.S.
Chemistry, A.B., B.S.
Computer Science, B.S.
Geology, A.B., B.S.
Mathematics, A.B., B.S.
Physics, A.B., B.S.
Statistics, A.B., B.S.

Minors:
Computer Science
Environmental Geology
Geology
Geophysics
Mathematics
Physics
Statistics

Division of Social Sciences

These majors focus largely on issues and problems that characterize social, cultural, political, and economic life across human societies. They provide students the opportunity to explore the relationships between people and the groups and organizations of which they are a part, the antecedents of individual behavior, the development of political and economic systems, the social forces that have shaped the contemporary world, and the foundations of language, thought, knowledge and perception. Students interested in studying these types of issues may select from more than a dozen different majors.

Majors:
Anthropology, A.B., B.S.
Economics, A.B.

Exercise Science, A.B., B.S.
History, A.B.
International Relations, A.B.
Linguistics, A.B.
Philosophy, A.B.
Political Science, A.B.
Political Science–Public Service, A.B.
Psychology, A.B., B.S.
Rhetoric and Communication, A.B.
Sociology, A.B.
Sociology–Organizational Studies, A.B.

Minors:
Anthropology
Education
Exercise Science
History
History and Philosophy of Science
Linguistics
Philosophy
Political Science
Psychology
Rhetoric and Communication
Sociology
War-Peace Studies

Collegewide Program

Students whose academic interests cannot be satisfactorily met through the completion of an established major have the opportunity to develop an individual major. Individual majors may reflect the most recent trends in scholarship and research and are typically interdisciplinary in nature. The major proposal is developed in close and active consultation with two faculty advisers from the academic disciplines most closely related to the subject matter of the individual major. Careful faculty guidance and review assure that individual majors are comparable in academic rigor and intellectual coherence to those regularly available through the departments and programs of the college.

Major:
Individual Major, A.B., B.S.

BACHELOR'S DEGREE REQUIREMENTS

You must satisfy four groups of requirements before you can become eligible for candidacy for the bachelor's degree. (See box, page 79.) The four groups are:

- University requirements, which apply to all colleges;
- General Education requirement, which applies to all colleges;
- College requirements; and
- Major requirements.

Detailed information on university requirements, the General Education requirement and college requirements can be found in this chapter.

Every student is responsible for seeing that all his or her degree requirements are fulfilled.

UNIVERSITY REQUIREMENTS

All students must fulfill the following University of California requirements.

Subject A: English Requirement

The university requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfaction of the Subject A requirement is a prerequisite to all other undergraduate courses in English.

The requirement, as determined by Undergraduate Admissions, may be met in one of the following ways:

- By achieving a score of 660 or higher on the SAT II-Writing Test.
- By achieving a grade of 5, 4, or 3 on the College Board Advanced Placement Examination in English.
- By entering the university with credentials showing the completion of an acceptable 3 semester-unit or 4 quarter-unit college-level course in English composition with a grade of C or better.
- By passing with credit the California State University and Colleges English Equivalency Examination. (Note: the CSUC English Placement Test may not be used to satisfy the Subject A requirement.)
- By writing a passing essay on the Subject A Examination. This examination may be taken only once prior to enrollment. It is offered in the spring at local sites throughout California; a student admitted for fall quarter who has not already satisfied the Subject A requirement must take this examination. An out-of-state student or any California freshman admitted after mid-April will take another form of the Subject A Examination, which will be offered on the UC Davis campus during the orientation period each quarter. For the time and location consult the *Class Schedule and Room Directory,* published before the beginning of each quarter.

If you have not satisfied the requirement in one of the ways described above, *you must enroll in English 57 during your first quarter of residence at the university, or as soon thereafter as space is available in the course.* English 57, offered by Sacramento City College on the Davis campus, counts as 4.5 units on your study list and toward minimum progress but is not transferable as units toward graduation. To satisfy the requirement, students must pass the Subject A Examination offered as the final examination for English 57. Students failing the examination must repeat English 57. If the requirement has not been satisfied by the end of your third quarter, a hold will be placed on your registration.

Students whose native and school language is not English, and some students whose schooling combines work in the United States and in another country, must demonstrate proficiency in English. The level of proficiency must meet the standards of both the non-native speakers of English program and the Subject A program. The results of the Subject A Examination and a special examination in English administered during the orientation period each quarter determine whether a student has met the Subject A requirement or must take specific course work before meeting that requirement.

Bachelor's Degree Requirements

University Requirements

All students must fulfill the following University of California requirements:

Subject A
American History and Institutions
Unit Requirement
Residence Requirement
Scholarship Requirement

General Education Requirement

Students must complete three courses in the two areas of *topical breadth* outside the assigned area of their major. Students also must complete three *writing experience* courses and one *social-cultural diversity* course.

College Requirements

College of Agricultural and Environmental Sciences	College of Engineering	College of Letters and Science
Unit	Unit	Unit
Residence	Residence	Residence
Scholarship	Scholarship	Scholarship
English Composition	English Composition	English Composition
	Design	Area (Breadth)
		Foreign Language (A.B. and B.A.S. degrees)

Major Requirements

Course requirements for each major are listed in the Programs and Courses section of this catalog.

American History and Institutions

The American History and Institutions requirement ensures that every graduating student will have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic and social interrelationships of its way of life.

You may meet this requirement in any of these ways:

- By offering one high school unit in American history, or 1/2 high school unit in American history and 1/2 high school unit in civics or American government, with a grade of C or better in each course.
- By completing any one of the following courses:

  African American and African Studies 10, 100, 120, 121
  Asian American Studies 1, 2
  Economics 111A, 111B
  History 17A, 17B, 17C, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 179, 180A, 180B, 183A, 183B (upper division courses may be taken only with the consent of the instructor)
  Native American Studies 1, 10, 55, 116, 130A, 130B, 130C
  Political Science 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163

(Students electing to offer one of the above courses are subject to the rules for prerequisites and majors.)

- By presenting evidence that the requirement has been accepted as satisfied at another campus of the university.
- By presenting evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to UC Davis.
- By successful completion of the Advanced Placement Examination in American History.

International students, regardless of the type of visa they hold, must meet the university's American History and Institutions requirement for graduation.

Unit Requirement

A minimum of 180 quarter units is required for graduation. These must be distributed according to the minimum requirements set forth by the faculty of your college.

A maximum of 12 units of Internship Courses (92, 192, or a combination) may be counted toward the 180-unit bachelor's degree requirement.

The acceptability of transfer courses for unit credit is determined by Undergraduate Admissions and Outreach Services. The acceptability of such courses toward specific requirements is determined by the individual college or school.

Students should refer to the Advanced Placement Examination chart and their transcripts to eliminate the possibility of duplication of credit.

Residence Requirements

The minimum residence requirement for a bachelor's degree at the University of California is one academic year (three quarters). Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the Davis campus. Each summer session in which a student completes a course of at least 2 quarter units may be counted as half a quarter's residence. Not more than 18 of these 35 quarter units may be completed in summer session courses at UC Davis.

Regularly approved courses (laboratory, field, or other individual work) done outside of a regular session but under the direction of a department of instruction may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree. Registration is with the consent of the instructor only.

University Extension courses are not accepted as part of the university residence requirement.

There are additional residence requirements for students enrolled in the Colleges of Letters and Science and Engineering. If you are planning to study abroad during your senior year, you should consult your college dean's office.

With the approval of the dean of a student's college or school, a candidate for the bachelor's degree who was in active service in the armed forces of the United States in the year preceding the awarding of the degree may be recommended for the degree after only one quarter of university residence in which the candidate completes at least 16 units or passes a comprehensive examination in the major or field of concentration.

Scholarship Requirement

To receive a bachelor's degree, you must obtain twice as many grade points as units (a 2.0 GPA) for all courses you have attempted in the university. An exception to this rule is made for those students undertaking certain honors courses. Grades earned in University Extension courses are not used in calculating individual grade point averages. For specific college requirements consult the college sections following.

GENERAL EDUCATION REQUIREMENT

The General Education (GE) requirement promotes the intellectual growth of all undergraduates by ensuring that they acquire a breadth of knowledge that will enlarge their perspectives beyond the focus of a major and serve them well as participants in a knowledge-based society. It seeks to stimulate continued intellectual growth by providing students with knowledge not only of the content but also of the methodologies of different academic disciplines. It involves students in the learning process by its expectation of considerable writing and class participation. It encourages students to consider the relationships between disciplines.

The GE requirement has three components: **Topical Breadth, Social-Cultural Diversity** and **Writing Experience.**

Topical Breadth

A GE course in *topical breadth* addresses broad subject areas that are important to the student's general knowledge. It takes a critical, analytical perspective on knowledge, considering how knowledge has been acquired and the assumptions, theories, or paradigms that guide its use.

Topical breadth courses are grouped into three broad subject areas of knowledge:

1. **Arts and Humanities.** Courses in this area provide students with knowledge of significant intellectual traditions, cultural achievements and historical processes.
2. **Science and Engineering.** Courses in this area provide students with knowledge of major scientific ideas and applications. They seek to communicate the scope, power, limitations and appeal of science.
3. **Social Sciences.** Courses in this area provide students with knowledge of the individual, social, political and economic activities of people.

Social-Cultural Diversity

Courses in *social-cultural diversity* teach students the significance of the many patterned differences that characterize human populations—particulary differences of gender, race, ethnicity, sexuality, religion or social class.

Writing Experience

A GE course in *writing experience* normally requires a minimum of five pages of writing in a block, which will be evaluated for content, use of language and logical coherence.

Fulfilling the General Education Requirement

Topical Breadth Component: 6 courses

To fulfill the *topical breadth* component of the General Education requirement you must successfully complete

Fulfilling the General Education Requirement

Students entering UC Davis during the 1996-97 academic year, and thereafter

Freshman student, or Transfer student* who has not completed TCC or IGETC†

6 GE courses in topical breadth—3 courses in each of the two subject areas other than your major's assigned area
3 GE courses in writing experience
1 GE course in social-cultural diversity

Bear in mind that some courses may count toward two or three components of GE. For example, a single course might provide GE credit for *topical breadth, writing experience* and *social-cultural diversity.* Depending on the GE courses you choose, you can satisfy the GE requirement with 6 courses.

* Transfer work comparable to approved UC Davis GE courses may be used to satisfy the GE requirement, as determined by the college dean's office.

Transfer student who has successfully completed TCC or IGETC†

GE requirement satisfied; no further GE courses required

† Transfer Core Curriculum (TCC) or Intersegmental General Education Transfer Curriculum (IGETC); completion must be certified by the community college.

Topical Breadth: Assigned Subject Areas for Majors and Minors

Arts and Humanities

Majors

African American and African Studies
American Studies
Art History
Art Studio
Chicana/Chicano (Mexican-American) Studies (Humanities emphasis)
Chinese
Classical Civilization
Comparative Literature
Design
Dramatic Art
English
French
German
Greek
History
Italian
Japanese
Landscape Architecture
Latin
Medieval Studies
Music
Native American Studies
Philosophy
Religious Studies
Russian
Spanish
Women's Studies

Minors

African American and African Studies
American Studies
Art History
Art Studio
Asian American Studies
Chicana/Chicano (Mexican-American) Studies
Chinese
Classical Civilization
Comparative Literature
Dramatic Art
English
Film Studies
French
German
Greek
History
Italian
Japanese
Jewish Studies
Latin
Medieval Studies
Music
Native American Studies
Philosophy
Religious Studies
Russian
Social and Ethnic Relations
Spanish
Women's Studies

Science and Engineering

Majors

Agricultural Systems and Environment
Animal Biology
Animal Science
Animal Science and Management
Anthropology (B.S.degree only)
Applied Physics
Atmospheric Science
Avian Sciences
Biochemistry
Biological Sciences
Biotechnology
Cell Biology
Chemistry
Community Nutrition
Computer Science
Crop Science and Management
Dietetics
Engineering (all majors)
Entomology
Environmental and Resource Sciences
Environmental Biology and Management
Environmental Horticulture and Urban Forestry
Environmental Toxicology
Evolution and Ecology
Exercise Science
Fermentation Science
Fiber and Polymer Science
Food Biochemistry
Food Science
Genetics
Geology
Hydrology
Mathematics
Microbiology
Nature and Culture
Neurobiology, Physiology and Behavior
Nutrition Science
Physics
Plant Biology
Psychology (B.S. degree)
Range and Wildlands Science
Soil and Water Science
Statistics
Viticulture and Enology
Wildlife, Fish and Conservation Biology

Minors

Agricultural Computing and Information Systems
Agricultural Entomology
Agricultural Systems and Environment
Animal Science
Anthropology (Biological Emphasis)
Apiculture
Applied Biological Systems Technology
Atmospheric Science
Avian Sciences
Biological Sciences
Community Nutrition
Computer Science
Entomology
Environmental Geology
Environmental Horticulture
Environmental Toxicology
Exercise Science
Fiber and Polymer Science
Geographic Information Systems
Geology
Geophysics
Hydrology
Insect Ecology
Mathematics
Medical-Veterinary Entomology
Nature and Culture
Nematology
Nutrition and Food
Nutrition Science
Physics
Plant Biology
Science and Society
Soil Science
Statistics

Social Sciences

Majors

Agricultural and Managerial Economics
Anthropology (A.B. degree)
Chicana/Chicano (Mexican-American) Studies (Social Sciences emphasis)
Community and Regional Development
East Asian Studies
Economics
Environmental Policy Analysis and Planning
Human Development
International Agricultural Development
International Relations
Linguistics
Political Science
Political Science—Public Service
Psychology (A.B. degree)
Rhetoric and Communication
Sociology
Sociology—Organizational Studiess
Textiles and Clothing

Minors

Aging and Adult Development
Agricultural and Managerial Economics
Anthropology (General Emphasis)
Community Development
East Asian Studies
Education
Energy Policy
Environmental Policy Analysis
History and Philosophy of Science
Human Development
International Agricultural Development
Linguistics
Political Science
Psychology
Rhetoric and Communication
Science and Society
Sociology
Textiles and Clothing
War–Peace Studies

Professor Dan Sperling, who heads UC Davis' Institute of Transportation Studies, received the Academic Senate's 1996 Distinguished Public Service Award for his research into cleaner fuels and vehicle technologies.

three approved courses in each of the two subject areas of *topical breadth* other than the one that includes your major. To identify the area of *topical breadth* to which your major belongs, refer to the chart on the previous page. Each academic major has been assigned to one of the three subject areas of GE *topical breadth*. If you have any questions concerning the subject area to which your major is assigned, consult your college dean's office.

- **Double majors** will satisfy the *topical breadth* subject areas to which they are assigned. You will still be responsible for completing any *topical breadth* subject area in which you do not have a major. If, for example, two majors are assigned to the same subject area, you will need to complete the *topical breadth* component in each of the other two other subject areas. If, on the other hand, you complete two majors that have been assigned to two different areas of *topical breadth* then you will be responsible for completing the *topical breadth* component in only the remaining subject area.
- **Individual majors** are assigned to an area of *topical breadth* at the time they are approved by your college.
- **Each minor** has also been assigned to one of the three subject areas of *topical breadth*. A minor assigned to a subject area other than the area of your major will satisfy the GE course requirement for *topical breadth* in that subject area.
- **Courses in your major** may count toward the *topical breadth* component when those courses are also assigned to subject areas other than the area of your major.
- **A course approved in more than one *topical breadth* subject area** may only be offered in satisfaction of **one** of those subject areas.

Social-Cultural Diversity Component: 1 course

To fulfill the *social-cultural diversity* component of the GE requirement, you must successfully complete one course from the approved list that follows.

Writing Experience Component: 3 courses

To fulfill the *writing experience* component of the GE requirement, you must successfully complete three courses from the approved list that follows.

- **Subject A.** You must satisfy the university Subject A requirement **before** you take any *writing experience* course for GE credit. If you take an approved *writing experience* course but have not yet satisfied the Subject A requirement, you will **not** receive GE *writing experience* credit for that course.

Additional Conditions

1. **Letter grading.** All courses taken to fulfill the GE requirement must be taken for a letter grade. No GE credit will be awarded for a course that you take on a Passed/Not Passed basis.
2. **College and university composition requirements.** The following GE courses may not be used to satisfy university or college requirements in composition and GE *writing experience* simultaneously: Comparative Literature 1, 2, 3, 4, English 1, 3, 18, 19, 101, 102, 104A, 104B, 104C, 104D, 104E, Native American Studies 5, Rhetoric and Communication 1.

   Remember: You must satisfy the university Subject A requirement **before** you take any *writing experience* course for GE credit.
3. **Courses approved for multiple GE components.** Courses approved for more than one component of the GE requirement (*topical breadth, writing experience* and *social-cultural diversity*) will be accepted toward satisfaction of all components for which the course has been approved.
4. **Approved GE courses.** You cannot claim GE credit for any course you completed before it was an approved GE course.

GE Exemption

IGETC, TCC, and UC Reciprocity. You are exempt from the UC Davis GE requirement if you come from a California community college and are certified as having successfully completed the "Intersegmental General Education Transfer Curriculum" (IGETC) or "Transfer Core Curriculum" (TCC), or if you come from another UC campus and are certified has having successfully completed the lower division breadth or General Education requirements of that UC campus (UC reciprocity).

Approved General Education Courses

A list of the courses that provide General Education credit for 1997-98 appears on the following pages. These courses may be used to fulfill the GE Requirement for students entering UC Davis in 1996-97 and thereafter. Please note that you cannot claim GE credit for a course you completed **before** it was an approved GE course. This list is subject to change. You should check the *Class Schedule and Room Directory* each quarter for the most current information.

GENERAL EDUCATION COURSES FOR 1997-98

TOPICAL BREADTH

These courses provide GE credit for *topical breadth*. Many of these courses also satisfy the GE requirement for *social-cultural diversity* (indicated by D) and/or provide GE credit for *writing experience* (indicated by W). Complete lists of the courses that satisfy the *social-cultural diversity* requirement and the courses that provide *writing experience* credit follow this list.

Arts and Humanities

African American and African Studies 12	D	W
African American and African Studies 15	D	W
African American and African Studies 50	D	W
African American and African Studies 52	D	W
African American and African Studies 100	D	
African American and African Studies 107A	D	W
African American and African Studies 107B	D	W
African American and African Studies 107C	D	W
African American and African Studies 123	D	
African American and African Studies 150A	D	
African American and African Studies 150B	D	
African American and African Studies 152	D	W
African American and African Studies 153	D	W
African American and African Studies 160	D	
African American and African Studies 162	D	W
African American and African Studies 170	D	W
African American and African Studies 171	D	
American Studies 1A†	D	W
American Studies 1B†	D	W
American Studies 1C†	D	W
American Studies 1E†	D	W
American Studies 30†	D	W
American Studies 110†	D	W
American Studies 120†	D	W
American Studies 130†	D	W
American Studies 151†	D	W
American Studies 152†	D	W
American Studies 153†	D	W
American Studies 154†	D	W
American Studies 155†	D	W
American Studies 156†	D	W
Art History 1A		‡
Art History 1B		‡
Art History 1C	D	‡
Art History 1D	D	‡
Art History 25		‡
Art History 150	D	
Art History 151	D	
Art History 152	D	
Art History 153	D	W
Art History 154A		W
Art History 154B		W
Art History 155		W
Art History 163A	D	W
Art History 163B	D	W
Art History 163C	D	W
Art History 164	D	W
Art History 168		W
Art History 176A		W
Art History 176B		W
Art History 177A		W
Art History 177B		W
Art History 178A		W
Art History 178B		W
Art History 178C		W
Art History 179B		W
Art History 182	D	W
Art History 183A		W
Art History 183B		W
Art History 183C		W
Art History 183E	D	W
Art History 184		W
Art History 188B		W
Art History 188C		W
Art Studio 30	D	W
Art Studio 131	D	W
Art Studio 132A		W
Art Studio 132B	D	W
Art Studio 147		W
Art Studio 148		W
Art Studio 149	D	W
Art Studio 150		W
Chicano Studies 111		
Chicano Studies 154	D	
Chinese 10	D	W
Chinese 11	D	W
Chinese 50	D	W
Chinese 104	D	W
Chinese 105	D	W
Chinese 106	D	W
Chinese 107	D	W
Chinese 108	D	W
Chinese 109A	D	W
Chinese 109B	D	W
Chinese 109C	D	W
Chinese 109D	D	W
Chinese 109E	D	W
Chinese 109F	D	W
Chinese 109G	D	W
Chinese 109H	D	W
Chinese 109I	D	W
Chinese 110	D	W
Classics 1		W
Classics 2		W
Classics 3		W
Classics 10		
Classics 15	D	W
Classics 20		W
Classics 50		W
Classics 102		W
Classics 110		W
Classics 140		W
Classics 141		W
Classics 142		W
Classics 143		W
Classics 150		W
Classics 171	D	W
Classics 174		W
Comparative Literature 1*		W
Comparative Literature 2*		W
Comparative Literature 3*		W
Comparative Literature 4*		W
Comparative Literature 5	D	W
Comparative Literature 6	D	W
Comparative Literature 7	D	W
Comparative Literature 8		W
Comparative Literature 9	D	W
Comparative Literature 12	D	W
Comparative Literature 13		W
Comparative Literature 14		W
Comparative Literature 15		W
Comparative Literature 20		W
Comparative Literature 25	D	W
Comparative Literature 53A	D	W
Comparative Literature 53B	D	W
Comparative Literature 120		W
Comparative Literature 135	D	W
Comparative Literature 138	D	W
Comparative Literature 140		W
Comparative Literature 141		W
Comparative Literature 144		W
Comparative Literature 145		W
Comparative Literature 146		W
Comparative Literature 147	D	W
Comparative Literature 151	D	W
Comparative Literature 152	D	W
Comparative Literature 153	D	W
Comparative Literature 154	D	W
Comparative Literature 157		W
Comparative Literature 158		W
Comparative Literature 159	D	W
Comparative Literature 160A		W
Comparative Literature 160B		W
Comparative Literature 161A		W
Comparative Literature 161B		W
Comparative Literature 163		W
Comparative Literature 164A		W
Comparative Literature 164B		W
Comparative Literature 164C		W
Comparative Literature 164D		W
Comparative Literature 166A		W
Comparative Literature 166B		W
Comparative Literature 167		W
Comparative Literature 168A		W
Comparative Literature 168B		W
Comparative Literature 169		W
Comparative Literature 170		W
Comparative Literature 180		W
Design 1		W
Design 100		W
Design 140		W
Design 142A		W
Design 142B		W
Design 143		W
Design 144		W
Dramatic Art 1	D	W
Dramatic Art 20		
Dramatic Art 150	D	W
Dramatic Art 154	D	W
Dramatic Art 155	D	W
Dramatic Art 156A	D	W
Dramatic Art 156B	D	W
Dramatic Art 156C	D	W
East Asian Studies 113	D	W
English 3*		W
English 4		W
English 30A	D	W
English 30B	D	W
English 105		W
English 107		W
English 118		W
English 156		W
English 160		W
English 162		W
English 171A	D	W
English 171B	D	W
English 173		W
English 175		W
English 180		W
English 182	D	W
English 184		W
French 25		W
French 50		W
French 101		
French 102		
French 103		
French 107N		
French 108		
French 112		W
French 113		W
French 114		W
French 115		
French 116		
French 117A		
French 117B		
French 118A		
French 118B		
French 119A		
French 119B		
French 119C		
French 120		
French 121		
French 124	D	
French 125		
French 127		
French 130		
French 133	D	
French 162		
German 47	D	W
German 48		W
German 50		W
German 110		W
German 111A		W
German 111B		W
German 111C		W
German 111D		W
German 111E		W
German 111F		W
German 111G		W
German 111H		W
German 112A	D	W
German 112B		W
German 113		W
German 114		W
German 115A		W
German 116		W
German 117A		W
German 117B		W
German 117C		W
German 118A		W
German 118B		W
German 118C		W
German 118E		W
German 119		W
German 130		W
German 140		W
German 141		W
Greek 100		W
Greek 101		W
Greek 102		W
Greek 103A		W
Greek 103B		W
Greek 104		W
Greek 105		W

* This course may not be used to satisfy a college or university composition requirement and GE *writing experience* simultaneously.

† Also assigned to another area of *topical breadth*. ‡ Credit for *writing experience* allowed if co-course taken concurrently (see *Writing Experience* list).

GENERAL EDUCATION COURSES FOR 1997-98

Greek 111		W
Greek 112		W
Greek 113		W
Greek 114		W
Greek 115		W
Greek 116		W
Hebrew 100		W
Hebrew 101		W
Hebrew 102		W
History 3		
History 4A		W
History 4B		W
History 4C		W
History 8	D	
History 9A	D	W
History 9B	D	W
History 10		
History 15	D	W
History 17A	D	W
History 17B	D	W
History 30		
History 72A	D	W
History 72B	D	W
History 85		
History 110		
History 111A		W
History 111B		W
History 111C		W
History 112A	D	W
History 112B	D	W
History 115A	D	W
History 115B	D	W
History 115C	D	W
History 116		
History 121A		W
History 121B		W
History 121C		W
History 122		
History 125		W
History 130A	D	W
History 130B		
History 130C		
History 131A		
History 131B		W
History 131C		W
History 133		
History 134A		
History 135A		
History 135B		
History 136		W
History 138A		W
History 138B		W
History 138C		W
History 139A†		W
History 139B†		W
History 141		W
History 142	D	
History 143	D	W
History 144	D	W
History 145		W
History 146A		W
History 146B		W
History 147A†		W
History 147B†		W
History 147C†	D	W
History 148A	D	W
History 148B	D	W
History 151A		W
History 151B		W
History 151C		W
History 151D	D	W
History 161A	D	W
History 161B	D	W
History 162	D	W
History 163A		
History 163B		
History 164		
History 165		
History 166A		
History 166B		
History 168		
History 169A	D	W
History 169B	D	W
History 170A	D	W
History 170B	D	W
History 170C		
History 171A	D	W
History 171B		
History 173	D	W
History 174A	D	W
History 174B		W
History 174C		W
History 174D		
History 176A		
History 176B		
History 177A	D	W
History 177B	D	W
History 178	D	W
History 180A		
History 180B		
History 180C		
History 183A	D	W
History 183B	D	W
History 185A		W
History 185B		W
History 189A		
History 189B		
History 189C		W
History 191A	D	W
History 191B	D	W
History 191C	D	W
History 191D	D	W
History 191E	D	W
History 191F	D	W
History 194A	D	W
History 194B	D	
History 194C	D	
History 194D		
History 194E		
History 196A	D	W
History and Philosophy of Science 130A†		W
History and Philosophy of Science 130B†		W
History and Philosophy of Science 131†		W
Humanities 10	D	W
Humanities 20A		W
Humanities 110A		W
Humanities 120		W
Humanities 122	D	W
Humanities 124		W
Humanities 125		W
Humanities 180		W
Integrated Studies 8B		W
Italian 50		W
Italian 105		
Italian 107		
Italian 112		
Italian 113		
Italian 114		
Italian 115A		
Italian 115B		
Italian 115C		
Italian 115D		
Italian 118		
Italian 119		
Italian 120A		
Italian 120B		
Italian 131		
Italian 139B		
Italian 140		W
Italian 141	D	W
Italian 142		W
Italian 150	D	W
Japanese 10	D	W
Japanese 15	D	W
Japanese 50	D	W
Japanese 101	D	W
Japanese 102	D	W
Japanese 103	D	W
Japanese 104	D	W
Japanese 105	D	W
Japanese 106	D	W
Japanese 107	D	W
Japanese 108	D	W
Landscape Architecture 30		W
Landscape Architecture 40†		W
Landscape Architecture 140		W
Landscape Architecture 168†		W
Latin 100		W
Latin 101		W
Latin 102		W
Latin 103		W
Latin 104		W
Latin 105		W
Latin 106		W
Latin 108		W
Latin 109		W
Latin 110		W
Latin 111		W
Latin 112		W
Latin 114		W
Latin 115		W
Latin 116		W
Latin 125		W
Linguistics 1†		W
Linguistics 50†		W
Medieval Studies 20A		W
Medieval Studies 20B		W
Medieval Studies 20C		W
Medieval Studies 120A		W
Medieval Studies 120D		W
Medieval Studies 120E		W
Medieval Studies 130A		W
Medieval Studies 130B		W
Music 10		W
Music 105	D	W
Music 110A		W
Music 110B		W
Music 110C		W
Music 110D		W
Music 110E		W
Native American Studies 5*	D	W
Native American Studies 10†	D	W
Native American Studies 33	D	
Native American Std. 101	D	
Native American Std. 156	D	W
Native American Std. 181A	D	W
Native American Std. 181B	D	W
Native American Std. 181C	D	W
Native American Studies 191	D	
Nature and Culture 1†		W
Nature and Culture 120		W
Philosophy 1		W
Philosophy 6		W
Philosophy 11	D	W
Philosophy 13		W
Philosophy 14	D	W
Philosophy 15		W
Philosophy 21		W
Philosophy 22		W
Philosophy 23		W
Philosophy 24		W
Philosophy 31†		
Philosophy 32†		W
Philosophy 101		W
Philosophy 102		W
Philosophy 103		W
Philosophy 104†		W
Philosophy 105		W
Philosophy 106†		W
Philosophy 107†		W
Philosophy 108†		W
Philosophy 109†		W
Philosophy 110†		W
Philosophy 114		W
Philosophy 115		W
Philosophy 123		W
Philosophy 127†		W
Philosophy 143		W
Philosophy 145		W
Philosophy 151		W
Religious Studies 1	D	W
Religious Studies 2	D	W
Religious Studies 3A	D	W
Religious Studies 3B	D	W
Religious Studies 3C	D	W
Religious Studies 21	D	W
Religious Studies 23	D	W
Religious Studies 40		W
Religious Studies 115	D	W
Religious Studies 141A		W
Religious Studies 141B		W
Religious Studies 141C		W
Religious Studies 142		W
Russian 41		W
Russian 42		W
Russian 44	D	W
Russian 102		
Russian 121		
Russian 123		W
Russian 126		W
Russian 127		
Russian 128		
Russian 129	D	W
Russian 130		W
Russian 131		W
Russian 132		W
Russian 139	D	W
Russian 140	D	W
Russian 141	D	W
Russian 142	D	W
Russian 143	D	W
Russian 150	D	W
Russian 151		W
Russian 154	D	W
Russian 166	D	W
Spanish 139	D	
Spanish 141	D	
Spanish 148		W
Spanish 149	D	W
Spanish 170	D	
Spanish 172	D	
Spanish 174	D	
Spanish 176	D	
Women's Studies 20	D	W
Women's Studies 50†	D	W
Women's Studies 60†	D	
Women's Studies 70†	D	
Women's Studies 130†	D	
Women's Studies 158†	D	
Women's Studies 160	D	
Women's Studies 162	D	
Women's Studies 164	D	
Women's Studies 180	D	
Women's Studies 195†	D	

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† Also assigned to another area of *topical breadth*. ‡ Credit for *writing experience* allowed if co-course taken concurrently (see *Writing Experience* list).

GENERAL EDUCATION COURSES FOR 1997-98

Science and Engineering

Agricultural Systems and Environment 7		W
Agricultural Systems and Environment 120		
Agricultural Systems and Environment 121		W
Agricultural Systems and Environment 130		W
Animal Science 1		W
Animal Science 2		W
Animal Science 18		
Animal Science 42		W
Animal Science 104		
Animal Science 105		
Animal Science 106		W
Animal Science 115		
Animal Science 120		
Animal Science 123		
Animal Science 124		W
Animal Science 146		W
Anthropology 1	D	W
Anthropology 5		W
Anthropology 15	D	W
Anthropology 151		W
Anthropology 152		W
Anthropology 153		W
Anthropology 154A		W
Anthropology 154B		W
Anthropology 155		W
Anthropology 156		
Anthropology 157		‡
Anthropology 158	D	W
Anthropology 181		
Anthropology 183		W
Astronomy 10		
Atmospheric Science 5		W
Atmospheric Science 10		W
Avian Sciences 11		W
Avian Sciences 13		W
Biological Sciences 1C		W
Biological Sciences 10		W
Chemistry 2A		
Chemistry 2B		
Chemistry 2C		
Chemistry 10		W
Chemistry 111		W
Chemistry 115		W
Chemistry 150		W
Engineering 160†		
Engineering: Applied Science—Davis 137†		
Engineering: Biological Systems 1		
Engineering: Biological Systems 75		
Engineering: Civil and Environmental 3		
Engineering: Computer Science 15		W
Engineering: Computer Science 15AT		W
Engineering: Computer Science 167		W
Entomology 10		
Entomology 17		W
Entomology 100		‡
Entomology 101		
Entomology 102		
Entomology 103		W
Entomology 104		
Entomology 107		W
Entomology 109		W
Entomology 110		W
Entomology 111		W
Entomology 116		
Entomology 119		W
Entomology 147		W
Entomology 153		W
Entomology 156		‡
Environmental Horticulture 1		W
Environmental and Resource Sciences 60		W
Environmental and Resource Sciences 121		W
Environmental and Resource Sciences 131		W
Environmental Studies 10		W
Environmental Studies 30		‡
Environmental Studies 116		‡
Environmental Studies 121		W
Environmental Toxicology 10		
Environmental Toxicol. 101		
Environmental Toxicol. 112A		
Environmental Toxicol. 112B		
Environmental Toxicol. 114A		
Environmental Toxicol. 114B		
Environmental Toxicol. 128		
Environmental Toxicol. 131		
Environmental Toxicol. 135		
Environmental Toxicol. 146		
Evolution and Ecology 108		
Evolution and Ecology 121		W
Evolution and Ecology 138		W
Exercise Science 101		
Exercise Science 103		
Exercise Science 110		W
Exercise Science 113		
Exercise Science 115		
Exercise Science 117		
Exercise Science 118		W
Exercise Science 126		
Fiber and Polymer Sci. 110†		W
Food Science and Technology 2†		
Food Science & Technol. 120		
Food Science & Technol. 128		
Geology 1		
Geology 3		‡
Geology 4		
Geology 32		W
Geology 36		W
Geology 43		W
Geology 100		‡
Geology 101		‡
Geology 105N		W
Geology 106N		W
Geology 108N		W
Geology 109 (course 109L required concurrently)		‡
Geology 110		W
Geology 115N†		W
Geology 116		‡
Geology 134		W
Geology 135		‡
Geology 143		W
Geology 144N		W
Geology 145N		W
History and Philosophy of Science 130A†		W
History and Philosophy of Science 130B†		W
History and Philosophy of Science 131†		W
Human Development 19		
Hydrologic Science 21		W
Hydrologic Science 100		W
Integrated Studies 8A		W
Landscape Architecture 50		
Landscape Architecture 153		
Linguistics 175		
Mathematics 16A		
Mathematics 16B		
Mathematics 16C		
Mathematics 21A		
Mathematics 21AH		
Mathematics 21B		
Mathematics 21BH		
Mathematics 21C		
Mathematics 21CH		
Mathematics 21M		
Mathematics 36		
Mathematics 63		
Medicine: Cell Biology and Human Anatomy 101		‡
Microbiology 10		W
Microbiology 20		W
Molecular and Cellular Biology 10		W
Molecular and Cellular Biology 162		W
Nature and Culture 1†		W
Nematology 110		
Neurobiology, Physiology and Behavior 10		
Neurobiology, Physiology and Behavior 12		‡
Nutrition 10		
Nutrition 11		W
Nutrition 20†		
Nutrition 114		W
Nutrition 115		W
Nutrition 120		
Nutrition 123		W
Philosophy 31†		
Philosophy 32†		W
Philosophy 104†		W
Philosophy 106†		W
Philosophy 107†		W
Philosophy 108†		W
Philosophy 110†		W
Physics 10		
Physics 122		W
Physics 137†		
Physics 160†		
Plant Biology 11		W
Plant Biology 12	D	W
Plant Biology 108		
Plant Biology 112		
Plant Biology 116		
Plant Biology 142		
Plant Biology 143		W
Plant Biology 151		W
Plant Pathology 140		W
Pomology 10		W
Science and Society 1†	D	W
Science and Society 2†		W
Science and Society 3†		W
Science and Society 5†		W
Science and Society 15†	D	W
Science and Society 20†		W
Science and Society 105		W
Science and Society 120†		W
Soil Science 10		W
Statistics 10†		W
Statistics 12		
Statistics 13		
Statistics 32		
Statistics 100		
Statistics 102		
Statistics 103		
Statistics 104		
Statistics 106		
Statistics 108		
Statistics 120		
Statistics 138		
Statistics 144		
Textiles and Clothing 6		
Textiles and Clothing 162		
Viticulture and Enology 3†		‡
Wildlife, Fish and Conservation Biology 10	D	W
Wildlife, Fish and Conservation Biol. 102L		W
Wildlife, Fish and Conservation Biology 121		W
Wildlife, Fish and Conservation Biology 123		W
Wildlife, Fish and Conservation Biology 140		W
Wildlife, Fish and Conservation Biology 141		W
Wildlife, Fish and Conservation Biology 153		W

Social Sciences

African American and African Studies 80	D	W
African American and African Studies 110	D	
African American and African Studies 133	D	
African American and African Studies 145A	D	
African American and African Studies 145B	D	
Agricultural and Resource Economics 1		
Agricultural and Resource Economics 15	D	W
Agricultural and Resource Economics 115A	D	
Agricultural and Resource Economics 115B		
Agricultural and Resource Economics 120		W
Agricultural and Resource Economics 141		W
Agricultural and Resource Economics 141M		W
Agricultural and Resource Economics 147		
Agricultural and Resource Economics 150	D	W
Agricultural and Resource Economics 175		
Agricultural and Resource Economics 176		
Agricultural Education 100		W
Agricultural Education 160		W
Agricultural Education 172		W
American Studies 1A†	D	W
American Studies 1B†	D	W
American Studies 1C†	D	W
American Studies 1E†	D	W
American Studies 30†	D	W
American Studies 110†	D	W
American Studies 120†	D	W
American Studies 130†	D	W
American Studies 151†	D	W
American Studies 152†	D	W
American Studies 153†	D	W
American Studies 154†	D	W

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GENERAL EDUCATION COURSES FOR 1997-98

American Studies 155†	D	W
American Studies 156†	D	W
Animal Science 141		W
Animal Science 148		W
Anthropology 2	D	W
Anthropology 3	D	
Anthropology 4	D	W
Anthropology 20	D	
Anthropology 21	D	W
Anthropology 23	D	W
Anthropology 101		
Anthropology 110		
Anthropology 112		
Anthropology 113	D	
Anthropology 117	D	W
Anthropology 119		
Anthropology 120	D	W
Anthropology 121N		
Anthropology 122	D	W
Anthropology 123A	D	W
Anthropology 123B	D	W
Anthropology 124	D	W
Anthropology 125A	D	
Anthropology 125B	D	W
Anthropology 126	D	W
Anthropology 127	D	W
Anthropology 128	D	W
Anthropology 129	D	W
Anthropology 130	D	W
Anthropology 131	D	W
Anthropology 132N		W
Anthropology 133	D	W
Anthropology 134	D	W
Anthropology 135	D	W
Anthropology 136		W
Anthropology 137		
Anthropology 138		
Anthropology 139	D	W
Anthropology 140A	D	W
Anthropology 140B	D	W
Anthropology 141A	D	W
Anthropology 141B	D	W
Anthropology 142	D	W
Anthropology 143A	D	W
Anthropology 143B	D	W
Anthropology 144	D	W
Anthropology 145	D	W
Anthropology 146	D	W
Anthropology 147	D	W
Anthropology 148A	D	W
Anthropology 148B	D	W
Anthropology 148C	D	W
Anthropology 149A	D	W
Anthropology 149B	D	W
Anthropology 170	D	W
Anthropology 171		W
Anthropology 172	D	W
Anthropology 173	D	W
Anthropology 176	D	W
Anthropology 178	D	W
Anthropology 179	D	W
Anthropology 184		
Asian American Studies 1	D	W
Asian American Studies 2	D	W
Asian American Studies 110	D	
Asian American Studies 111	D	
Asian American Studies 112	D	
Chicano Studies 110	D	W
Chicano Studies 120	D	
Chicano Studies 121	D	W
Chicano Studies 131	D	
Chicano Studies 140	D	
Community and Regional Development 1	D	W
Community and Regional Development 2	D	W
Community and Regional Development 118		W
Community and Regional Development 140		W
Community and Regional Development 151	D	W
Community and Regional Development 152		W
Community and Regional Development 154	D	W
Community and Regional Development 157	D	W
Community and Regional Development 176	D	W
Consumer Sciences 100	D	W
Economics 1A		
Economics 1B		
Economics 104		
Economics 105		
Economics 110A	D	
Economics 110B		
Economics 111A		
Economics 111B		
Economics 115A	D	
Economics 115B		
Economics 116		
Economics 121A		
Economics 121B		
Economics 123		
Economics 125		
Economics 162		
Education 110		W
Education 120		W
Engineering 160†		
Engineering: Applied Science—Davis 137†		
Engineering: Civil and Environmental 160		W
Environmental and Resource Sciences 10		‡
Environmental Studies 101	D	
Environmental Studies 133	D	W
Environmental Studies 161		W
Environmental Studies 172		
Environmental Toxicology 138		
Exercise Science 105		
Exercise Science 120	D	
Fiber and Polymer Science 110†		W
Food Science and Technology 2†		
Geography 2		‡
Geography 5		‡
Geology 115N†		W
History 132	D	W
History 139A†		W
History 139B†		W
History 140		
History 147A†		W
History 147B†		W
History 147C†	D	W
History 196B	D	W
History and Philosophy of Science 150	D	W
Human Development 13		
Human Development 15		
Integrated Studies 8C		W
International Agricultural Development 10	D	W
International Agricultural Development 103	D	
Landscape Architecture 2		W
Landscape Architecture 40†		W
Landscape Architecture 168†		W
Linguistics 1†		W
Linguistics 50†		W
Linguistics 163	D	W
Linguistics 171		
Linguistics 173		
Native American Studies 1	D	
Native American Studies 10†	D	W
Native American Studies 46	D	W
Native American Studies 55	D	W
Native American Studies 115	D	W
Native American Studies 116	D	
Native American Studies 117	D	
Native American Studies 118	D	
Native American Studies 120	D	W
Native American Studies 122	D	W
Native American Std. 130A	D	W
Native American Std. 130B	D	W
Native American Std. 130C	D	W
Native American Studies 133	D	
Native American Studies 134	D	W
Native American Studies 180	D	W
Nature and Culture 100	D	W
Nutrition 20†		
Philosophy 109†		W
Philosophy 118	D	W
Philosophy 119	D	W
Philosophy 127†		W
Physics 137†		
Physics 160†		
Political Science 1		W
Political Science 2		W
Political Science 3		W
Political Science 4		W
Political Science 5		W
Political Science 7		W
Political Science 100		W
Political Science 102		W
Political Science 105		W
Political Science 106		W
Political Science 107		W
Political Science 108		W
Political Science 109		W
Political Science 112		W
Political Science 113		W
Political Science 114		W
Political Science 115		W
Political Science 116		W
Political Science 118A		W
Political Science 118B		W
Political Science 118C		W
Political Science 121		W
Political Science 122		W
Political Science 123		W
Political Science 124	D	W
Political Science 126	D	W
Political Science 128		W
Political Science 129		W
Political Science 130		W
Political Science 131		W
Political Science 132		W
Political Science 136		W
Political Science 141		W
Political Science 142	D	
Political Science 151		W
Political Science 152	D	W
Political Science 155		W
Political Science 160		W
Political Science 162		W
Political Science 163		W
Political Science 164		W
Political Science 165		W
Political Science 166	D	
Political Science 168	D	
Political Science 169	D	W
Political Science 174		W
Political Science 175		W
Political Science 176	D	
Political Science 180		W
Political Science 181		W
Political Science 182		W
Political Science 187		W
Political Science 192A		W
Political Science 192B		W
Psychology 1		
Psychology 114	D	W
Psychology 120		W
Psychology 144		
Psychology 147		W
Psychology 168		
Psychology 175		W
Psychology 177		W
Rhetoric and Communication 103		
Rhetoric and Communication 105		
Rhetoric & Communic. 114		
Rhetoric & Communic. 115		
Rhetoric & Communic. 130		
Rhetoric & Communic. 134		
Rhetoric & Communic. 135	D	
Rhetoric & Communic. 136		
Rhetoric & Communic. 138		
Rhetoric & Communic. 140		
Rhetoric & Communic. 141		
Rhetoric & Communic. 143		
Rhetoric & Communic. 145		
Rhetoric & Communic. 152		
Science and Society 1†	D	W
Science and Society 2†		W
Science and Society 3†		W
Science and Society 5†		W
Science and Society 15†	D	W
Science and Society 20†		W
Science and Society 120†		W
Sociology 1		
Sociology 2		W
Sociology 3		W
Sociology 4	D	W
Sociology 5	D	W
Sociology 25		W
Sociology 125		
Sociology 131	D	W
Sociology 132	D	
Sociology 146	D	W
Sociology 156		
Sociology 170		
Statistics 10†		W
Textiles and Clothing 7	D	W
Textiles and Clothing 8	D	
Textiles and Clothing 107	D	W
Textiles and Clothing 174	D	
Textiles and Clothing 177	D	W
Veterinary Medicine 170		W
Viticulture and Enology 3†		‡
Women's Studies 50†	D	W
Women's Studies 60†	D	
Women's Studies 70†	D	
Women's Studies 102	D	
Women's Studies 130†	D	
Women's Studies 140	D	
Women's Studies 158†	D	
Women's Studies 182	D	W
Women's Studies 184	D	W
Women's Studies 187	D	
Women's Studies 195†	D	

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† Also assigned to another area of *topical breadth*. ‡ Credit for *writing experience* allowed if co-course taken concurrently (see *Writing Experience* list).

GENERAL EDUCATION COURSES FOR 1997-98

Writing Experience

These courses satisfy the GE requirement for *writing experience,* provided you have previously satisfied the Subject A requirement. Many of these courses also provide GE credit for *topical breadth* or *social-cultural diversity.* Refer to the *topical breadth* and *social-cultural diversity* course lists to determine if any additional GE credit applies.

African American and African Studies 12, 15, 50, 52, 80, 107A, 107B, 107C, 152, 153, 162, 170
Agricultural and Resource Economics 15, 120, 141, 141M, 150
Agricultural Education 100, 160, 172
Agricultural Systems and Environment 7, 121, 130
American Studies 1A, 1B, 1C, 1E, 30, 110, 120, 130, 151, 152, 153, 154, 155, 156
Animal Science 1, 2, 42, 106, 124, 141, 146, 148, 193
Anthropology 1, 2, 4, 5, 15, 21, 23, 117, 120, 122, 123A, 123B, 124, 125B, 126, 127, 128, 129, 130, 131, 132N, 133, 134, 135, 136, 139, 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 148C, 149A, 149B, 151, 152, 153, 154A, 154B, 155, 157L (course XXX required concurrently), 158, 170, 171, 172, 173, 176, 178, 179, 183
Art History 1AG (course 1A required concurrently), 1BG (course 1B required concurrently), 1CG (course 1C required concurrently), 1DG (course 1D required concurrently), 25G (course 25 required concurrently), 153, 154A, 154B, 155, 163A, 163B, 163C, 164, 168, 176A, 176B, 177A, 177B, 178A, 178B, 178C, 179B, 182, 183A, 183B, 183C, 183E, 184, 188B, 188C
Art Studio 30, 131, 132A, 132B, 147, 148, 149, 150
Asian American Studies 1, 2
Atmospheric Science 5, 10
Avian Sciences 11, 13
Biological Sciences 1C, 10
Chemistry 10, 111, 115, 150
Chicano Studies 10, 110, 121
Chinese 10, 11, 50, 104, 105, 106, 107, 108, 109A, 109B, 109C, 109D, 109E, 109F, 109G, 109H, 109I, 110
Classics 1, 2, 3, 15, 20, 50, 102, 110, 140, 141, 142, 143, 150, 171, 174
Community and Regional Development 1, 2, 118, 140, 151, 152, 154, 157, 176
Comparative Literature 1*, 2*, 3*, 4*, 5, 6, 7, 8, 9, 12, 13, 14, 15, 20, 25, 53A, 53B, 120, 135, 138, 140, 141, 144, 145, 146, 147, 151, 152, 153, 154, 157, 158, 159, 160A, 160B, 161A, 161B, 163, 164A, 164B, 164C, 164D, 166A, 166B, 167, 168A, 168B, 169, 170, 180
Consumer Sciences 100
Design 1, 3, 100, 140, 142A, 142B, 143, 144
Dramatic Art 1, 150, 154, 155, 156A, 156B, 156C
East Asian Studies 113
Education 110, 120
Engineering: 45
Engineering: Chemical 155A, 155B
Engineering: Civil and Environmental 146, 155, 160, 163
Engineering: Computer Science 15, 15AT, 167
Engineering: Materials Science 130, 132, 138, 140, 142, 146, 148
English 1*, 3*, 4, 5F, 18*, 19*, 30A, 30B, 45, 46A, 46B, 46C, 101*, 102*, 104A*, 104B*, 104C*, 104D*, 104E*, 105, 107, 110A, 110B, 111, 113A, 113B, 115, 117A, 117B, 117C, 118, 122, 123, 130, 133, 137, 142, 143, 144, 146, 149, 150A, 150B, 152, 153, 155A, 155B, 155C, 156, 158A, 158B, 159, 160, 162, 165, 171A, 171B, 173, 175, 177, 178, 179, 180, 181A, 181B, 182, 184, 185A, 185B, 187, 188, 189
Entomology 17, 100L (course 100 required concurrently), 103, 107, 109, 110, 111, 119, 147, 153, 156L (course 156 required concurrently)
Environmental Horticulture 1
Environmental and Resource Sciences 10G (course 10 required concurrently), 60, 121, 131
Environmental Studies 10, 30G (course 30 required concurrently), 116G (course 116 required concurrently), 121, 133, 161, 166
Evolution and Ecology 121, 138
Exercise Science 110, 118
Fiber and Polymer Science 110
French 25, 50, 112, 113, 114
Geography 2G (course 2 required concurrently), 5G (course 5 required concurrently)
Geology 3G (course 3 required concurrently), 20, 32, 36, 43, 100L (course 100 required concurrently), 101L (course 101 required concurrently), 105N, 106N, 108N, 109L (course 109 required concurrently), 110, 115N, 116G (course 116 required concurrently), 134, 135G (course 135 required concurrently), 143, 144N, 145N
German 47, 48, 50, 110, 111A, 111B, 111C, 111D, 111E, 111F, 111G, 111H, 112A, 112B, 113, 114, 115A, 116, 117A, 117B, 117C, 118A, 118B, 118C, 118E, 119, 130, 140, 141
Greek 100, 101, 102, 103A, 103B, 104, 105, 111, 112, 113, 114, 115, 116
Hebrew 100, 101, 102
History 4A, 4B, 4C, 9A, 9B, 15, 17A, 17B, 72A, 72B, 111A, 111B, 111C, 112A, 112B, 115A, 115B, 115C, 121A, 121B, 121C, 125, 130A, 131B, 131C, 132, 136, 138A, 138B, 138C, 139A, 139B, 141, 143, 144, 145, 146A, 146B, 147A, 147B, 147C, 148A, 148B, 151A, 151B, 151C, 151D, 161A, 161B, 162, 169A, 169B, 170A, 170B, 171A, 173, 174A, 174B, 174C, 177A, 177B, 178, 183A, 183B, 185A, 185B, 189C, 191A, 191B, 191C, 191D, 191E, 191F, 194A, 196A, 196B
History and Philosophy of Science 130A, 130B, 131, 150
Honors Challenge 94, 194
Humanities 10, 20A, 110A, 120, 122, 124, 125, 180
Hydrologic Science 21, 100
Integrated Studies 8A, 8B, 8C
International Agricultural Development 10
Italian 50, 140, 141, 142, 145, 150
Japanese 10, 15, 50, 101, 102, 103, 104, 105, 106, 107, 108
Landscape Architecture 2, 30, 40, 140, 168
Latin 100, 101, 102, 103, 104, 105, 106, 108, 109, 110, 111, 112, 114, 115, 116, 125
Linguistics 1, 50, 141, 152, 163, 166, 167
Mathematics 108
Medicine: Cell Biology and Human Anatomy 101L (course 101 required concurrently)
Medieval Studies 20A, 20B, 20C, 120A, 120D, 120E, 130A, 130B
Microbiology 10, 20
Molecular and Cellular Biology 10, 162
Music 10, 24A, 24B, 24C, 28, 105, 110A, 110B, 110C, 110D, 110E, 121, 122, 124A, 124B, 126, 129
Native American Studies 5*, 10, 46, 55, 115, 120, 122, 130A, 130B, 130C, 134, 156, 180, 181A, 181B, 181C, 188
Nature and Culture 1, 100, 120
Neurobiology, Physiology and Behavior 12G (course 12 required concurrently), 104L, 111L, 114
Nutrition 11, 114, 115, 123, 129
Philosophy 1, 5, 6, 11, 13, 14, 15, 21, 22, 23, 24, 32, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 114, 115, 118, 119, 123, 127, 143, 145, 151
Physics 122
Plant Biology 11, 12, 143, 151
Plant Pathology 140
Political Science 1, 2, 3, 4, 5, 7, 100, 102, 105, 106, 107, 108, 109, 112, 113, 114, 115, 116, 118A, 118B, 118C, 121, 122, 123, 124, 126, 128, 129, 130, 131, 132, 136, 141, 151, 152, 155, 160, 162, 163, 164, 165, 169, 174, 175, 180, 181, 182, 187, 192A, 192B
Pomology 10
Psychology 114, 120, 147, 170, 175, 177
Religious Studies 1, 2, 3A, 3B, 3C, 21, 23, 40, 115, 125, 141A, 141B, 141C, 142
Rhetoric and Communication 1*
Russian 41, 42, 44, 123, 126, 129, 130, 131, 132, 139, 140, 141, 142, 143, 150, 151, 154, 166
Science and Society 1, 2, 3, 5, 15, 20, 105, 120
Sociology 2, 3, 4, 5, 25, 100, 120, 126, 127, 128, 131, 134, 135, 141, 143B, 145A, 145B, 146, 149, 172, 181
Soil Science 10
Spanish 148, 149
Statistics 10
Textiles and Clothing 7, 107, 177
Veterinary Medicine 170
Viticulture and Enology 3W (course 3 required concurrently), 123, 124, 125, 126, 130, 190X
Wildlife, Fish and Conservation Biology 10, 102L, 121, 123, 140, 141, 153
Women's Studies 20, 50, 182, 184

* This course may not be used to satisfy a college or university composition requirement and GE *writing experience* simultaneously.

GENERAL EDUCATION COURSES FOR 1997-98

Social-Cultural Diversity

These courses satisfy the GE requirement for *social-cultural diversity.* Many of these courses also provide GE credit for *topical breadth* or *writing experience.* Refer to the *topical breadth* and *writing experience* course lists to determine if any additional GE credit applies.

African American and African Studies 12, 15, 50, 52, 80, 100, 107A, 107B, 107C, 110, 123, 133, 145A, 145B, 150A, 150B, 152, 153, 160, 162, 170, 171
Agricultural and Resource Economics 15, 115A, 150
American Studies 1A, 1B, 1C, 1E, 30, 110, 120, 130, 151, 152, 153, 154, 155, 156
Anthropology 1, 2, 3, 4, 15, 20, 21, 23, 113, 117, 120, 122, 123A, 123B, 124, 125A, 125B, 126, 127, 128, 129, 130, 131, 133, 134, 135, 139, 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 148C, 149A, 149B, 158, 170, 172, 173, 176, 178, 179
Art History 1C, 1D, 150, 151, 152, 153, 163A, 163B, 163C, 164, 182, 183E
Art Studio 30, 131, 132B, 149
Asian American Studies 1, 2, 110, 111, 112, 120
Chicano Studies 10, 21, 30, 50, 70, 110, 120, 121, 130, 131, 140, 154
Chinese 10, 11, 50, 104, 105, 106, 107, 108, 109A, 109B, 109C, 109D, 109E, 109F, 109G, 109H, 109I, 110
Classics 15, 171
Community and Regional Development 1, 2, 151, 154, 157, 176
Comparative Literature 4, 5, 6, 7, 9, 12, 25, 53A, 53B, 135, 138, 147, 151, 152, 153, 154, 159
Consumer Sciences 100
Dramatic Art 1, 150, 154, 155, 156A, 156B, 156C
East Asian Studies 113
Economics 110A, 115A
English 30A, 30B, 171A, 171B, 178, 179, 181A, 181B, 182, 185A, 185B
Environmental Studies 101, 133
Exercise Science 120
French 124, 133
German 47, 112A
History 8, 9A, 9B, 15, 17A, 17B, 72A, 72B, 112A, 112B, 115A, 115B, 115C, 130A, 132, 142, 143, 144, 147C, 148A, 148B, 151D, 161A, 161B, 162, 169A, 169B, 170A, 170B, 171A, 173, 174A, 177A, 177B, 178, 183A, 183B, 191A, 191B, 191C, 191D, 191E, 191F, 194A, 194B, 194C, 196A, 196B
History and Philosophy of Science 150
Human Development 103, 160
Humanities 10, 122
International Agricultural Development 10, 103
Italian 141, 150
Japanese 10, 15, 50, 101, 102, 103, 104, 105, 106, 107, 108
Linguistics 163, 166, 167
Music 28, 105, 126, 129
Native American Studies 1, 5, 10, 32, 33, 46, 55, 101, 107, 115, 116, 117, 118, 120, 122, 130A, 130B, 130C, 133, 134, 156, 157, 180, 181A, 181B, 181C, 188, 191
Nature and Culture 100
Nutrition 110
Philosophy 11, 14, 118, 119
Plant Biology 12
Political Science 124, 126, 142, 152, 166, 168, 169, 176
Psychology 114, 170
Religious Studies 1, 2, 3A, 3B, 3C, 21, 23, 115
Rhetoric and Communication 135
Russian 44, 129, 139, 140, 141, 142, 143, 150, 154, 166
Science and Society 1, 15
Sociology 4, 5, 128, 129, 130, 131, 132, 133, 134, 135, 145A, 145B, 146, 149, 172
Spanish 139, 141, 149, 170, 172, 174, 176
Textiles and Clothing 7, 8, 107, 174, 177
Wildlife, Fish and Conservation Biology 10
Women's Studies 20, 50, 60, 70, 102, 130, 140, 158, 160, 162, 164, 180, 182, 184, 187, 195

GENERAL EDUCATION REQUIREMENT FOR 1992-93 THROUGH 1995-96

(Applies only to students who entered UC Davis before 1996-97)

Students who entered UC Davis before the 1996-97 academic year may elect to complete the requirement in effect the year of their entrance to UC Davis or to fulfill the GE requirement for students entering in 1996-97 or thereafter.

If you elect to complete the GE requirement in effect the year of your entrance to UC Davis, you must meet the requirements and conditions listed below and select approved GE courses from the list on the next page.

If you elect to complete the GE requirement for 1996-97 and thereafter, you must meet all of the requirements and conditions explained in the preceding section and select approved GE courses from the lists on the preceding pages. Courses completed before 1996-97 may be counted towards fulfillment of the GE requirement only if they appear on the list of approved GE courses in the 1996-97 *General Catalog.* In all other cases, you cannot claim GE credit for a course you completed **before** it was an approved GE course.

Determining Your General Education Requirement

Each academic major, minor and degree program has been assigned to one of the three areas of General Education: **Civilization and Culture, Contemporary Societies,** and **Nature and Environment.** Each GE course has also been assigned to one of the three areas. You must complete three courses in each of the two General Education areas outside of the area of your major. Two of the three courses in each area must be certified General Education courses. One of the three courses in each area must be an upper division course.

Double majors will satisfy the GE requirement in two areas only if the majors are assigned to two different areas. You will still be responsible for completing the GE requirement in the third area. Double majors in the same area do not reduce your GE requirements.

Individual majors are assigned to one of the three General Education areas when the major is approved by your college. If you have any questions concerning the GE area to which your major was assigned, consult your college dean's office.

A minor in an area outside the area of your major will satisfy your GE requirement in that minor's area. The minor in Science and Society may satisfy the GE requirement in any one of the three areas.

The specific General Education requirements for students who entered UC Davis from the 1992-93 academic year through the 1995-96 academic year are detailed in the General Education Requirements table on the next page. Students who entered UC Davis before the 1992-93 academic year should consult their college dean's office to determine their GE requirement.

Fulfilling the General Education Requirement

Students who entered UC Davis from the 1992-93 academic year through the 1995-96 academic year

(GE courses must be completed in the areas of General Education other than the area containing the major.)

Freshman or transfer student with 40 or fewer transfer units

6 GE courses:

- 3 courses in each of two areas;
- at least 1 upper division course in each area;
- at least 2 of the 3 courses in each area *must* come from the list of certified GE courses;
- the third course in each area may come from a list of courses approved for GE credit by your college.

Transfer student with more than 40 but fewer than 84 units

4 GE courses:

Option 1: 2 courses in each of two areas:

- at least 1 course in each area must be upper division;
- at least 1 course in each area must come from the list of certified GE courses;
- the second course in each area may come from a list of courses approved for GE credit by your college.

Option 2: 3 courses in one area;

- at least 1 course must be upper division;
- 2 courses must come from the list of certified GE courses;
- the remaining course may come from a list of courses approved for GE credit by your college;

and

- 1 upper division course in the other area, which must come from the list of certified GE courses.

Transfer student with 84 or more units

2 or 3 GE courses:

Option 1: 1 upper division course in each of two areas;

- both courses *must* come from the list of certified GE courses.

Option 2: 3 courses in one area;

- at least 1 course must be upper division;
- 2 courses *must* come from the list of certified GE courses;
- the remaining course may come from a list of courses approved for GE credit by your college

Additional Conditions

In addition to the requirements outlined above and in the GE requirements table, you must meet the following conditions:

1. **Letter grading.** All courses taken to fulfill the GE requirement must be taken for a letter grade. No GE credit will be awarded for a course that is taken on a Passed/Not Passed basis.
2. **Subject A.** This requirement must be completed before you begin your GE course work.

   Exception: GE credit may be earned before completing the Subject A requirement for the following course sequences which have been approved for the General Education Program: Chemistry 2A-2B, Economics 1A-1B and Music 3A-3B.

Transfer Credit

If you have transferred from a community college or other post-secondary institution, or enter with Advanced Placement (AP) units, you still have to complete some GE courses at UC Davis, but the number of required courses may be reduced depending upon the number of transfer or AP units you have brought with you.

The following courses and transfer credits will be used in determining the General Education requirement for transfer students:

- UC Davis Extension courses if they are accepted for transfer by Undergraduate Admissions and Outreach Services
- Advanced Placement credit
- Transfer work from other community colleges and four-year institutions

UC Davis Summer Sessions courses completed before entry do not count as "transfer credit" for determining your GE requirement. Successful completion of an approved GE course during a UC Davis Summer Session before entry, however, will count toward satisfaction of the GE requirement.

Consult the "Transfer Credit Evaluation" form prepared for you by Undergraduate Admissions and Outreach Services to determine your transfer credits.

GE Exemption

You are exempt from the UC Davis GE Requirement if you come from a California community college and have completed the "Intersegmental General Education Transfer Curriculum" (IGETC) or "Transfer Core Curriculum" (TCC), **or** you come from another campus of the University of California and have completed the lower division breadth or General Education requirements of that campus. Your college dean's office can tell you whether you fall into either of these categories.

Approved General Education Clusters

General Education "clusters" are groups of closely related lower division GE courses. You may earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster. A cluster allows you to substitute lower division for any required upper division courses. There are two approved clusters in the area of Civilization and Culture: History 4A, 4B, 4C; and Comparative Literature 1, 2, 3. There is one approved cluster in the area of Nature and Environment: Animal Science 1, 2, 42.

GE Courses for Continuing Students

The list on the following page contains approved GE courses **for continuing students who entered UC Davis from 1992-93 through 1995-96** and have elected to complete the GE requirement in effect the year of their entrance to UC Davis. Please consult prior years' catalogs or the Deans' offices for the lists of courses approved in previous years.

GENERAL EDUCATION COURSES FOR 1997-98

Approved courses for students who entered UC Davis from 1992-93 through 1995-96 and who have elected to complete the GE requirement in effect the year of their entrance to UC Davis.

Please consult prior years' catalogs or the Deans' offices for the lists of courses approved in previous years. Please note that you cannot claim GE credit for a course you completed **before** it was an approved GE course.

Civilization and Culture

Courses in this area present dominant intellectual traditions, achievements and socio-political institutions, and increase awareness of cultural diversity within the Western tradition and in other civilizations.

Lower Division

American Studies 1B, 1E
Art History 1A/1AG[1], 1B/1BG[1], 1C/1CG[1], 1D/1DG[1], 25/25G[1]
Chinese 11
Classics 15, 17B, 17C, 20, 50
Comparative Literature 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 20, 25, 53B
English 3, 4, 30A, 30B
French 25
German 47, 48, 50
History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 30, 72A, 72B
History and Philosophy of Science 20
Human Development 13
Integrated Studies 3B[4], 8B[4]
Italian 50
Landscape Architecture 40
Linguistics 1, 50
Medieval Studies 20A, 20B, 20C
Music 3A-3B[2], 10
Native American Studies 5
Philosophy 1, 11, 13, 14, 21, 22, 23, 24, 31, 32
Political Science 4
Religious Studies 3A, 3B, 3C, 21, 23, 40
Russian 44
Viticulture and Enology 3-3W[1]

Upper Division

Art History 178C
Chinese 110
Classics 110, 140, 141, 143, 150
Comparative Literature 120, 135, 138, 141, 144, 152, 153, 157, 159, 160A, 160B, 161A, 161B, 163, 164A, 164B, 164D, 166A, 166B, 168A, 168B, 169, 170
Dramatic Art 156A, 156B, 156C
Education 120
English 118, 156, 162, 171A, 171B, 182, 184
French 112, 113, 114
German 110, 111A, 111E, 112A, 112B, 113, 114, 115A, 116, 117A, 117B, 117C, 118A, 118B, 118C, 118E, 119, 130, 140, 141
History 138A, 138B, 139A, 140, 147A, 147B, 147C, 161A, 169A, 169B, 175A, 177A, 177B, 188A
History and Philosophy of Science 130A, 130B, 131
Humanities 110A
Italian 140, 141, 142
Medieval Studies 120A, 120D, 120E
Music 105, 110A, 110B, 110C, 110D, 110E, 129
Native American Studies 130A, 130B, 156, 181A, 181B, 181C
Philosophy 101, 102, 104, 105, 107, 108, 151
Religious Studies 141A, 141B, 141C, 142
Russian 129, 130, 131, 143, 151, 166
Spanish 149
Veterinary Medicine 170

Contemporary Societies

Courses in this area create an awareness of critical economic, political and social problems of the contemporary world.

Lower Division

Agricultural Economics 15
American Studies 1A
Anthropology 2, 4
Chicana/Chicano Studies 40
Community and Regional Development 2
Economics 1A-1B[2]
Environmental and Resource Sciences 10-10G[1]
Environmental Studies 10
Geography 2-2G[1], 5-5G[1]
History 10, 72B
Human Development 15
Integrated Studies 3A[4], 3E[4], 8C[4]
International Agricultural Development 10
Native American Studies 10, 55
Political Science 1, 2
Religious Studies 1, 2
Sociology 2, 3, 4, 25
Women's Studies 50

Upper Division

African American and African Studies 100, 133
Agricultural Economics 120, 141, 141M
American Studies 120, 130
Anthropology 101, 117, 124, 129, 130, 133, 134, 178
Community and Regional Development 151, 153, 154
Chicana/Chicano Studies 132
Consumer Science 100
Education 110
Engineering 160
Engineering: Applied Science 137
Engineering: Civil and Environmental 160
Environmental Studies 101, 133, 161, 166
Geography 155, 170, 171
History 165, 188B
Linguistics 163
Native American Studies 115, 130C, 134, 180
Philosophy 109, 118, 119
Physics 137, 160
Psychology 175, 177
Russian 132
Textiles and Clothing 107
Veterinary Medicine 170
Women's Studies 140

Nature and Environment

Courses in this area provide students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations and appeal of science.

Lower Division

Agricultural Systems and Environment 1
Animal Science 1, 2, 42
Anthropology 1, 15, 23
Astronomy 10
Atmospheric Sciences 10
Avian Sciences 11, 13
Biological Sciences 10
Chemistry 2A-2B[2], 10
Engineering: Civil and Environmental 30
Engineering: Computer Science 15, 15AT
Entomology 17
Environmental Studies 30-30G[1]
Food Science and Technology 2
Geology 1, 3-3G[1], 32, 36, 43
Human Development 19
Hydrologic Science 21
Integrated Studies 1A[4], 8A[4]
Microbiology 20
Molecular and Cellular Biology 10
Nutrition 10-11[3], 20
Philosophy 31
Physics 10
Plant Biology 11, 12
Pomology 10
Science and Society 20
Soil Science 10
Statistics 10
Viticulture and Enology 3-3W[1]
Wildlife, Fish and Conservation Biology 10

Upper Division

Agricultural Systems and Environment 121
Anthropology 152, 153
Engineering 160
Engineering: Applied Science 137
Engineering: Computer Science 167
Entomology 111, 119, 147, 153
Environmental and Resource Sciences 121, 131
Environmental Studies 116-116G[1]
Evolution and Ecology 121, 138
Fiber and Polymer Science 110
Geology 115N, 116-116G[1], 135-135G[1]
History and Philosophy of Science 130A, 130B, 131
Hydrologic Science 100
Landscape Architecture 155
Philosophy 108
Physics 137, 160
Plant Biology 151
Plant Pathology 140

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[1]These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.
[2]This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.
[3]Nutrition 10 and 11 must both be completed to satisfy the requirement for one GE course. These courses may be taken concurrently, if offered, or sequentially (10 then 11).
[4]GE courses in Integrated Studies are open only to students in the Integrated Studies program.

COLLEGE REQUIREMENTS FOR THE BACHELOR'S DEGREE

College of Agricultural and Environmental Sciences

Unit Requirements

Of the required 180 units counted toward a degree, **54 units must be upper division work.** In addition, the following unit limitations apply to all majors:

- Not more than 6 units can be Physical Education 1 and 6
- Not more than 20 units can be courses numbered 90X, 92, 97T, 97TC, 99, 190C, 190X, 192, 197T, 197TC, or 199
- Not more than 12 units can be courses numbered 92 and/or 192 (credit will not be given for 192s or 199s taken before the completion of 84 units)
- Not more than 5 units per quarter of Special Study courses (99, 194H, 199)
- Not more than 9 units of professional courses (numbers 300–499) may be used toward the 54 upper division units

Credit in University Extension Courses. Students in residence may apply a maximum of 9 units of credit earned in some University Extension courses toward the 180-unit requirement *provided* written approval has been obtained from the dean *before* registering. Units of credit allowed by the dean may be less than the number of units listed for a course. No grade points are assigned for courses completed through University Extension.

Residence Requirement

Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the Davis campus. Not more than 28 of these 35 quarter units may be completed in summer session courses at UC Davis.

Scholarship Requirement

Students in the College are required to attain a minimum grade point average of 2.0 for all courses specified as depth subject matter in their major. Each candidate must complete a program of study either as prescribed in *(a)* a major approved by the Undergraduate Majors and Courses Subcommittee and printed in this catalog, or *(b)* an individual major approved by the Individual Major Subcommittee.

English Composition Requirement

The English Composition requirement can be met in one of two ways:

1. by taking, before you have completed 120 units, **either** two courses emphasizing written expression **or** one course emphasizing written expression and one course emphasizing oral expression. The following UC Davis courses satisfy this requirement:

   (*a*) one course must be selected from English 1, 3, 18, 19, 101, 104A, 104B, 104C, 104D, or 104E (courses with primary emphasis in writing skills);

   (*b*) one course selected from the courses not selected above, or from English 102, Comparative Literature 1, 2, 3, 4, Native American Studies 5, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills);

OR

2. by passing the English Composition Examination administered by the College of Letters and Science upon completion of 70 units of degree credit (the examination does not yield credit).

General Education

You should consult your Dean's Office or department adviser in advance to determine exactly how your General Education courses will apply toward your major.

Study Plan Approval

A Study Plan provides for attainment of specific long-term goals and should allow for the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters; the fulfillment of College and major requirements; a proper balance between the demands of the courses and your ability to master the subject matter; and meeting the minimum progress requirements (see the Academic Information chapter).

In conjunction with a faculty adviser and/or staff adviser, you must plan and prepare a program that specifies your goals and shows how the graduation requirements will be met. It is a regulation that a written "study plan" be filed with your faculty adviser or staff adviser by the end of the second quarter of the junior year (having completed not more than 120 units either in residence and/or by transfer).

You may be denied registration for future quarters if you do not comply with this regulation. However, filing this study plan does not preclude a change of major or program modifications.

Major Degree Certification

A Major Certification is completed during the quarter you plan to graduate. At that time, you and your faculty adviser and/or staff adviser check to see that all *major* requirements have been completed. The Dean's Office completes the degree certification by verifying that all *college* and *university* requirements have been satisfied.

Degree Requirement Changes

On occasion, the faculty make changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is college policy that you may choose to fulfill the university, college and major requirements in effect at the time you were registered at UC Davis. If you have transferred to UC Davis from a community college, state college, or another university, you may follow the requirements as stated in any UC Davis catalog in effect *either* during the three years immediately preceding your transfer to Davis or at the time you first registered at that institution, *whichever is most recent.* Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university, college and major requirements specified in that catalog.

College of Engineering

Unit Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. Each curriculum consists of a specified Lower Division Program (or an approved equivalent program for students who transfer into the College with 90 or more quarter units) and a specified Upper Division Program. Detailed requirements for the approved curricula are given in the Programs and Courses section of this catalog; to see the courses required in your major, consult this section.

The minimum number of required units in the combined Lower and Upper Division Programs varies, with the curriculum, from 180 to 195.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, which are available in the Undergraduate Office, can be a valuable aid in resolving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Study Committee, a body of six professors and six (non-voting) students. A negative decision by the committee may be appealed to the College faculty for action at a regular meeting.

Transfer students. If you are admitted with *90 or more quarter units,* you are classified as having upper division standing, but you are required to complete the minimum number of quarter units in the subject areas specified below before your Lower Division Program is considered complete. You may, however, start your Upper Division Program while completing your Lower Division Program requirements. For more specific advice on your requirements, see the transfer counselor of your institution.

Subject Areas	Minimum Quarter Units
Mathematics (calculus, differential equations, linear algebra, vector analysis)	22
Physical and biological sciences (typically, at least 10 units must be in general chemistry and at least 12 units in physics courses designed for engineering and physical science students)	22-26
Engineering (lower division subjects such as graphics, properties of materials, surveying, computer programming, dynamics, statics and circuit theory. These courses must include statics, dynamics, circuits and FORTRAN for all but Electrical and Computer Engineering and Computer Science majors, who must take Pascal. Students majoring in Mechanical, Aeronautical, Materials Science, Civil, Electrical or Computer Engineering, or Computer Science may have additional course requirements specific to their respective majors. Because of additional lower division chemistry requirements, Chemical Engineering majors may elect to take only 10 units—FORTRAN, circuit theory and statics—of engineering in their lower division programs)	15-26
Written and oral expression English 1 or 3 and Rhetoric and Communication 1 or 3, or courses that are their equivalents	8
Humanities–Social Sciences (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study)	5-12
Additional subjects (Chemical Engineering majors should cover quantitative analysis and one course in organic chemistry with a laboratory component during their sophomore year)	7-8
Total	**90**

Once you have completed the Lower Division Program and fulfilled these specified subject area requirements, you need not take additional lower division courses, except those that are prerequisite to upper division courses in your curriculum. For additional information on core prerequisite courses, please contact your department of college adviser.

Credit in University Extension Courses. Appropriate courses taken through University Extension may be used for degree credit; however, you may use a maximum of 16 units of courses taken through University Extension for degree credit. Simultaneous registration in resident courses and Extension courses requires *prior approval* by the College's Associate Dean for Undergraduate Studies. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

Residence Requirement

In addition to fulfilling the university residence requirement, you must complete at least 35 of the final 45 units characteristic of your curriculum in engineering while registered in the College.

Scholarship Requirement

In addition to meeting the university scholarship requirement, you are required to maintain a 2.0 grade point average for all engineering course work.

English Composition Requirement (Upper Division)

After completing 70 quarter units, you may elect to satisfy the upper division English Composition requirement by passing the English Composition Examination administered by the College of Letters and Science. (You should take it early in your junior year and must take it before your last quarter. Units of credit are not given for passing this examination.)

Or, upon completion of 90 quarter units, you may satisfy this requirement by completing English 101, 102, 104A, or 104E with a grade of C– or higher.

This requirement is in addition to the expository writing course requirement (English 1 or 3; Comparative Literature 1, 2, 3 or 4; or Native American Studies 5) specified in the Lower Division Programs.

During the 1997-98 academic year, the English Composition Examination will be offered on the following three Saturdays: October 25, 1997; January 24, 1998; and April 25, 1998. Sign-up rosters will be posted on the bulletin board near the main English Department office (176 Voorhies), Monday until noon on Friday (or until they are filled) just preceding each Saturday examination date. You must sign up, in person, by noon on Friday. You must obtain the English Composition

Examination form, available at the UCD Bookstore, to take the exam.

Engineering Design Requirement

Engineering design is the process of devising a system, component, or process to meet certain needs. Design involves a decision-making process (often iterative), in which the basic sciences, mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. You must take at least 24 quarter units of such design course work through a combination of required and restricted elective courses. Specific comments about design are included in individual curricula descriptions. You should also review the design content of your individual program with your adviser in the course of completing the upper division advising worksheet.

Electives

In general, there are four kinds of elective courses in the engineering curricula: *Humanities–Social Sciences, General Education, technical and unrestricted.* Transfer students have an additional set of electives: *Physical and Biological Sciences electives* or *Mathematics/Science electives.*

Humanities–Social Sciences electives: Because engineers are significant agents of social change, they must be sensitive to the human setting in which that change takes place. The Humanities–Social Sciences (HSS) electives have been selected within the engineering curricula to increase your awareness of the human and societal implications of engineering practice. The humanities include subject areas such as literature, philosophy, history and the fine arts. The social sciences include areas such as anthropology, political science, sociology, psychology and economics.

You must take at least 24 quarter units of course work in the humanities and social sciences; Computer Science and Engineering majors must have 33 quarter units. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Foreign language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical skills. You may petition to have a non-literature course in a foreign language which is not your native language count as a humanities course. Students enrolled in the Davis Honors Challenge may receive HSS credit for approved Honors Seminars; consult with the Undergraduate Advising Office for a list of approved seminars each quarter. You may petition for HSS credit for 92, 98, 99, 192, 197, 198 and 199 courses in appropriate cases. If you repeat any of the courses which may be repeated for credit, not more than 4 units in any such courses can be counted toward your HSS requirement.

Your HSS electives should be selected to include a comprehensive and coherent set of courses and may, in some cases, be integrated with your General Education electives, as described in the next section. HSS electives must be selected from the following list.

African American and African Studies 10, 12, 15, 50, 51, 52, 80, 100, 101, 107A, 107B, 107C, 110, 121, 123, 130, 133, 141, 145A, 145B, 150A, 150B, 151, 152, 153, 160, 162, 170
Agricultural and Resource Economics 1, 15, 100A, 100B, 120, 141, 141M, 148, 150, 175, 176
American Studies 1A, 1B, 1C, 1E, 1F, 2, 101A-H, 110, 120, 125, 130, 151, 152, 153, 154, 155, 156
Anthropology 2, 3, 4, 20, 21, 23, 101, 110, 112, 113, 117 through 149B, 170 through 179, 184
Art History 1A, 1B, 1C, 1D, 25, 150 through 188C, 190 (also Art History 1AG, 1BG, 1CG, 1DG and 25G when taken concurrently with Art History 1A, 1B, 1C, 1D and 25)
Art Studio 10, 147 through 150
Asian American Studies 1, 2, 20, 100, 101, 110, 111, 112, 130, 136, 150, 155
Chicana/Chicano Studies 10, 21, 30, 40, 50, 60, 70, 100 through 140, 154, 155, 156, 165
Chinese 10, 11, 50, 104 through 109A-I, 110, 111 through 116, 130, 131, 132, 140, 160
Classics 1, 2, 3, 10, 15, 17A, 17B, 17C, 20, 50, 102, 140, 141, 142, 143, 150, 171, 174, 175
Community and Regional Development 1, 2, 17, 118, 140, 151, 152 through 154, 157, 158, 161 through 164, 171 through 178, 190
Comparative Literature 1 through 53B, 120, 135 through 180
Consumer Science 100
Design 1, 3, 140, 142A, 142B, 143, 144
Dramatic Art 1, 20, 115, 150 through 159
East Asian Studies 113
Economics 1A-1B, 100, 101, 103, 104, 105, 110A through 136B, 151A through 175
Economy, Justice and Society 100
Education 110, 120, 130, 145, 151, 153
English 3, 4, 30A, 30B, 46A, 46B, 46C, 105, 110A through 189
Environmental Studies 101, 133, 160 through 162, 164 through 167, 175
Exercise Science 105
French 25, 50, 101, 102, 103, 107N, 108, 112 through 133, 140, 141, 160, 161, 162
Geography 2, 5, (2G, 5G when taken concurrently with 2 or 5), 10, 50, 104, 120 (but not 120L), 121, 122A through 126, 131, 141 through 162, 168, 170 through 173, 175
German 47, 48, 50, 51, 101A, 101B, 105, 106, 107, 108, 110 through 133, 140, 141, 142C, 144, 145, 150, 160, 165 through 168, 176, 185
Greek 100 through 116
History 3 through 86, 101 through 104A, 110 through 191F, 194A through 196B
History and Philosophy of Science 20, 130A, 130B, 131, 150
Human Development 13, 15, 19, 100A through 103, 110, 130, 131, 132, 151, 160, 162
Humanities 10, 20A, 110A
Hydrologic Science 150
Integrated Studies 1A, 2A, 2C, 2E, 3A, 3B, 3E, 8, 8B, 8C (Open only to students accepted to the Integrated Studies Program)

International Agricultural Development 10, 103
Italian 50, 105, 107 through 145
Japanese 10, 15, 25, 50, 101 through 108, 131 through 135
Landscape Architecture 140
Latin 100 through 116, 125
Linguistics 1, 10 through 15, 50, 103A, 103B, 104, 105, 121, 131, 141, 151, 152, 163, 166, 167, 171, 173
Medieval Studies 20A, 20B, 20C, 120A-F
Music 3A, 3B, 4A, 4B, 4C, 5A, 5B, 5C, 10, 24A through 28, 105, 109, 110A, 110B, 110C, 110D, 110E, 121, 122, 124A, 124B, 125, 126, 129
Native American Studies 1, 5, 10, 32, 33, 55, 101 through 191
Nature and Culture 1
Nutrition 20, 118
Philosophy 1, 11, 13, 14, 21, 22, 23, 24, 32, 101 through 111, 114 through 127, 137, 143 through 177, 190
Political Science 1 through 7, 100 through 113, 115 through 191
Psychology 1, 112, 114, 120, 130, 131, 132, 136 through 150, 165, 168, 175, 177, 183
Religious Studies 1 through 75, 100 through 178A-E
Rhetoric and Communication 50, 103 through 145, 152
Russian 41, 42, 44, 121 through 154, 160, 166
Sociology 1, 2, 3, 4, 5, 25, 100, 118 through 185
Spanish 100, 111N, 112N, 114N, 115N, 116, 118, 130 through 176
Textiles and Clothing 107, 177
Women's Studies 20, 50, 60, 70, 80, 102, 103, 104, 130, 140, 158, 160, 164, 180, 182, 184, 187

General Education electives are used to satisfy a campus requirement and are chosen from the list of General Education Courses for 1997-98 given earlier in this chapter. Since all engineering majors are in the Science and Engineering GE *topical breadth* area, you must fulfill the campus requirement by taking courses in the Arts and Humanities area and the Social Sciences area.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) course work is a College of Engineering requirement and is in addition to the campus General Education (GE) requirement of a fixed number of courses. *You may satisfy the HSS and GE requirements simultaneously,* provided that you take the courses that are listed on both the list of HSS courses above and the GE courses list shown earlier in this chapter.

In satisfying the GE requirement, note that (a) *you must take GE courses for a letter grade,* and (b) *you must fulfill the Subject A requirement before you can receive GE credit for any course providing writing experience credit.* In consultation with your academic adviser, you should attempt to design a comprehensive and coherent set of courses using both the HSS electives and GE electives.

Technical electives permit you to tailor a program to your own academic and career objectives. For some, the technical electives offer the opportunity to prepare for a specific occupation. For others, they offer an opportunity to broaden a background in the sciences and engineering.

You may receive technical elective credit to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 197, 198 and 199. Academic credit for 199 courses is limited to a maximum of 5 units per quarter for each substantially different project. Academic credit for engineering internship courses (192s) is also limited to a maximum of 5 units per quarter.

With the exception of the following courses, all upper division courses in engineering, physics, chemistry, mathematics and statistics may be taken as technical electives. The courses which may *not* be used are:

Applied Science Engineering 137 (restricted to one unit of technical elective)
Physics 137 and 160 (restricted to one unit of technical elective), 194H, 195, 197T, 198, 199
Chemistry 194H, 197, 198, 199
Engineering 160 (restricted to one unit of technical elective)
Mathematics 192, 197TC, 198, 199
Statistics 102

In addition to upper division engineering, physics, chemistry, mathematics and statistics courses, the following courses may be taken as technical electives:

Agricultural and Resource Economics 100A, 100B, 113, 118A, 118B, 155, 157, 171A, 171B, 175, 176
Agricultural Systems and Environment, any upper division course except 101 and 190 through 199
Anatomy, Physiology, and Cell Biology 100
Animal Science 104, 105
Applied Biological Systems Technology 161, 163, 180, 181
Atmospheric Science 111, 121A, 121B, 124, 128, 133, 149, 150, 158
Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, 120, 120P, 122, 122P
Chemistry 2C, 2CH, 8A, 8B
Economics 140
Environmental Studies 100, 128, 128L, 150A, 150B, 150C, 151, 155, 160, 167, 168A, 168B, 173, 178, 179
Environmental Toxicology 101, 131, 135, 155
Evolution and Ecology 100, 103, 105, 108, 112, 112L, 117, 134, 134L, 140, 170, 170L
Fiber and Polymer Science 100, 150, 161, 161L
Food Science and Technology 100A, 100B, 100C, 101A, 101B, 102A, 102B, 103, 104, 108, 109, 110A, 110B, 119, 120, 120L, 121, 122, 123, 123L, 128, 131, 140, 151, 156, 159, 160, 180
Geography 105, 106, 107, 108, 110, 117
Geology 17, 50, 50L, 100, 100L, 101, 101L, 102N, 108N, 109, 109L, 134, 146N, 150A, 150B, 150C, 152N
Hydrologic Science 110, 113, 115, 117, 122, 122L, 124, 134, 141, 143, 145A, 145B, 150
Management 11A, 11B
Microbiology 102, 102L, 105, 140, 150, 155L, 160, 162, 177, 177L
Molecular and Cellular Biology 120L, 121, 122, 123, 126, 140L, 141, 142, 146, 150, 150L, 151L, 160L, 161, 162, 163, 164, 166, 170L
Neurobiology, Physiology and Behavior, any upper division course
Plant Biology 105, 108, 111, 111D, 111L, 112, 112D, 113, 113D, 116, 117, 118, 121, 125, 143, 144, 148, 152, 153, 154, 157, 158, 160, 161A, 161B, 173, 174, 175, 176, 177, 178, 189
Plant Pathology 120, 125, 130, 148
Soil Science 100, 102, 107, 109, 111, 118, 120

Wildlife, Fish and Conservation Biology 100, 102, 102L, 110, 110L, 111, 111L, 120, 120L, 121, 122, 123, 130, 131, 136, 140, 151, 152, 153, 154

You are urged to discuss the selection of technical elective courses with your academic adviser.

Unrestricted electives. You may count any course for which university credit is allowed as an unrestricted elective in the engineering curricula.

Physical and Biological Science electives. Engineering students are required to have 26 units in physical and biological sciences, typically 10 units of chemistry and 16 units of physics. Students who transfer into the College of Engineering with advanced standing are required to complete 26 units of physical and biological science by graduation, but need only have completed 5-10 units of chemistry (depending on major) and 12 units of physics by the time of transfer. Transfer students may make up the remaining 4 units by taking 4 additional units of chemistry, 4 additional units of physics, or 4 units in courses selected from any of the curricula listed below, with the restrictions that follow.

Atmospheric Science
Biological Science
Chemistry
Evolution and Ecology
Geology
Microbiology
Molecular and Cellular Biology
Neurobiology, Physiology and Behavior
Physics
Plant Biology

All courses in these departments numbered 10 and 190–199 are excluded for credit, as are the following courses:

Evolution and Ecology 138
Geology 1-1G, 3-3G-3L, 43, 116-116G, 135-135G
Microbiology 20
Physics 137, 160
Plant Biology 1, 11, 12

Electrical Engineering and Computer Engineering students should also use this list to identify the courses to satisfy the mathematics/science electives. To identify additional courses that may also satisfy this requirement, please refer to the Electrical Engineering and Computer Engineering curricula.

Degree Check

Use the Degree Requirement Check sheets for each of the curricula for monitoring your progress toward a degree. The Undergraduate Office will prepare only one *unofficial* preliminary degree check for you (preferably at the end of your junior year). You should also request an exit interview during the quarter before you plan to graduate. To have this degree check prepared, submit a signed Degree Check Request and request an appointment. You can get further information concerning these services and the forms for requesting a degree check or an exit interview in the Undergraduate Advising Office.

Degree Requirement Changes

Since engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. To ensure that you benefit from these changes, the College of Engineering has established a policy that you must fulfill the degree requirements stated in the catalog for the year in which you complete degree work or in the catalog for the year immediately preceding.

College of Letters and Science

Unit Requirements

A minimum of 180 units is required for the bachelor's degree. Of these units, 64 must be earned in upper division courses.

Registration Beyond the 225-unit Limit. You are normally expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed (excluding units awarded for College Board Advanced Placement Examinations), you may register only with the permission of the dean. Such permission is rarely granted, and then typically only to allow completion of *minimum* degree requirements. You will be expected to adhere to a program of courses agreed upon and to meet other conditions that may have been set. Approval must be obtained before you will be permitted to register for courses for the quarter following completion of 225 or more units.

If you are in good standing, you will be able to complete 12 quarters or the equivalent (e.g., four years) of college work even if you have earned more than 225 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.

Unit Credit Limitations

For certain courses, limits have been established on the number of units that can be counted towards the 180-unit minimum required for the degree. To avoid discovering just before graduation that you are short units, keep track of the number of units you have taken in each of the following categories.

Limitation on Credit for Graduate and Professional Courses. Undergraduates may enroll in graduate and professional courses in the 200, 300 and 400 series subject to the restrictions described in the Academic Information section in this catalog. Graduate and professional courses that have been completed will be listed on the student's transcript in the usual manner. *However, the units earned may be counted toward degree requirements only under the conditions listed below.*

Within the limitations A, B and C given below, undergraduate students in the College may count an unlimited number of units in graduate 200 series courses and up to a combined total of 9 units in 300 and 400 series professional courses toward degree requirements. These units, however, are not counted as upper division units unless this is granted by petition to the dean.

A. The recommendations of the instructor in the course and the department chairperson—in addition to approval from the dean—must be obtained by petition in order to receive credit toward the degree for the following kinds of courses:

- all graduate courses 200–298, whether offered by a department or program outside of or within the College of Letters and Science
- all professional courses 300–398 for teachers offered outside of the College of Letters and Science
- all postgraduate professional courses 400–498 offered outside of the College of Letters and Science
- all variable unit courses 300–398 and 400–498 offered within the College of Letters and Science

B. The minimum eligibility conditions for an undergraduate student in the College to petition for degree credit for a 200, 300, or 400 series course are a UC grade point average of 3.3 and completion of 18 upper division units basic to the subject matter of the course. These eligibility conditions may be waived, however, upon the recommendation of the course instructor and concurrence of the department chairperson if the student's preparation warrants exception.

C. Undergraduates in the College cannot receive degree credit for special study courses 299, 399, or 499.

Limitation on Credit for Units Graded P. *Excluding* courses that are graded on a Passed/Not Passed (P/NP) basis *only, the number of units graded P that may be accepted towards a degree in the College of Letters and Science is limited to not more than one fourth* of the units completed in residence on the Davis campus.

The Academic Senate limits the *total* number of courses graded P, *including units earned in courses graded "P/NP only,"* to *one third* of the units completed on the Davis campus. This limitation applies to *all* Davis undergraduates, including Letters and Science students.

Limitation on Credit for University Extension Courses. Students may apply credit earned in University Extension courses toward the 180-unit requirement only when written approval has been obtained from the dean before registration. The degree credit allowed by the dean for Extension courses is usually less than the unit value listed in the course description. A maximum of 9 units may be offered for elective credit only. Such units and courses may not be applied toward fulfillment of the Area, Foreign Language, Upper Division, or Residence requirements of the College. No grade points are assigned for courses completed in University Extension.

Other Unit Credit Limitations. The following are additional courses that have limits on the number of units that can be counted toward your degree.

Internship courses (numbers 92, 192): 12 units maximum including internship units taken at other institutions. (See under Nonstandard courses below.)

Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses): 30 units maximum or one-sixth of the units taken at UC Davis, whichever is the smaller. (Note the separate unit limits on internship, special study and tutoring courses; and major limitations.)

Physical Education 1 and 6 (combined): 6 units maximum.

Special Study courses (99, 194H, 199): 5 units maximum in any one quarter. (See under Nonstandard courses above.)

Tutoring courses (97T, 97TC, 197T, 197TC): 10 units maximum. (See under Nonstandard courses above.)

Residence Requirement

While registered in the College of Letters and Science, a minimum of 27 upper division units, including 18 upper division units in the major, must be completed on the Davis campus. (Work completed while registered in the Education Abroad Program does not satisfy campus or College Residence requirements.)

Scholarship Requirement

The minimum grade point average to satisfy the scholarship requirement is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. Only grades earned in courses taken at UC Davis will be included in the grade point computations. To obtain these minimal averages in the major, you may repeat courses that are graded D or F. If you have to repeat a course more than once, you need the dean's approval.

English Composition Requirement

The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination upon completion of 70 units of degree credit (the examination does not yield credit);

OR

2. by completing with a grade of C– (or P) or better

(a) one course in English composition from English 1, 3, 18, 19, Comparative Literature 1, 2, 3 or 4, or Native American Studies 5; **and**

(b) English 101, 102, or 104A, 104B, 104C, 104D, or 104E (which must be taken after 84 units have been completed).

Transfer Courses in English Composition. Transfer courses considered by the dean to be equivalent or comparable to English 1, 3, 18, 19, 101, 104A, 104B, 104C, 104D, 104E, Comparative Literature 1, 2, 3, 4, or Native American Studies 5 will be accepted toward satisfaction of the English Composition requirement. Note that English 101 and 104A, 104B, 104C, 104D, and 104E or the equivalent must be taken after you have completed 84 units of transferable degree credit.

If your transfer work does not include an acceptable English composition course taken after you had completed or accumulated 84 units, you may fulfill the requirement by examination (see below) or take English 101, 102, 104A, 104B, 104C, 104D, or 104E at UC Davis.

English Composition Examination. This academic year, the no-fee examination will be offered on the following Saturday mornings:

October 25, 1997
January 24, 1998
April 25, 1998

There are no examinations given during the summer. Sign-up rosters will be posted on the bulletin board near the main English Department office (176 Voorhies), Monday until noon on Friday (or until they are filled)

just preceding each Saturday examination date. You must sign up, in person, by noon Friday. The English Composition Examination form, available at the UCD Bookstore, is required.

Area (Breadth) Requirement

The College Breadth Requirement promotes the intellectual growth of students by asking them to acquire a broader background of knowledge than is provided by the usual major. The Breadth requirement also guides students in exploring the interdependence of knowledge and, in the case of the A.B. degree, provides students the opportunity to become acquainted with performance in the fine arts.

***A.B. degree*—**satisfaction of the campus General Education requirement **plus** completion of one of the following options:

a. a "Mini Minor" consisting of a minimum of three approved upper division courses in a single Letters and Science department or program other than the major (and which are not offered in satisfaction of major requirements);

OR

b. a minimum of three **approved** lower or upper division courses in Art, Music, or Dramatic Art from outside the student's major;

OR

c. a certified minor from any UC Davis college or program.

The Letters and Science faculty believes that the completion of a certified minor is often the best way for a student to obtain structure and coherence in pursuit of intellectual breadth.

For the purposes of options *a* and *b* above, all courses are considered as approved except: courses bearing less than 3 units of credit, internship courses, non-standard courses, directed group study courses, and courses used to satisfy the College English Composition Requirement.

***B.S. degree*—**a total of 90 units in natural sciences/mathematics; and satisfaction of the General Education requirement.

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the natural sciences/mathematics Area requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirements. Courses used to satisfy the English Composition and Foreign Language requirements may not be counted toward the Area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling the 90-unit natural sciences/mathematics Area requirement are:

Natural Sciences and Mathematics

Anatomy, Physiology and Cell Biology 100
Animal Science 135
Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158
Astronomy
Avian Sciences 13
Biological Sciences: All courses except 19
Cell Biology and Human Anatomy 101, 101L
Chemistry
Engineering 5, 102
Engineering: Civil and Environmental 30
Engineering: Computer Science 10, 30, 40, 100, 110, 120, 122A, 140A, 170
Engineering: Electrical and Computer 170
Entomology 10, 100, 153
Environmental and Resource Sciences 131
Environmental Studies 30, 100, 121, 126
Environmental Toxicology 101
Evolution and Ecology
Exercise Science 101, 102, 103, 110, 111, 112, 113, 115, 116, 117, 126, 133, 135
Fiber and Polymer Science 110
Food Science and Technology 2, 100A, 100B, 101A, 101B
Geography 1, 3, 102, 108, 110, 117, 118, 162
Geology
Integrated Studies 1A, 1B, 8A
Mathematics
Microbiology
Molecular and Cellular Biology
Neurobiology, Physiology and Behavior
Nutrition 10, 101, 110, 111
Pathology, Microbiology and Immunology 126
Physics
Plant Biology
Psychology 41, 103, 104, 105, 108, 129, 130, 131, 134, 136, 150, 152, 160, 180B
Statistics
Wildlife, Fish and Conservation Biology 10

Foreign Language Requirement (A.B. and B.A.S. degrees)

The Foreign Language requirement may be satisfied in any language offered at UC Davis, or for which transfer credit is allowed from another academic institution (including American Sign Language).

You may also satisfy this requirement by examination in a language not offered on the Davis campus. In this case, the Dean's Office will assist you in making arrangements to take an examination on another University of California campus, with a faculty member who teaches the language in question.

Satisfaction of the Requirement. Plan to complete the Foreign Language Requirement by the end of your first or second year, as program priorities permit. This is particularly important if you plan to apply for the university's Education Abroad Program. The Foreign Language requirement may be satisfied by examination or completion of language courses as follows:

1. *Foreign Language Placement Test.* This test does not yield unit credit—it only determines whether the Foreign Language requirement has been met, or at which point in the language sequence you should enroll.

   You may validate your knowledge of a language learned in high school by taking this test. A test may not be taken, however, in a language for which you have already received degree credit. If you are a transfer student, consult your *Graduation Requirement Degree Check*, which is issued by the Dean's Office within a quarter after enrollment.

2. *College Board Achievement Test*. Earning a qualifying score of at least 550 on a College Board Foreign Language Achievement Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at Undergraduate Admissions and Outreach Services, notify the Letters and Science Dean's Office so that satisfaction of the College requirement can be noted on your record.
3. *College Board Advanced Placement Examination*. A score of 5, 4, or 3 on any foreign language College Board Advanced Placement Examination, with the exception of Latin, taken in high school will satisfy the Foreign Language requirement.
4. *Course Completion in College (or the equivalent)*. A.B. and B.A.S. degrees—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S degree—none, but as is required in the major program.

   If you have successfully completed (C– or better) the second or third year of a language in the tenth or higher grade in high school you may receive unit credit for course 1 of that language on a P/NP grading basis only. Although a Passed or Not Passed grade will be charged to your P/NP option, no petition is required. [See "Passed/Not Passed (P/NP) Grading" in the Academic Information chapter.]
5. *Proficiency Examination*. If you have not completed the required level language course, but assume you have attained equivalent knowledge, you may satisfy the language requirement by passing a proficiency examination. For more information, consult the appropriate foreign language department.

Davis has more than 50 miles of bicycle paths and more bicycles per capita than any other city in the nation.

Major Program Requirements

Requirements for major programs are described in the Programs and Courses section of this catalog. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see the list of majors) or an individual major program approved by the College's Committee on Individual Majors.

No more than 6 units in internship courses (numbered 92, 192, or similar internship courses), may be accepted in satisfaction of the requirements of major programs. Courses numbered 97T, 97TC, 197T and 197TC do not satisfy unit or course requirements in the major.

Degree Check

Before the beginning of your senior year, take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and to ensure that you get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements remain unsatisfied. To help you in these efforts, the Letters and Science Advising Office provides informational materials and instructions on how to evaluate your progress on college and university requirements. You should also obtain a check of major requirements from your faculty adviser.

Once you have completed 135 units of degree credit, you should contact the Letters and Science Advising Office and your faculty adviser for a degree check. The Letters and Science Advising Office will provide each student with one official degree check summarizing your progress in fulfilling college and university requirements. You may request this degree check anytime during your final four regular quarters of registration before graduation.

Degree Requirement Changes

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the university and College requirements (see General Education requirement for an exception) as stated in any UC Davis *General Catalog* in effect at any time you were registered in a postsecondary institution of higher education (i.e., community college, college, or university). Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university and college requirements specified in that catalog.

With respect to the completion of your major requirements, most of the majors in the College of Letters and Science require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.

GRADUATE STUDIES

GRADUATE STUDIES

Information:
252 Mrak Hall
916-752-0655
World Wide Web:
http://pubweb.ucdavis.edu/documents/gradstudies/homepage.htm

UC Davis offers advanced degrees in more than 70 graduate programs. Students' graduate study is guided by either departments or graduate groups. Graduate groups are composed of individual faculty members with similar disciplinary or research interests. The group structure, used extensively at Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students flexibility and breadth by crossing the administrative boundaries of the various departments, colleges, schools and sometimes campuses. In keeping with UC Davis' progressive spirit, the group structure also allows for expansion of established degree programs and facilitates the development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups. You will find a list of the graduate degrees available at UC Davis in the front of this catalog.

Graduate study is administered by the Graduate Council, a standing committee of the Davis Division of the Academic Senate and by the dean of Graduate Studies. A universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

Preparing for an Advanced Degree

Admission to a graduate program at the University of California requires a bachelor's degree that is comparable to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, portfolios, or examples of written work to assist in selecting from among qualified applicants. Admission to graduate study is limited by the number of spaces available in major programs. Not all eligible applicants can be admitted.

UC Davis is committed to maintaining excellence, preserving fairness and promoting diversity in its student population. In addition to an applicant's past scholastic achievement, admissions criteria include an applicant's potential for service in the field, keeping in mind the needs of our society and of underrepresented and disadvantaged communities. Criteria also attempt to take into account any prior disadvantages applicants have experienced that may bear on future achievements and services.

Wine research at UC Davis ranges from improving the vines to assessing the effects of red wine on human health.

Applying for Admission

March 1 Deadline for **international students** to file applications for admission to graduate standing, with complete credentials, with the dean of Graduate Studies

April 1 Deadline for **United States residents** to file applications for admission to graduate standing, with complete credentials, with the dean of Graduate Studies

Applications are accepted for fall quarter only. You may apply for admission to graduate study via the World Wide Web at: http://secureweb.ucdavis.edu:2443/. If you apply electronically, the $40 nonrefundable application fee and offical transcripts from each college and university you have attended must be mailed directly to Graduate Studies. You should begin the application process as early as possible in the academic year, since many programs have early deadlines. In addition, your chances for employment as a teaching or research assistant or of receiving financial support are greatly enhanced by applying early. The application deadlines are as noted above, unless otherwise indicated by the program, or until your proposed graduate program is full, whichever occurs first.

If you do not apply electronically, you may request the application for admission and fellowship from the Office of Graduate Studies, University of California, Davis, CA 95616. The completed application form, the application fee and official transcripts must be sent directly to Graduate Studies. Supplemental application materials required by the graduate program must be sent directly to the graduate adviser for that program.

When all application materials have been received by Graduate Studies, they will be forwarded to your proposed major program where they will be evaluated along with the supplemental materials you have sent to the program adviser. The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to Graduate Studies; final admission decisions rest with the dean of Graduate Studies. This approval procedure applies to all applicants, including those seeking a transfer to UC Davis from another UC campus.

Applications for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, Master of Business Administration and Master of Preventive Veterinary Medicine must be filed directly with the appropriate professional school.

Readmission

April 1 Deadline to file applications for **readmission** to graduate status with Graduate Studies

If you were formerly registered at UC Davis as a graduate student and wish to return to the **same degree program and major,** you must apply for readmission and pay the readmission application fee of $40. The readmission application must be filed with Graduate Studies by April 1 (or earlier if the program specifies an earlier date). Readmission to quarters other than fall is granted on an exception basis by special petition to the dean of Graduate Studies. If you are seeking to return to a new degree program and/or new major, you must apply for admission along with other new applicants. Obtain an application from the Graduate Studies office. Transcripts of all work undertaken since you were last registered in graduate status at Davis must be presented with the application. (There is no assurance of reentry, as applicants for readmission will be considered in competition with other applicants for the program.)

International Students

Assessment of a foreign degree is based on the characteristics of the national system of education, the type of institution attended and the level of study completed.

If you are an international student with credentials from universities outside the U.S., you should begin the application process as early as a year in advance. Official copies or certified copies of all transcripts in English and in the original language are required before your application can be processed. Completed applications along with the nonrefundable $40 application fee must be received from international students by March 1, unless your proposed program has an earlier deadline.

International students may also apply via the World Wide Web at: http://secureweb.ucdavis.edu:2443/.

English Requirement. If English is not your native language and you have not studied at an institution where English was the language of instruction, you will be required to demonstrate proficiency in English by submitting your test scores from the Test of English as a Foreign Language (TOEFL). This test is given six times each year by the Educational Testing Service, CN6151, Princeton, NJ 08541-6151. The minimum score required for admission to graduate study at UC Davis is 550.

Visas. If you need a certificate of eligibility for a student visa issued by UC Davis, you will be required to complete a certification of finances form showing the availability of sufficient funding for your graduate program (see under "International Student Services" in the Academic Advising chapter for complete details). No financial aid of any kind (grants, loans, fellowships, scholarships, or work-study awards) is available to international students during their first year of registration at UC Davis.

Fees

At the time of registration each quarter, every student must pay the following fees.

Graduate Student Fees (per quarter)

These are the proposed fees for the 1997-98 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.

University Registration Fee	$238.00
Educational Fee	$1,029.00
Memorial Union Fee	$28.50
Student Health Services Fee	$32.00
Health Insurance*	$143.00
Graduate Student Association Fee	$6.50
Student Facilities Safety Fee	$22.00
Total Full-Time California Resident	**$1,499.00**
Nonresident Tuition	$2,995.00
Total for full-time nonresident	**$4,494.00**
Reduced Nonresident Tuition**	$749.00
Total for full-time nonresident, reduced	**$2,248.00**
Total Part-time California Resident	$985.00
Total part-time nonresident	$2,483.00
Total Employee-Student	$473.50

*Graduate students must purchase the Graduate Student Health Insurance Plan (GSHIP) unless they are able to prove comparable coverage under another insurance plan. GSHIP is approximately $143.00 per quarter.

**Effective fall quarter 1997, nonresident Ph.D. candidates who have advanced to candidacy by the first day of the quarter will be assessed 25% of the 1997-98 Nonresident Tuition charge. The reduced nonresident tuition will be applied for three calendar years, after which enrolled nonresident advanced doctoral students will again be charged the full Nonresident Tuition in effect at that time.

Program of Study

New students are assigned an adviser within the appropriate department or graduate group who assists them in planning a program of study. The program will depend to some degree on the student's undergraduate training and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Graduate Program Directory, or as documented by the program. Additional requirements for study may be established by the department or group and approved by the Graduate Council. These requirements often include a core of required courses, but considerable flexibility is permitted to suit individual needs. Undergraduates at Davis who plan to pursue graduate study should consult with their major adviser early in their senior year to guarantee adequate preparation.

A graduate degree is awarded to recognize a student's command of a wide range of knowledge in an academic field. It is not awarded merely for fulfillment of technical requirements, such as residence, or the completion of specific courses.

GRADUATE STUDENT DEADLINES*

	FALL 1997	WINTER 1998	SPRING 1998	SUMMER 1998 (for Sept. 1998)	FALL 1998
Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the dean of Graduate Studies	Sept. 22	Jan. 5	Feb. 23	June 1	Sept. 22
Deadline for candidates for master's degrees to file theses with the committee in charge	Nov. 3	Feb. 2	May 1	July 21	
Deadline for candidates for master's degrees to file theses with the dean of Graduate Studies	Nov. 28	Mar. 2	June 1	Sept. 2	
Deadline for candidates for master's degrees to file final report on comprehensive examination with the dean of Graduate Studies	Dec. 13	Mar. 26	June 19	Sept. 18	
Deadline for students who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the dean of Graduate Studies	Aug. 11	Nov. 10	Feb. 2	May 18	Aug. 11
Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education and Doctor of Engineering to file theses with the committee in charge	Oct. 3	Jan. 2	Apr. 1	July 1	
Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Engineering to file theses with the dean of Graduate Studies	Nov. 28	Mar. 2	June1	Sept. 2	

* Deadlines are subject to change without notice.

Master's Degree

Students working toward a master's degree must be registered in residence for at least three quarters. Two regular six-week Summer Sessions may count as the equivalent of one quarter. Usually, all work for the master's degree is done in residence on the Davis campus. With the consent of the graduate adviser and the dean of Graduate Studies, however, some work taken elsewhere may be credited toward your degree. The normal limit for such transfer credit is 6 units from another institution, or 12 concurrent units, or up to one half of the unit requirement if the courses were taken at another UC campus—providing the units were not used to satisfy requirements for another degree.

A master's degree may be awarded upon completion of one of two basic plans in which either a thesis or a comprehensive examination is required.

Ph.D. Degree

The Doctor of Philosophy degree, as granted at the University of California, means that the recipient possesses knowledge of a broad field of learning and has given evidence of distinguished attainment in that field; it is a warrant of critical ability and powers of imagination and synthesis. It means, too, that the candidate has presented a dissertation containing an original contribution to the knowledge of the chosen field of study.

Students working toward a doctorate must be registered and in university residence for a minimum of six regular quarters. Experience indicates that it takes considerably longer than this to complete a degree program. Two consecutive regular Summer Sessions may count as the equivalent of one regular quarter.

There is no university unit requirement for the doctoral degree. However, individual programs have course requirements that must be completed before admission to the qualifying examination.

The qualifying examination is administered by a committee appointed by the dean of Graduate Studies. The examination is intended to demonstrate critical thinking ability, powers of imagination and synthesis and broad knowledge of the field of study. Upon recommendation of the Qualifying Examination Committee, and with the approval of the Graduate Council, the examination may be repeated one time.

After successful completion of the Qualifying Examination, the student must file for Advancement to Candidacy for the degree. At this time, a committee is appointed to direct the research problem and guide in the preparation of the dissertation.

Graduate students in certain Ph.D. programs may participate in a **Designated Emphasis,** a specialization that might include a new method of inquiry or an important field of application which is related to two or more existing Ph.D. programs. The Designated Emphasis is awarded in conjunction with the Ph.D. degree and is signified by a transcript designation; for example, "Ph.D. in History with a Designated Emphasis in Critical Theory." Programs approved as Designated Emphases include: Computational Science; Critical Theory; Economy, Justice and Society; Feminist Theory and Research; International Nutrition; Native American Studies; and Social Theory and Comparative History.

Intercampus Exchange Program

A graduate student registered on any campus of the university may become an intercampus exchange student

with the approval of the graduate adviser, the chairperson of the department or group on the host campus and the dean of Graduate Studies on both the home and the host campuses.

An intercampus exchange student has library, health service and other student privileges on the host campus, but is considered a graduate student in residence on the home campus. The grades obtained in courses on the host campus are transferred to the home campus and entered on the student's official graduate transcript.

Application forms may be obtained at the Office of the Dean of Graduate Studies and should be submitted six weeks before the beginning of the quarter in which you wish to participate in the program.

Fellowships, Assistantships and Loans

World Wide Web (applications for fellowships and scholarships): http://pubweb.ucdavis.edu/documents/gradstudies/support/studsup.htm

Financial support for graduate study at UC Davis is available in several forms: teaching and research assistantships, financial aid and fellowships/scholarships.

Financial aid, which is available to U.S. citizens, permanent residents or immigrants only, is awarded on the basis of demonstrated financial need and is administered by the Financial Aid Office. Federal financial aid includes student loans, grants and work-study funding. You may apply for financial aid before you have been admitted. To be considered for financial aid, or for any awards based on financial need, you must file a "Free Application for Federal Student Aid" (FAFSA) no later than March 2, prior to the fall quarter enrollment. This form, submitted directly to the Federal Student Aid Program Office, Iowa City, IA, is used to determine financial need only. Contact the Graduate Financial Aid Office for information regarding loans, grants and work-study.

Fellowships and graduate scholarships are awarded primarily on the basis of scholarship and promise of outstanding academic and professional achievement.

Fellowship awards can include a stipend, fees and/or nonresident tuition. Considered in evaluations are the Graduate Record Examination (GRE) scores, undergraduate and graduate grade point averages, academic transcripts, statement of purpose, letters of recommendation and other documentation such as publications or awards. The minimum cumulative undergraduate or graduate grade point average required for a stipend or in-state fee award is 3.5 (A=4.0); for nonresident tuition fellowships the minimum is 3.25. Applicants must be U.S. citizens, or permanent residents of the U.S., or immigrants. U.S. citizens and permanent residents are eligible for nonresident tuition fellowships for their first three quarters only at UC Davis. New international students may be awarded nonresident tuition fellowships, but not stipend or in-state fee fellowships, in their first three quarters.

Applications for fellowships and graduate scholarships are due by **January 15** for awards beginning fall quarter. Information for both new and continuing students and application materials for fellowships and graduate scholarships are available on the World Wide Web. You may print the application forms, complete them and submit them by mail. The fellowship applications may NOT be submitted electronically.

Entering students submit the "Application for Graduate Admission and Fellowship;" continuing students file an "Application for Fellowships and Graduate Scholarships for Continuing UCD Graduate Students" with their graduate program.

Graduate Certificate Program for Engineers

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects and requires fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas and to explore new fields of technical interest.

Art studio facilities include a photo lab, electronic arts lab, a print-making lab, wood shop and the ceramics lab, known as TB-9.

General requirements for the program are

- 15 or 16 units of specified graduate course work, or a combination of specified graduate and undergraduate course work
- Admission to Graduate Studies

Further information on the Graduate Certificate Program may be found in the *College of Engineering Bulletin*.

Teacher Credential Programs

Division of Education
Student Services Office
2078 Academic Surge
916-752-0757; e-mail: jgmacdonald@ucdavis.edu
World Wide Web: http://education.ucdavis.edu/

Department of Agronomy (Agriculture Teaching Credential)
Agricultural Education Program Office
132 or 155 Hunt Hall
916-752-3040 or 4369

The Division of Education offers programs for students interested in becoming elementary or secondary teachers. The elementary education program prepares you to teach all the subjects commonly taught in an elementary classroom. In addition, it offers the option of receiving in-depth training for teaching in a bilingual (Spanish) or English as a Second Language classroom. The secondary education program is designed to prepare teachers who will work in grades 7 through 12 in the following areas: agriculture, English, foreign language (Spanish), science (biology, chemistry, geoscience and physics), math, music, physical education and social studies education.

To apply you need to have done the following:

- completed a bachelor's degree;
- completed most of the required course work in the area you want to teach, or have taken a National Teacher Exam (NTE) and National Evaluation Systems (NES) exam in the area you want to teach;
- taken the California Basic Education Skill Test (CBEST);
- worked with school-age children; and,
- met Graduate Studies minimum GPA requirement (3.0).

There are additional requirements that we encourage you to take as undergraduates. Information is available in the Student Services Office.

The teaching credential program starts in the fall quarter only and is nine months long. It is a full-time professional program with a rigorous schedule. Student teachers are in classrooms in the morning and early afternoon and back on campus in the afternoon and evening for course work. The student teaching assignments generally are in the following communities: Davis, Winters, Woodland, Dixon, Vacaville, Fairfield, Sacramento and West Sacramento. Student teachers are required to participate in the schools in the role of a regularly credentialed teacher. A typical course schedule follows:

- student teaching
- teaching methods courses [on how to teach your subject area(s) and grade level(s)]
- reading methods course
- computer education course
- health education course
- special education course

Upon satisfactory completion of all requirements, you will be recommended to receive a California teaching credential.

Applications and filing deadlines should be obtained from the Division of Education or from the Department of Agronomy (agricultural education).

The teacher education program is also available to upper division students who have a 3.3 GPA and room in their schedule for a full-time teaching program. Satisfactory completion of your degree and the credential program would entitle you to a nonrenewable **preliminary** credential. Within five years you must complete a graduate year of study to be eligible for an additional credential. Specific requirements may be obtained from the Student Services staff in the Division of Education.

Students considering teaching as a career should consult the Division of Education or the Department of Agronomy **as early as their freshman year.** Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.

Program in College Teaching

Teaching Resources Center
17 Wellman Hall
916-752-6050
World Wide Web: http://trc.ucdavis.edu/trc/grad/colteach.htm

The Program in College Teaching provides graduate students interested in college and university teaching the opportunity to improve their teaching skills and gain familiarity with a wide range of issues important to a faculty career. The program focuses on teaching in the participant's own discipline area. Direction and instruction are predominantly provided by a faculty mentor selected by the participant. Successful participants earn a certificate of completion and an appropriate annotation is added to their university transcripts. They also have the opportunity to construct a well-developed teaching portfolio for prospective employers.

The heart of the program is co-teaching with a faculty mentor. Many participants choose UC Davis faculty members as their mentors and do their teaching on the Davis campus. Participants considering a career at a community college or at a four-year teaching college are encouraged to find faculty mentors and teaching opportunities at cooperating colleges nearby, thereby developing contacts and references at institutions similar to those at which they intend to eventually teach. Participants also complete individualized learning contracts and attend regularly scheduled "Teaching Roundtables."

The program begins in late spring quarter, lasts until the end of the following spring quarter, and is designed to fit into the student's existing schedule. The Teaching Resources Center administers this graduate student professional development program, with the support of the Office of Graduate Studies.

SCHOOL OF LAW

SCHOOL OF LAW

Information:
School of Law
916-752-6477
World Wide Web: http://kinghall.ucdavis.edu/

The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. In addition to the traditional professional curriculum, the School provides professional skills training in interviewing and counseling, negotiation and dispute resolution and trial practice. It also offers opportunities for practical experience through clinical programs and for in-depth study of an area of law in an individualized program of classroom work, research, writing, or experience in the community. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

The School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools, and has a chapter of the Order of the Coif.

Preparing for the Study of Law

No specific college major is required for admission to the School of Law, and there is no prescribed pre-legal program. Your college record and Law School Admission Test (LSAT) score must, of course, demonstrate that you are highly qualified for the study of law.

As a pre-law student, you should plan a course of study that will give you a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Pre-law students should develop the ability to think critically. They should gain an understanding of people and institutions and know how to gather and weigh facts, to solve problems and think creatively. They should be able to read rapidly with comprehension, and express themselves clearly, completely and concisely, both orally and in writing.

You can get help with program planning from the Pre-Law Advising Office, 227 Voorhies Hall, 916-752-3009.

For additional information, see the *Official Guide to U.S. Law Schools,* a publication of the Law School Admission Council in cooperation with the American Bar Association and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law school and the study of law, together with individualized information on all ABA approved law schools. It can be found at college and major bookstores or ordered from Law Services, Box 2400, Newtown, PA 18940-0977.

Applying for Admission

February 1 Deadline for filing applications for admission for 1998-99 to the School of Law

1. Request application forms and the school catalog from the Office of Admissions, School of Law, University of California, Davis, CA 95616-5201 or post an e-mail request to: admissions@lawadmin.ucdavis.edu. *Return your completed application to that office, plus a $40 nonrefundable application fee,* in the form of a check or money order made payable to the Regents of the University of California.

The last date for filing completed application forms, together with all supporting documents, including LSAT scores, Law School Data Assembly Service (LSDAS) reports and letters of recommendation, is *February 1* of the year in which admission is sought. Early filing of all application materials is strongly recommended and will materially assist the School of Law Admissions Committee in its considerations. Applications postmarked after February 1 will be returned to the applicant.

2. You must take the Law School Admission Test and register with the Law School Data Assembly Service so that the score will be reported to the school. You are urged to take the test as early as possible, and no later than December preceding the year in which admission is sought.

Testing centers are located in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, October and December. The completed test application blank, accompanied by the required fee, must be postmarked approximately six weeks before the date of the test to ensure that you will be registered for that test date.

To obtain application forms, information about the test, specific test dates and the location of testing centers, write to: Law Services, Box 2000, 661 Penn Street, Newtown, PA 18940-0998. You can also contact Law Services via e-mail at lsacinfo@lsac.org. The LSAT/LSDAS Registration and Information book is also available in the Law School Admission Office and the Pre-Law Advising Office on campus.

3. Register with the LSDAS no later than December 1 by completing and mailing the registration form supplied in each LSAT/LSDAS Registration and Information book book. Have a transcript from each college or university you have attended sent directly to Law Services, Box 2700, 661 Penn Street, Newtown, PA 18940-0978.

4. Submit an official transcript of college work completed during the first semester or quarter of your senior year directly to the School of Law as soon as it is available. Failure to do so may delay consideration of your application materials. Successful applicants must submit directly to the School of Law a final transcript showing the award of a bachelor's degree.

5. Provide two letters of recommendation from objective and responsible persons to whom you are well known. At least one of these letters should come from a faculty member under whom you studied while in college. These letters of recommendation should be enclosed in sealed envelopes, the recommender must sign across the seal, and the letters should be submitted along with the application for admission; or they may be sent directly from a college placement center, career center, or college pre-law office. Your application cannot be considered until two letters have been received.

Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by LSAT scores and the undergraduate grade point average (GPA). The committee seeks students of diverse backgrounds and considers economic factors, advanced degrees or other advanced studies, significant work

experience and extracurricular and community activities during and after the college years. An applicant's growth, maturity and commitment to the study of law are also major considerations. Students are admitted only on a full-time basis and only in August.

6. When accepted by the School of Law, you are simultaneously admitted to Graduate Studies on the Davis campus of the university for the program leading to the degree of Juris Doctor. If you intend to pursue studies leading to other graduate degrees, or wish to become a candidate for a Combined Degree Program (see below), you must make separate application to Graduate Studies before commencing such studies.

Admission to Advanced Standing

If you have completed at least one year of full-time law course work in another approved law school, you may be considered for admission to advanced standing with credit for not more than one year of such work. The application filing period is June 1–30. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

Application procedures for advanced standing are the same as described above with the addition of *(1)* a letter of good standing including class rank from the dean of any law school previously attended; *(2)* at least one letter of recommendation from a law professor; *(3)* transcripts of all law school work; *(4)* LSAT score (no need to register with LSDAS—a copy of the report previously submitted to the school you are presently attending will suffice); and *(5)* an official transcript from the school where you earned your undergraduate degree, stating the date the degree was conferred. The deadline for transfer applications is *June 30* of the year for which transfer is sought. Committee decisions on advanced standing are normally made in late July or early August of the year in which admission is sought.

Students who have been disqualified at another law school will not be admitted to this school.

Recruitment of Underrepresented Groups

The students and faculty of the UC Davis School of Law recognize the great need for lawyers from underrepresented groups. The School, therefore, actively solicits applications from those groups that reflect the many diverse populations of California but, traditionally, have been underrepresented in the law school population.

The School of Law, in cooperation with the Association of American Law Schools (AALS) and the Council on Legal Education Opportunity (CLEO), participates in programs designed to increase the number of law students from underrepresented groups. CLEO applications may be obtained by writing to: Council on Legal Education Opportunity, 1420 N Street, N.W., Terrace One, Washington, D.C. 20005.

Applications for the Prelaw Summer Institute for American Indians and Alaskan Natives may be obtained from the American Indian Law Center, P.O. Box 4456-Station A, Albuquerque, NM 87196 (505-277-5462).

The Mexican-American Legal Defense and Education Fund (MALDEF) has scholarships available for Latino students who have applied to law school. Applications may be obtained by writing to MALDEF, 634 So. Spring Street, 11th Floor, Los Angeles, CA 90014 (213-629-2512, ext. 146).

Program of Study

The professional curriculum requires six semesters for completion and extends over a period of three years. It is for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the fall semester.

After satisfactorily completing the professional curriculum of 88 semester units and the required period of resident study, you will receive the degree of Juris Doctor. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, prerequisite to second- and third-year courses. The work of the second and third years is elective. The courses of the professional curriculum are listed in the Programs and Courses section of this catalog. Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

Combined Degree Programs

Students may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. To encourage this kind of study, the School, in conjunction with other schools and university departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. In some instances it may be possible to work on a Ph.D. degree as well. Students working toward a combined degree are required to spend their first year at the Law School.

The Law School building is named after the late Dr. Martin Luther King Jr., in recognition of his efforts to achieve social and political justice by lawful and orderly means.

Student Fees: School of Law

At the time of registration each semester, every student must pay the following fees.

These are the proposed fees for the 1997-98 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.

Students entering 1997-98

	Per Semester	Annually
University Registration Fee	$356.50	$713.00
Educational Fee	$1,543.00	$3,086.00
Law Student Association Fee	$10.00	$20.00
Memorial Union Fee	$42.75	$85.50
Student Services Health Fee	$48.00	$96.00
Health Insurance*	$215.00	$429.00
Student Facilities Safety Fee	$33.00	$66.00
Professional School Fee	$3,188.00	$6,376.00
Total for CA residents	**$5,436.25**	**$10,871.50**
Non-Resident Tuition	$4,492.00	$8,984.00
Total for nonresidents	**$9,928.25**	**$19,855.50**

* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

Students previously admitted

The Professional School Fee for students admitted to the School of Law in previous years is as follows:

1996-97: $6,376 per year. Total annual student fees for California residents is $10,871.50; for nonresidents, $19,855.50.

1995-96: $4,376 per year. Total annual student fees for California residents is $8,871.50; for nonresidents, $17,855.50.

PELP students are considered continuing students.

Readmitted students are considered new (entering) students.

Normally, a Combined Degree Program will take at least four years. You will usually be able to earn up to 10 semester-hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than it would take to earn the two degrees separately. The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the Law School and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with UC Davis departments for the M.A. degree in economics and sociology, and with the School of Management for the M.B.A. degree. The Law School will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time before the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should notify the School of Law if that application is accepted.

School of Law: Academic Calendar 1997-98

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

	FALL 1997	SPRING 1998*
Introduction Week	Mon-Fri, Aug 18-22	
Law School instruction begins	Mon, Aug 25	Mon, Jan 12
Labor Day holiday	Mon, Sept 1	
Thanksgiving holiday	Thurs-Fri, Nov 27-28	
Martin Luther King, Jr., holiday		Mon, Jan 19
President's Day holiday		Mon, Feb 16
Spring recess		Mon-Fri, Mar 23-27
Law School instruction ends	Fri, Dec 5	Fri, May 1
Reading period	Sat-Tues., Dec 6-9	Sat-Thurs, May 2-7
Law School examination period	Wed.-Mon., Dec 10-22	Fri-Fri, May 8-22
Law School Commencement		Sat, May 23

*Friday, February 20 is treated as a Monday for class schedule purposes.

GRADUATE SCHOOL OF MANAGEMENT

GRADUATE SCHOOL OF MANAGEMENT

Information:
Graduate School of Management
106 AOB 4
916-752-7399
World Wide Web: http://www.gsm.ucdavis.edu

The Graduate School of Management offers a full-time, two-year program leading to the Master of Business Administration degree. The program provides both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made. Successful completion requires not only a sophisticated understanding of a variety of functional skills in finance, marketing, production, program evaluation and accounting, but also an understanding of computers, information systems and the application of scientific methods to the identification and solution of management problems.

Preparing for the Study of Management

A bachelor's degree and a strong interest in professional management are prerequisites for admission to the Graduate School of Management. The school seeks students from diverse professional and academic backgrounds and does not limit its consideration to applicants from any particular category of majors. Entry-level and mid-career applicants are considered, and women and minorities are encouraged to apply.

Although the program has no specific subject prerequisites, it is strongly recommended that students complete the following course work before enrolling:

Accounting—introductory course that discusses basic concepts.

Economics—introductory courses in micro- and macroeconomics, and one upper division course in microeconomics.

English—a business communication course.

Mathematics—an introductory course in calculus.

Statistics—one course in elementary statistics.

Applying for Admission

April 1 Deadline for filing applications for admission for 1998-99 to the School of Management

Admission is for the fall quarter only. Application materials may be obtained from the Graduate School of Management, University of California, Davis, CA 95616. Complete and return your application, with all supporting documents, by *April 1.* The application fee is $40.00.

In addition to your application, you need to submit:

- Transcripts from all colleges or universities previously attended.
- Graduate Management Admission Test (GMAT) taken within the last five years of the admission date. Applicants must take the GMAT no later than March to be considered for fall admission. For further information and registration forms contact: Graduate Management Admission Test, Educational Testing Service, CN 6108, Princeton, NJ 08541-6108, 609-771-7330.
- Three letters of recommendation. Applicants currently enrolled in school should include one recommendation from a professor. For individuals who are out of school, recommendations from employers or business associates are acceptable.
- A writing sample and a personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not required, although visits from applicants are welcomed.

Each year on Alumni Day, GSM graduates share their knowledge and experience with current GSM students.

Student Fees: Graduate School of Management

At the time of registration each quarter, every student must pay the following fees.

These are the proposed fees for the 1997-98 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.

Students entering 1997-98

	Per Quarter	Annually
University Registration Fee	$238.00	$713.00
Educational Fee	$1,029.00	$3,086.00
Graduate Student Assoc. Fee	$6.50	$19.50
Memorial Union Fee	$28.50	$85.50
Student Facilities Safety Fee	$22.00	$66.00
Student Health Services Fee	$32.00	$96.00
Health Insurance*	$143.00	$429.00
Professional School Fee	$2,000.00	$6,000.00
Total for CA residents	**$3,499.00**	**$10,495.00**
Nonresident Tuition	$2,995.00	$8,984.00
Total for nonresidents	**$6,494.00**	**$19,479.00**

* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

Students previously admitted

The Professional School Fee for students admitted to the Graduate School of Management in previous years is as follows:

1996-97: $6,000 per year. Total annual student fees for California residents are $10,495.00; for nonresidents, $19,479.00.

1995-96: $4,000 per year. Total annual student fees for California residents are $8,495.00; for nonresidents, $17,479.00.

1994-95: $2,000 per year. Total annual student fees for California residents are $6,495.00; for nonresidents, $15,479.00.

PELP students are considered continuing students.

Readmitted students are considered new (entering) students.

International Students

Foreign students for whom English is a second language must take the Test of English as a Foreign Language (TOEFL) by March 1, and receive a score of 600 or better. To receive registration forms, write to: TOEFL, Educational Testing Service, Box 899, Princeton, NJ 08541-6108.

International students must show proof of financial support for one academic year including tuition and living expenses.

Criteria for Admission

The major criterion of the committee granting admission is what an applicant has to gain from, and offer to, the program. Consideration of an applicant's undergraduate performance includes a review of trends in scholastic performance and areas of academic strength as well as an assessment of overall grade point averages. Admissions standards and grading policies of the schools attended are also considered. Both verbal and quantitative scores on the GMAT are used to evaluate measurable general aptitude for management. Background and maturity as indicated by employment history, service and activity records, recommendations and the applicant's personal statement are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

Program of Study

In the first year, the program offers a series of core courses that focus on all the basic disciplines of business—accounting, economics, finance, marketing, organizational behavior, decision sciences and information systems.

The second year of the program allows students to take courses in individually selected concentrations. These concentrations include accounting, agricultural management, environmental and natural resource management, finance, management information systems, management science, marketing, public sector management and science and engineering management. Students may also design their own concentration.

In addition to the above full-time program, the Graduate School of Management offers an evening M.B.A. program for working professionals (WPMBA). If you would like more information about the evening program, please contact the Graduate School of Management Admissions Office at 752-7399.

U.S. News & World Report ***ranked the Graduate School of Management in the top 20 nationally among public business schools.***

SCHOOL OF MEDICINE

SCHOOL OF MEDICINE

Information:
School of Medicine
916-752-2717
World Wide Web: http://www.med.ucdavis.edu/

The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study composed of 15 consecutive quarters. Course work is conducted on the Davis campus, at the UC Davis Medical Center, Sacramento; and in nearby affiliated hospitals.

Preparing for the Study of Medicine

When you apply to the School of Medicine, you must submit the results from the New Medical College Admission Test (MCAT), so it is recommended that you take the MCAT by the spring before application. Information can be obtained at your undergraduate institution or directly from MCAT Program, Box 24720, Oakland, CA 94623-1720. To be acceptable for the entering class of fall 1998, the new MCAT must be taken no later than fall 1997. No scores before August 1994 will be accepted.

Applicants must also meet the following academic requirements:

A. Must have completed at least three years of study in an accredited college or university in the United States or Canada. A minimum of 90 semester hours or 135 quarter units of college-level work is required. Courses in highly specialized fields are acceptable only at the discretion of the medical school.

B. Must have completed satisfactorily before matriculation each of the following courses:

	Quarter Units	Semester Units
1. English, 1 year or its equivalent.	12	6
2. Biological science, 1 year including laboratory, or its equivalent.	158	
3. General chemistry, 1 year including laboratory, or its equivalent.	158	
4. Organic chemistry, 1 year or its equivalent. If two or more undergraduate organic chemistry courses are offered, it is recommended that you elect the more rigorous option.	128	
5. Physics, 1 year including laboratory or its equivalent.	12	8
6. Mathematics, course work sufficient to satisfy prerequisites for integral calculus. (Course work through integral calculus is recommended).	64	

(You will find helpful experience and knowledge gained in biochemistry, genetics and embryology.)

C. Must demonstrate the potential to perform academically at least as well as the average of the current first year class. This reflects the School of Medicine's generally higher standards and our emphasis on potential as judged from the application as a whole, including but not limited to MCAT and GPA scores.

For additional information, contact the School of Medicine Admissions Office and request *A Guide for Prospective Students*.

Applying for Admission

November 1 Deadline for filing applications for admission for 1998-99 to the School of Medicine

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). Application request cards are available from the Admissions Office, School of Medicine, University of California, Davis, CA 95616, after April 1 of each year. You may also secure this form from other AMCAS-participating medical schools or from your premedical adviser. You need to submit only one application and one set of official transcripts to AMCAS, regardless of the number of member schools to which you are applying.

Upon receipt of the application request form, AMCAS will send you an application for admission, together with descriptive material and instructions. Submit the completed application and other required credentials directly to AMCAS for verification, reproduction and immediate distribution to the medical schools you have indicated.

After your AMCAS application has been received by the School of Medicine, the Admissions Office will notify you and may request a secondary application and two letters of recommendation along with a nonrefundable application fee of $40. Send these items directly to the Chairperson of the Admissions Committee, School of Medicine, University of California, Davis, CA 95616, and not to AMCAS. Recommendations can be in the form of a report by a premedical advisory committee at the college or university where you are enrolled or letters from two faculty members who are familiar enough with you and your abilities to make a meaningful evaluation. We recommend that one letter be from a science instructor and the other from a non-science instructor.

Applications are accepted by AMCAS between *June 1* and *November 1*. We strongly recommend that you make an early request for application materials from AMCAS and see that the necessary supporting items reach the Committee as soon as possible after the School of Medicine requests them. The Committee reviews only complete application files and schedules interviews for highly qualified applicants throughout the application period and beyond.

A personal interview is usually required before a place in the first-year class can be offered. However, because of the large number of applicants, it is not possible to interview each one, and for this reason interviews are held only at the invitation of the Admissions Committee. Interviews take place at the medical school in order to provide you with first-hand knowledge of programs and facilities and give you the opportunity to meet some of the students.

As decisions are made, letters of acceptance are sent; this can be as early as mid-October and as late as September of the following year.

Applicant Selection. The class entering in the fall will be limited to 93 students selected on the basis of academic achievement, academic promise and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate will be able to com-

plete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers and interviewers with regard to intellectual capacity, motivation, emotional stability and personal dedication.

The majority of openings in the entering class will be awarded to students who are California residents. However, the School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE) and residents of participating states will be considered as residents for purposes of admission. For more information, write the WICHE at Post Office Drawer P, Boulder, CO 80302.

The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School's commitment to expand opportunities in medical education for individuals from groups underserved in medicine as the result of socioeconomic disadvantage and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of backgrounds and which is representative of a broad spectrum of medical sciences, evaluates applicants in terms of all relevant factors. These include academic credentials, with due regard to how they may have been affected by disadvantages experienced by the applicant, such personal traits as character and motivation, experience in the health sciences and/or the community, career objectives, and the ability of the individual to make a positive contribution to society, the profession and the School.

Transfer with Advanced Standing

Currently enrolled students in good standing at approved medical schools in the United States or Canada may apply for admission to the third year of study. In order to provide the best facilities and clinical resources, however, we must limit the number of students in our clinical clerkships. Therefore, applications for transfer to the third year are considered on a space-available basis.

Deadline for application is April 1 of the year of transfer. A nonrefundable application fee of $40.00 is required. Applicants must provide medical school transcripts, and if accepted, must pass Part I of the USMLE at their current institution. Available spaces may be filled by the Admissions Committee based upon the entire content of an application, or they may request additional information including letters of recommendation and a personal interview. All applicants for transfer must meet the usual requirements for admission, as well as satisfactorily completing the equivalent of two years of study at the medical school. Applicants will be notified of the Admissions Committee's decision starting April 30.

Program of Study

Doctor of Medicine. The curriculum for the M.D. degree is normally a four-year program that provides comprehensive training for the practice of medicine. The curriculum has been designed to provide a blend of basic sciences training and clinical experience. Although the emphasis during the first two years is on the basic-science foundations of medicine, medical students are introduced to patient care during their very first quarter of study, reflecting the school's commitment to the training of highly skilled clinicians. Several volunteer clinics, largely staffed by UC Davis medical students, provide an ideal setting for hands-on clinical experience.

Combined Degree Program. In addition to the Doctor of Medicine degree, the School of Medicine at Davis offers a combined M.D./Ph.D. program whose target is to train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care. Meeting this challenge requires those capable of advancing our biological sciences knowledge base, and others who can recognize

UC Davis medical students get hands-on experience working as volunteers in clinics serving low-income families.

and solve the ethical, political and humanitarian issues that confront the broad delivery of health care to all. Hence, the field for the Ph.D. in the joint degree program at UC Davis can be any graduate program offered on the Davis campus, extending beyond the traditional biological sciences boundaries, and strongly encouraging candidates to seek degrees in social sciences and humanities. All requirements for both degrees are met in a course of study that usually lasts six years. To be admitted, and be concurrently enrolled in both degree programs, students are required to apply for separate admission to both the M.D. and Ph.D. programs, and also obtain permission of the School of Medicine M.D./Ph.D. Advisory Committee. Funding for two competitive fellowships is awarded annually to students enrolled in the M.D./Ph.D. program. The Sierra Health Foundation M.D./M.B.A. program is designed to attract academically outstanding students who are committed to a career in health care leadership and who desire to remain in Northern California. Selected students will embark upon a six-year course which will result in a degree in Medicine from the UC Davis School of Medicine and an MBA in Health Services Management from the UC Davis Graduate School of Management. Students receive funding for tuition and fees for the full six years of the program.

Advisory Committee. Inquiries about admission to graduate education should be directed to the Dean of Graduate Studies, University of California, Davis, CA 95616. For more information concerning the M.D./Ph.D. program, contact Suzanne Mink, Office of Curricular Support, Room 2427, Tupper Hall, School of Medicine, University of California, Davis, CA 95616.

Family Nurse Practitioner/Physician Assistant Program. The Family Nurse Practitioner/Physician Assistant (FNP/PA) credential program educates health care professionals to act as members of a health care team, and improves the availability of culturally relevant primary health care in underserved populations throughout central and northern California. Enrollment in these courses (see Medicine, School of, Department of Family and Community Medicine), is limited to students who are enrolled in the FNP/PA program.

Academic Calendar

The School of Medicine operates on a different schedule from the rest of the campus. A detailed academic calendar may be obtained from the Office of Curricular Support, 2427 Tupper Hall, University of California, Davis, CA 95616.

The program is a continuous four-year academic experience, with the first year commencing in fall quarter. A six-week break is scheduled between the first and second year academic schedule, following spring quarter. The second year concludes with a three- to four-week period for preparation for USMLE Step 1 examination. The third and fourth year clinical experiences begin in summer and continue through spring.

With approval, students may extend the first two years over three years and use the additional time to individualize their programs. This alternative time is highly suitable for including research experiences and/or meeting other academic objectives. Flexibility in the third and fourth years also permits alternate scheduling.

Student Fees: School of Medicine

At the time of registration each quarter, every student must pay the following fees.

These are the proposed fees for the 1997-98 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.

Students entering 1997-98

	Per Quarter	Annually
University Registration Fee	$238.00	$713.00
Educational Fee	$1,029.00	$3,086.00
Memorial Union Fee	$28.50	$85.50
Student Facilities Safety Fee	$22.00	$66.00
Disability Insurance Fee*	$61.00	$61.00
Student Services Health Fee	$32.00	$96.00
Health Insurance**	$143.00	$429.00
Professional School Fee	$1,792.00	$5,376.00
Total for CA residents	**$3,345.50**	**$9,912.50**
Nonresident Tuition	$2,995.00	$8,984.00
Total for nonresidents	**$6,340.50**	**$18,896.50**

* The Disability Insurance Fee applies to medical students only (not interns, residents, or health science academics). The annual disability insurance fee of $61.00 is assessed fall quarter.

** Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

Students previously admitted

The Professional School Fee for students previously admitted to the School of Medicine is as follows:

1996-97: $4,376.00 per year. Total annual student fees for California residents are $10,050.00; for nonresidents, $19,034.00.

1995-96: $3,376.00 per year. Total annual student fees for California residents are $9,050.00; for nonresidents, $18,034.00.

1994-95: $2,376 per year. Total annual student fees for California residents are $8,050.00; for nonresidents, $17,034.00.

PELP students are considered continuing students.

Readmitted students are considered new (entering) students.

SCHOOL OF VETERINARY MEDICINE

SCHOOL OF VETERINARY MEDICINE

Information:
School of Veterinary Medicine
Office of the Dean
Surge IV
916-752-1383
World Wide Web: http://www.vetmed.ucdavis.edu

The mission of the School of Veterinary Medicine is to provide the best possible health care for animals through teaching, research and public service. Students are offered a rigorous four-year program of study that prepares them for diverse career opportunities in veterinary medicine.

Preparing for the Study of Veterinary Medicine

To be considered for admission to the School, you must have completed 108 quarter units (72 semester units) in an accredited college or university and have completed the following courses:

Lower Division Required Sciences	Quarter Units
General Chemistry	15
Organic Chemistry	6
Physics	6
Biological Sciences	10
Upper Division Required Sciences	
Embryology	4
Genetics	4
Biochemistry	3
Physiology	5
Required English	12
Required Humanities and Social Sciences	12
Required Statistics	4

(To convert semester units to quarter units, multiply by 3/2. For example, a 4-unit semester course is equivalent to a 6-unit course in the quarter system.)

You should plan your preveterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. An undergraduate major should be selected on the basis of individual interest and aptitude; there is no advantage gained toward admission by selecting one major over another. Many students planning to enter veterinary school have definite areas of interest within the general field of veterinary medicine. These individuals are encouraged to take courses (for example, computer science, agricultural economics, molecular and biochemical genetics) that will broaden their background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal practice and biomedical research.

Examinations. All applicants must take the General Aptitude Test of the Graduate Record Examination (GRE) by September of the year you apply for admission. Applications for the exams and additional information may be obtained from the Educational Testing Service, Box 23470, Oakland, CA 94623-0470. The GRE must be taken within five years of the time you submit your application. The highest scores will be used when the GRE is taken more than once.

Grade Point Average. To be considered for admission, you must have a minimum grade point average of 2.50 for both the required sciences and the cumulative grade point average. Applicants who do not meet the minimum grade point average can qualify for admission by receiving GRE scores in the upper 30th percentile for the combined General Aptitude Test scores. Applicants who do not have transcripts with letter grading can qualify for consideration with these same scores or by receiving a bachelor's degree with honors.

Practical Experience. Admission to the School requires extensive experience with animals. This experience should entail more than having family pets and should include experience with several animal species if it includes relevant experience with types of activities that give an applicant an appreciation and understanding of the veterinary profession. The minimum requirement for animal, veterinary and biomedical science experience is 180 hours (4.5 weeks). This experience should also include working with veterinarians, so that the applicant understands the duties and responsibilities of a practitioner and the breadth of veterinary medicine.

Applying for Admission

October 1, 1997 Deadline for filing applications for admission for Fall 1998 to the School of Veterinary Medicine

The Veterinary Medical Colleges Application Service (VMCAS) will be the central distribution, collection and processing service for applications to the School of Veterinary Medicine and to other veterinary colleges.

Students are admitted to the School of Veterinary Medicine in the fall only. Applications may be obtained any time after July 15 by writing to the Office of the Associate Dean—Student Programs, School of Veterinary Medicine, University of California, Davis, CA 95616 or by calling 916-752-1383.

Students interested in admission to the School of Veterinary Medicine are urged to request an *Announcement of the School of Veterinary Medicine* at an early date so that all minimum academic requirements and deadlines are met.

Applicants with disadvantaged backgrounds (cultural, economic, social, educational, disabled and other factors) are encouraged to apply to the Veterinary Medical Opportunity Program (VMOP). For further information and advising services, write or call the Office of the Dean—Student Programs (916-752-1383).

Letters of Evaluation. Three letters of evaluation are required and are submitted with your VMCAS application. Letters should be requested from persons who know you well, understand academic and professional demands, and have had the opportunity to evaluate your personal qualities and potential as a professional person. The evaluator should be willing to write a thorough, comprehensive letter on your behalf.

Interviews. Interviews may be requested, as deemed necessary, by the Dean and Admission Committee to obtain additional information. The Dean and Admission Committee may require additional evaluation procedures for selecting candidates for admission.

Student Fees: School of Veterinary Medicine

At the time of registration each quarter, every student must pay the following fees.

These are the proposed fees for the 1997-98 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.

Students entering 1997-98

	Per Quarter	Annually
University Registration Fee	$238.00	$713.00
Educational Fee	$1,029.00	$3,086.00
Memorial Union Fee	$28.50	$85.50
Student Services Health Fee	$32.00	$96.00
Health Insurance*	$143.00	$429.00
Student Facilities Safety Fee	$22.00	$66.00
Professional School Fee†	$1,334.00	$4,000.00
Total for CA residents	**$2,826.50**	**$8,475.50**
Non-Resident Tuition	$2,995.00	$8,984.00
Total for nonresidents	**$5,821.50**	**$17,459.50**

* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

†M.P.V.M., Masters, and Ph.D. students do not pay the Professional School Student Fee. These students pay the Graduate Student Fees (see Graduate Studies).

Students previously admitted

The Professional School Fee for students admitted to the School of Veterinary Medicine in previous years is as follows:

1996-97: $4,000 per year. Total annual student fees for California residents are $8,475.50; for nonresidents, $17,459.50.

1995-96: $3,000 per year. Total annual student fees for California residents are $7,475.50; for nonresidents, $16,459.50.

1994-95: $2,000 per year. Total annual student fees for California residents are $6,475.50; for nonresidents, $15,459.50.

PELP students are considered continuing students.

Readmitted students are considered new (entering) students.

Out-of-State and Foreign Applicants. California residents are given priority for admission to the school. A small number of uniquely qualified applicants who are not California residents may be admitted as nonresidents. The criteria for determining residency are explained in Residence for Tuition Information in the Appendix of this catalog. Specific questions should be addressed to the Legal Analyst—Residence Matters, 300 Lakeside Dr., 7th Floor, Oakland, CA 94720. No other persons are qualified to give rulings on residency.

If you are from a country other than the United States, you must include a certified English version of your college transcript, and, if English is your second language, the official scores from the Test of English as a Foreign Language (TOEFL) taken within five years of the date when your application is submitted.

Criteria for Selection

I. Academic Factors (50-60%)

A. College course work:

1. GPA of all undergraduate and graduate course work
2. GPA of required science course work
3. GPA of last two years of college work (minimum of 45 semester units)

B. Graduate Record Examination:

1. General Aptitude Test (Verbal, Quantitative and Analytical)

II. Non-Academic Factors (40-50%)

A. Narrative (5-20%)

B. Letters of Evaluation (5-20%)

C. Interviews (0-20%)

Applicants will also be evaluated for their understanding of the profession and the responsibilities of being a veterinarian, interest in serving the public, maturity, motivation and other qualities necessary for successful academic and professional work.

Program of Study

Doctor of Veterinary Medicine. To receive a Doctor of Veterinary Medicine degree, students must study veterinary medicine for the equivalent of 12 quarters of 12 weeks each (the last six quarters must have been spent in the School of Veterinary Medicine, University of California, Davis). A grade point average of 2.0 (C), computed on all courses taken in the School, is required and students must satisfactorily complete all required work as determined by the faculty of the School.

Master of Preventive Veterinary Medicine. Applicants for candidacy to the Master of Preventive Veterinary Medicine (M.P.V.M.) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the Admissions Committee, M.P.V.M program. Application deadline for August admission is March 15. International applicants are encouraged to apply as early as possible.

The M.P.V.M. degree normally takes one year to complete; however, some students may require as much as two years to finish the program. Students who intend to complete the program in one calendar year must commence the program in August. Candidates for the

M.P.V.M. degree must satisfactorily complete a total of 40 units of course work while in residence. This includes 27 units of required courses in epidemiology, biostatistics, information management and a minimum of 13 units of approved electives. Students must also complete a reasearch study which culminates in a written report and oral presentation. A committtee, consisting of three faculty members, reviews each paper for acceptability and assigns an appropriate grade.

Application forms and information about the program can be requested from the Director, M.P.V.M. Program, Office of the Dean, School of Veterinary Medicine, University of California, Davis, CA 95616.

Combined Program. Students may enroll in the combined D.V.M./M.P.V.M. program in which the M.P.V.M. degree may be awarded by the end of the fall quarter of the fifth year or as soon thereafter as all requirements for both the D.V.M. and M.P.V.M. degrees are completed. The advantage of the combined program resides in the ability of the student to complete the M.P.V.M. program within six months after normal completion time of the D.V.M. degree, rather than 15 months, as would be the case if taken sequentially.

Master of Science and Doctor of Philosophy. General information regarding these degrees will be found in the Announcement of Graduate Studies, which may be obtained from Graduate Studies, University of California, Davis, CA 95616. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.

School of Veterinary Medicine Academic Calendar 1997-98

FALL QUARTER 1997

Orientation for 1st-year students	Wed. and Fri., Sept. 10 and 12
Instruction begins for 4th-year students	Mon., September 8
Instruction begins for 1st-, 2nd- and 3rd-year students	Mon., September 15
Schalm Lecture	Sun., November 9
Thanksgiving Holiday	Thur.-Fri., Nov. 27-28
Instruction ends	Fri., December 5
Finals end	Fri., December 12

WINTER QUARTER 1998

Instruction begins for 4th-year students	Mon., January 5
Instruction begins for 1st-, 2nd- and 3rd-year students	Mon., January 5
M. L. King Holiday	Mon., January 19
President's Holiday	Mon., February 16
Monday classes meet	Wed., March 18
Instruction ends	Wed., March 18
Finals end	Friday, March 26

SPRING QUARTER 1998

Instruction begins	Mon., April 6
Student Awards Ceremony	Wed., May 6
Memorial Day Holiday	Mon., May 25
Instruction ends	Friday, June 12
Finals end	Friday, June 19
Commencement	Friday, June 19

The "Virtual Heart," a computer program detailing the structure and function of a dog's heart, was developed by the veterinary school's Computer Assisted Learning Facility.

PROGRAMS & COURSES

COURSES

Undergraduate Courses

Lower Division Courses
These courses, **numbered 1–99,** are open to all students for lower division credit, but are designed primarily for freshmen and sophomores.

Upper Division Courses
These courses, **numbered 100–199,** are open to all students who have met the necessary prerequisites as indicated in the catalog course description. Preparation should generally include completion of one lower division course in the given subject or completion of two years of college work.

Variable-Unit Courses

Subject to approval by the department chair, an instructor may arrange to give a special study course (numbers 90X, 92, 97T, 97TC, 98, 99, 190X, 192, 194H, 197T, 197TC, 198, 199) to interested students.

- **90X/190X (Seminar)** are seminar courses for in-depth examination of a special topic within the subject area.
- **92/192 (Internship)** courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units before enrolling in course 192.
- **97T/197T (Tutoring)** and **97TC/197TC (Tutoring in the Community)** are courses for students who want to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.
- **98/198 (Directed Group Study)** courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.
- **99 (Special Study for Undergraduates)** is a course arranged for an individual student who shares with an instructor an academic interest that cannot be accommodated within the formal course structure.
- **194H (Special Study for Honors Students)** courses are for individual students with honor status, as determined by the department offering the course, and who have completed 84 units.
- **199 (Special Study for Advanced Undergraduates)** courses are the upper division counterparts of course 99, and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Credit in courses 99, 194H and 199 is limited to a total of 5 units per term.

Autotutorial Courses are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 13AT, 141AT.

Research Conference Courses are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

Graduate Courses

Courses **numbered 200–299** are open to graduate students and to undergraduates who have completed 18 units of upper division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in 290C courses and variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory.

Professional Courses for Teachers and Nurse Practitioners

Courses **numbered 300–399** are teacher-training courses in the Division of Education and in other departments and are especially intended for teachers or prospective teachers. Included are courses designed to provide instruction to teaching assistants. Also included are courses for certification of family nurse practitioners and physician assistants. These courses are open only to students enrolled in those programs.

Other Professional Courses

Courses **numbered 400–499** are professional training courses. Graduate students should consult their faculty adviser or contact the Graduate Studies Office before registering in 400 series courses to determine if graduate credit may be awarded for the course in question.

Prerequisites

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests on the student. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you. However, the prerequisite that requires that you complete 84 units before registering in the course may not be waived.

COURSE DESCRIPTIONS

Here is a sample of how a course is listed in this catalog.

190. Proseminar in Nutrition (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical and dietetic problems of community, national and international scope. May be repeated for credit with consent of instructor. (P/NP grading only.)

Top line: course number; title; units; quarters offered; instructor(s).

Paragraph following: course instructional format; prerequisite; course description; grading if other than letter grading.

Quarters offered: the quarter in which a course is intended to be given is shown as follows:

I. Fall Quarter (September to December) or
Fall Semester (August to December), School of Law

II. Winter Quarter (January to March) or
Spring Semester (January to May), School of Law

III. Spring Quarter (April to June)

IV. Summer Quarter (July to September) for students in the School of Medicine only

Alternate Year Designation

Some course descriptions will include the phrase "Offered in alternate years." If the course number is marked with an asterisk (*), this indicates that the course *will not* be offered this academic year, but will be offered the following year. If the course number is not marked with an asterisk, this indicates that the course *will* be offered this academic year, but will not be offered the following year.

Multi-Quarter Courses

A series of course numbers followed by two or three letters (for example, Physics 110A-110B-110C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is a prerequisite to the second, and the second is prerequisite to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 160A and 160B), the A course is not a prerequisite to B, unless it is specifically mentioned in the list of prerequisites.

Expanded Course Descriptions

You may find that, because of space limitations, the descriptions in the *General Catalog* will not include all the information you would like about a course. The faculty has responded to this need by writing the "Expanded Course Descriptions," giving more detailed explanations about each course offering. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as course goals, texts used, preparation required of students, basis for grading, course format, special assignments (papers, field trips, etc.), and a topical outline of the material to be covered.

Copies of the "Expanded Course Descriptions" are available for on-campus use at the Shields Library Reference and Periodicals desks, the College deans' offices, advisers' offices, advising centers, departmental offices, The First Resort and in the dormitories at the head residents' offices.

The course offerings and instructors listed in this catalog are subject to change without notice. For more current quarter offerings and instructors, refer to the *Class Schedule and Room Directory,* available in the UCD Bookstore.

African American and African Studies

(College of Letters and Science)

John O. Stewart, Ph.D., Director

Program Office, 280 Kerr Hall (916-752-1548)

Committee in Charge

Bobbie J. Bolden *(African American and African Studies, Drama)*
Carl C. Jorgensen, Ph.D., Associate Professor *(Sociology)*
Annie King, Ph.D. *(Avian Sciences)*
Jacob K. Olupona, Ph.D. *(African American and African Studies)*
Melvin Ramey, Ph.D. *(Civil and Environmental Engineering)*
Ella Ray, Ph.D. *(African American and African Studies)*
John H. Stanfield, II, Ph.D. *(African American and African Studies, Sociology)*
John O. Stewart, Ph.D. *(African American and African Studies)*
Patricia A. Turner, Ph.D. *(African American and African Studies)*

Faculty

Bobbie J. Bolden, M.A., Lecturer
Jacob K. Olupona, Ph.D., Associate Professor
Ella Ray, Ph.D., Assistant Professor
John H. Stanfield, II, Ph.D., Professor
John O. Stewart, Ph.D., Professor
Patricia A. Turner, Ph.D., Associate Professor

Affiliated Faculty

Felicienne Ramey, Ph.D., Adjunct Associate Professor
Kristee Haggins, Ph.D., Adjunct Assistant Professor
Cecil A. Brown, Ph.D., Lecturer

The Major Program

The African American and African Studies Program provides courses through which students learn about the history and culture of African Americans. The program is committed to providing students with a multi-disciplinary learning experience. Majors are required to take selected courses in other programs and departments that complement those offered within African American and African Studies. Majors and minors are also encouraged to take advantage of internship programs.

The Program. Students are encouraged to combine an examination of African American history and culture in the U.S.A. with African or diaspora studies. The emphasis in African American (U.S.A.) culture includes courses on the history, culture, arts, and literature of African Americans, the patterns of their socio-political and cultural movements, and the struggle with racism as a social and psychological problem. The emphasis in African Studies includes courses on the social organization, culture, and religion of West African societies. The diaspora emphasis includes courses on the African heritage in the Americas, Islam in Africa and the Americas, African religion in the diaspora and cinema studies. In addition, students may choose to do special research projects.

Career Alternatives. African American and African Studies majors are well prepared for employment opportunities in the Office of Education, human service units, county social service programs, and counseling services. African American and African Studies is also an appropriate background for work in community organizations like the Urban League, NAACP, Urban Affairs, and Office of Economic Opportunity. The major also provides a strong background for future study in graduate school.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 36
African American and African Studies 10 ...4
Two courses from Anthropology 2; Economics 1A, 1B; Geography 2; Sociology 1; Political Science 1, 2; Psychology 1.....8
Two courses from Chicana/o Studies 10; Native American Studies 1, 10; American Studies 45; Asian American Studies 1, 2 8
Two courses from History 17A, 17B, 17C....8
Music 28.....4
One course from Statistics 13, Sociology 46A, or Psychology 41 4

Depth Subject Matter 36
A coordinated program of upper division courses, selected and approved in consultation with the major advisers to include:
African American and African Studies 101, 110, 133 12
Additional upper division units chosen to reflect the student's major emphasis 24

Total Units for the Major 72

Major Program Emphases
The major program must be developed in consultation with an African American and African Studies faculty member, and approved by the Program's Major adviser. The following areas of emphasis are offered as guidelines for students in the African American and African Studies major. They are not the only areas students may choose for the major.

Culture of African American emphasis: African American and African Studies 107A, 107B, 153; Anthropology 140A, 140B; History 177A, 177B; Political Science 167.

African emphasis: African American and African Studies 110, 162, 171; Anthropology 140A, 140B; History 115A, 116; Political Science 134, 146.

Information regarding the areas of emphasis may be obtained from the African American and African Studies Office.

Major Adviser. P.A. Turner.

Minor Program Requirements:

UNITS

African American and African Studies.....24
Select one course from African American and African Studies 10, 15, or 80.....4
Select five courses from African American and African Studies 100, 101, 107A, 110, 123, 133, 141, 145A, 145B, 151, 152, 153, 160, 162, 170 20

American History and Institutions. This University requirement can be satisfied by completion of African American Studies 10, 100. (See also under University requirements.)

Related Upper Division Courses
The following courses are offered by faculty members in other disciplines and focus on African and African American people and their culture.

Anthropology 104, 139A, 139B, 140, 153; Art History 150; Community and Regional Development 151, 152, 153, 159A, 159B, 172; Dramatic Art 155; Education 150; English 179, 181; Geology 125A, 125B; History 102, 115A, 115B, 115C, 116, 177; Music 113B; Political Science 134, 138, 146, 151, 167, 176; Sociology 129, 130.

Courses in African American and African Studies (AAS)

Lower Division Courses

10. Introduction to Afro-American Culture and Society (4) I. Turner
Lecture—4 hours. Introduction to the contemporary Black American experience by critically examining historical, political and social and economic factors that have affected the development and status of Afro-American people.

12. Introduction to African Studies (4) II. Olupona
Lecture/discussion—4 hours. Introduction to African Studies which will focus on the various disciplinary perspectives through which African society and culture are generally studied. A survey of methods, resources and conceptual tools for the study of Africa. GE credit: ArtHum, Div, Wrt.

15. Introduction to African American Humanities (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Introduction to the humanist tradition developed by writers, philosophers, and artists of African descent in the West. Attention given to African sources, as well as European, Caribbean, Latin-American, and North American variations on this tradition. GE credit: ArtHum, Div, Wrt.

50. Black Images in Popular Culture (4) III. Turner, Reid
Lecture—2 hours; discussion—2 hours. A survey of the depictions of Blacks in popular culture (popular press, stage, radio, film, television, advertising) from the middle of the sixteenth century to the present. GE credit: ArtHum, Div, Wrt.

51. History of Afro-American Dance (4) III. Wynn-Bolden
Lecture—2 hours; discussion—2 hours. Evolution of African American dance, tracing its history and development from West Africa through the Carribean and to the United States. Investigates the social relevance of African American dance and the artistic merits and contributions of African American choreographers and performers.

52. African Traditional Religion (4) II. Olupona
Lecture—2 hours; discussion—2 hours. Introduction to the traditional religions of the sub-Saharan African peoples: emphasis on myths, rituals and symbols in West, East, Central and South African indigenous religions. Examines themes such as sacred kingship, divination system, women, prophecy, conversion and adaptation to Islam and Christianity. GE credit: ArtHum, Div, Wrt.

54. University Gospel Choir (2) I, II, III. Lymus, Stewart
Rehearsal—4 hours. Prerequisite: consent of instructor; open to any student in the university. Rehearsal, study, and performance of Gospel music. May be repeated for credit. (Same course as Music 54.) (P/NP grading only.)

80. Introduction to Black Politics (4) III. Stanfield
Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences. GE credit: SocSci, Div, Wrt.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Survey of Ethnicity in the U.S. (4) II. Turner
Lecture—4 hours. The history, culture, philosophy, and current problems of groups considered ethnic minorities in the United States as viewed by the groups themselves. GE credit: ArtHum, Div.

101. Introduction to Research in the Afro-American Community (4) III. The Staff
Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Introductory survey of Afro-American Studies methods and techniques; problems and methodology in Afro-American Studies.

107A. African Descent Communities and Culture in the Caribbean and Latin America (4) I. Stewart
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. Origin and development of African descent communities and culture in the Caribbean and Latin America: (a) the evidence for pre-Columbian arrivals; (b) the African

slave trade and its aftermath; (c) the emergence of the African-creole cultures. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

107B. African Descent Communities and Culture in North America (4) I. Stewart
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. Origin and development of African descent communities and culture in the U.S.A., Canada, and Mexico from the African slave trade to contemporary urban society. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

107C. African Descent Communities and Culture in Europe and Asia (4) I. Stewart
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. The study of early African kingdoms, their relationship with Europe and Asia, and the development of African descent communities and culture in Europe and Asia from the pre-Columbian to the post-colonial era. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

110. West African Social Organization (4) II. Olupona
Lecture—4 hours. Prerequisite: course 101 or consent of instructor. Ecology, population, social organization, and survival culture of West Africa in the pre-colonial, colonial, and post-colonial periods. GE credit: SocSci, Div.

123. The Black Female Experience in Contemporary Society (4) III. Ray
Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women's contributions in history, literature, and social science; life experiences of Black women and philosophical underpinnings of the feminist movement. GE credit: ArtHum, Div.

130. Education in the African American Community (4) I. The Staff
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 10 or 100, and completion of the Subject A requirement. Examination of the history of the education of African Americans in the United States. Examination and critique of contemporary theories concerning the schooling of African Americans. (Former course 140.)

133. The Black Family in America (4) III. Ray
Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Analysis of social science research to examine relationship between Black family structures, patterns of functioning, and political, economic, and social conditions. Examination of role differentiation within families by race and social class. GE credit: SocSci, Div.

141. Psychology of the African American Experience (3) III. Haggins
Lecture—2 hours; discussion—1 hour. Prerequisite: course 10 or consent of instructor. Introduction to the psychological issues faced by African Americans. Analysis of issues from European/Western and Afrocentric frame of reference. Emphasis on Optimal Theory, a psychological theory based on an Afrocentric world view.

145A. Black Social and Political Thought (4) III. Stanfield
Lecture—4 hours. Prerequisite: course 10 or 80, or consent of instructor. Exploration and analysis of Black social and political thought in the Americas. GE credit: SocSci, Div.

145B. Black Intellectuals (4) III. Stanfield
Lecture—4 hours. Prerequisite: course 10, 80, 145A, or consent of instructor. Exposition and critical analysis of selected theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas. GE credit: SocSci, Div.

***150A. The Afro-American Visual Arts Tradition: A Historical and Cultural Study** (4) I. The Staff
Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 through Reconstruction. GE credit: ArtHum, Div.

***150B. The Afro-American Visual Arts Tradition: A Historical and Cultural Study** (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to present. GE credit: ArtHum, Div.

151. Afro-American Vernacular Music and Verbal Arts (4) III. Turner
Lecture—2 hours; discussion—2 hours. Socio-political dimensions of Afro-American musical forms like spiritual, work song, minstrelsy blues, rhythm and blues, jazz, gospel, soul and contemporary pop, and related verbal arts like preaching, toasting, rapping.

152. Major Voices in Black World Literature (4) II. Stewart
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing, completion of course 15 or comparable course in literature or the humanities. The recurrence of cultural tropes in the works of major black world authors and formation of an African-oriented canon. Principal activities include critical reading and the discovery of literature as a cultural resource. GE credit: ArtHum, Div, Wrt.

153. African Religions in the Americas (4) I. Olupona
Lecture—2 hours; discussion—2 hours. Prerequisite: course 10 or 15. Comparative study of African religious heritage in the Americas: Jamaica, Trinidad, Cuba, U.S.A., Haiti and Brazil. Emphasis on the origins and development of Candomble, Santeria, Shango, Vodun and Rastafarianism in the New World. GE credit: ArtHum, Div, Wrt.

154. University Gospel Choir (2) I, II, III. Lymus, Stewart
Rehearsal—4 hours. Prerequisite: consent of instructor; open to any student in the university. Rehearsal, study, and performance of Gospel music. May be repeated for credit. (Same course as Music 154.) (P/NP grading only.)

155A. African American Dance and Culture in the United States, Brazil and the Caribbean (4) II. Bolden
Lecture/discussion—4 hours. A comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (Same course as Dramatic Art 155A.)

160. African American Folklore (4) III. Turner
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 10. Theory and history of African American folklore and folklife, including music, material culture, oral narrative, proverbs, and humor. African and Caribbean cultural influences on New World folk genres will be probed. GE credit: ArtHum, Div.

162. Islam in Africa and the Americas (4) III. Olupona
Lecture—3 hours; discussion—1 hour. Prerequisite: course in African American or Religious Studies, preferably course 12 or 110 or Religious Studies 60. A comparative and historical survey of Islam in the regional and cultural settings of Sub-Saharan Africa and the Americas. GE credit: ArtHum, Div, Wrt.

170. African American Film and Video (4) II. The Staff
Lecture/discussion—2 hours; term paper; film viewing—2 hours. Prerequisite: one of courses 15, 50, or English 160, or 162. A comparative approach in the study of fictional film and video produced and directed by African Americans, drawing on the social sciences and black feminist theory to examine and discuss selected works. GE credit: ArtHum, Div, Wrt.

171. Black African and Black European Film and Video (4) III. The Staff
Lecture/discussion—2 hours; term paper; film viewing—2 hours. Prerequisite: one of courses 15, 50, or English 160 or 162. A comparative approach in the study of dramatic films and videos that treat black life in Africa and Europe. Critical attention will focus on the imaginative construction of ethnicity, race, nationality, gender, and sexuality in each particular work. GE credit: ArtHum, Div.

190. Topics in African and African-Diaspora Studies (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing in African American and African Studies or consent of instructor. Intensive treatment of a special topic or problem in African or African Diaspora Studies. May be repeated once for credit when topic differs.

192. Internship in African American and African Studies (1-8) I, II, III. The Staff (Chairperson in charge)
Internship—3-24 hours. Prerequisite: upper division standing, completion of 12 units of upper division study in African American and African Studies courses and consent of instructor. Enrollment limited to African American and African Studies majors and minors. Supervised internship in community, government, or private institutions, in all subject areas offered by the African American and African Studies Program. May be repeated for credit for a total of 12 units. (P/NP grading only.)

197T. Tutoring in Afro-American Studies (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: consent of major committee; upper division standing with major in Afro-American Studies. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Agricultural and Environmental Chemistry (A Graduate Group)

David S. Reid, Ph.D., Chairperson of the Group

Group Office, 111 Cruess Hall (916-752-1415)

Faculty. Includes members from various departments in the Colleges of Agricultural and Environmental Sciences, Engineering, Letters and Science, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. Study relates to the chemical and biochemical aspects of foods, wine, fibers/polymers, pesticides, and environmental pollution. Detailed information regarding graduate study may be obtained by writing the Group Chairperson.

Graduate Advisers: D.O. Adams *(Viticulture and Enology),* C.F. Shoemaker *(Food Science and Technology),* Y.-L. Hsieh *(Textiles and Clothing),* T. Shibamoto *(Environmental Toxicology),* R.J. Zasoski *(Land, Air, and Water Resources).*

Courses in Agricultural and Environmental Chemistry (AGC)

Graduate Courses

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.)

***298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesti-

*Course not offered this academic year.

cides, and other special topics as they apply to agricultural and environmental chemistry.

***299. Research** (1-12) I, II, III, summer. The Staff (Chairperson in charge)
Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.)

Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

The major in agricultural and managerial economics teaches students to apply economics and quantitative principles to problems in agricultural production, management, and marketing.

The Program. Each student must specialize in at least one of three options: agricultural economics, which focuses on topics related to the production and marketing of foods and fibers; environmental and resource economics, which focuses on issues related to use of resources and environmental quality; or managerial economics, which focuses on topics related to evaluating, financing, and managing business activities.

Internships and Career Alternatives. Students in agricultural and managerial economics have opportunities to gain additional career information and preparation through internships in a variety of private business and governmental agencies. Graduates qualify for supervisory and management training positions in farm and ranch production, food and agricultural processing, agricultural sales and service, banking, finance, commodity and stock brokerages in the private sector, and a variety of agency career positions in local, state, and federal government. Students who desire additional training are well qualified to enter graduate programs in agricultural economics, economics, business administration, or law.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement.....3-12
See College requirement 0-8
Additional English (English 1, 3, 20, 101, 104A, 104B, 104C, 104D, or 104E) ...3-4

Preparatory Subject Matter.....65-68
Accounting (Management 11A-11B) 8
Computer Science (Agricultural Systems and Environment 21, Computer Science Engineering 10, 15 or 30, Engineering 5)...3-4
Economic principles (Economics 1A-1B) ..10
Calculus (Mathematics 16A-16B or 21A-21B) 6-8
Statistics (Statistics 13, 103) 8
Social Science, Natural Science, Agricultural Science 40
(See undergraduate handbook in Department Advising Office for complete list of courses.)

Breadth/General Education.....6-24
Note: Approved General Education courses may be used to simultaneously satisfy Social, Natural, and Agricultural Science courses as defined in the Preparatory Subject Matter for the major and the campus General Education requirement.

Depth Subject Matter 19-21
Students graduating with this major are required to attain at least a C average (2.0) in all upper division courses taken at the University in the depth subject matter.
Micro theory, Agricultural and Resource Economics 100A, 100B.....8
Quantitative methods, Agricultural and Resource Economics 106, 155 8
Macro theory, Economics 101 or 105 4-5

Restricted Electives 32
Choose at least one of the options below

Agricultural Economics option
Chose at least 15 units from Agricultural and Resource Economics 120, 130, 132, 138, 139, 140, 145, 150. Select the remaining 13 units from the aforementioned courses, Agricultural and Resource Economics 18, or upper division courses in Agricultural and Resource Economics and/or Economics.

Environmental and Resource Economics option
Agricultural and Resource Economics 175, 176.
Chose at least 18 units from Agricultural and Resource Economics 15, 120, 138, 141M, 145, 150, 156, Economics 123, 125, 130, Environmental Studies 168A, 168B, 178. Select the remaining 8 units from the aforementioned courses or upper division courses in Agricultural and Resource Economics and/or Economics, Environmental Studies 160, 161, 162, 163, 165, 166, 167, 171, 172, 173, Environmental Toxicology 138.

Managerial Economics option
Agricultural and Resource Economics 18.
Chose at least 12 units from Agricultural and Resource Economics 112, 118, 136, 157, 171A, 171B. Select the remaining 16 units from the aforementioned courses or from Agricultural and Resource Economics 120, 130, 132, 138, 139, 140, 143, 144, 145, 150, 156, 175, 176, 194HA-194HB, Economics 121A, 121B, 151A, 151B, 160A, 160B, Political Science 174, 188.

Unrestricted Electives 37-48

Total Units for the Degree.....180

Advising Center for the major is in 1176 Social Sciences and Humanities Building (916-752-6185).

Major Adviser. R. Green (*Agricultural and Resource Economics).*

Minor Program Requirements:

The Department of Agricultural and Resource Economics offers four minor emphases open to students majoring in other disciplines who wish to complement their study programs with a minor in Agricultural and Managerial Economics. Each emphasis requires completion of Agricultural and Resource Economics 100A. Minimum prerequisites of Economics 1A-1B and Mathematics 16A-16B are required for Agricultural and Resource Economics 100A. For some courses, Statistics 13 and 103 may be required. Variable-unit courses are not accepted for any emphasis.

UNITS

Agricultural and Managerial Economics.....18

General emphasis
Agricultural and Resource Economics 100A or the equivalent 4
Additional upper division courses in Agricultural and Resource Economics.....14

Agricultural Economics emphasis
Agricultural and Resource Economics 100A or the equivalent 4
Additional upper division courses in Agricultural and Resource Economics.....14
Select 9 or more units from Agricultural and Resource Economics 120, 130, 132, 138, 139, 140, 145, 150.
Select additional upper division Agricultural and Resource Economics courses to complete the 18-unit total for the minor.

Environmental and Natural Resource Economics emphasis
Agricultural and Resource Economics 100A or the equivalent 4
Additional upper division courses in Agricultural and Resource Economics.....14
Select 9 or more units from Agricultural and Resource Economics 175 and 176, and either 100B or 120.
Select additional upper division Agricultural and Resource Economics courses to complete the 18-unit total for the minor.

Managerial Economics emphasis
Agricultural and Resource Economics 100A or the equivalent 4
Additional upper division courses in Agricultural and Resource Economics.....14
Select 9 or more units from Agricultural and Resource Economics 112, 118, 136, 157, 171A, 171B.
Select additional upper division Agricultural and Resource Economics courses to complete the 18-unit total for the minor.

Graduate Study. See the Graduate Studies section in this catalog.

Agricultural and Resource Economics

(College of Agricultural and Environmental Sciences)

Richard J. Sexton, Ph.D., Chairperson of the Department

Department Office, 2118 Social Sciences and Humanities Building (916-752-1517)

Undergraduate Student Information, 1176 Social Sciences and Humanities Building (916-752-6185)

Graduate Student Information, 1171 Social Sciences and Humanities Building (916-752-6886)

Faculty

Richard Alcauskas, J.D., Lecturer
Julian M. Alston, Ph.D., Professor
Steven Blank, Ph.D., Lecturer
Bayford D. Butler, M.S., Lecturer
Leslie J. Butler, Ph.D., Lecturer
Michael R. Caputo, Ph.D., Professor
Hoy F. Carman, Ph.D., Professor
Colin A. Carter, Ph.D., Professor
James A. Chalfant, Ph.D., Professor
Roberta L. Cook, Ph.D., Lecturer
James Faber, M.S. Lecturer
Y. Hossein Farzin, Ph.D., Assistant Professor
Richard D. Green, Ph.D., Professor
Arthur Havenner, Ph.D, Professor
Thomas W. Hazlett, Ph.D., Professor
Dale M. Heien, Ph.D., Professor
Garth J. Holloway, Ph.D., Assistant Professor
Richard E. Howitt, Ph.D., Professor
Lovell S. Jarvis, Ph.D., Professor
Desmond A. Jolly, Ph.D., Lecturer
Karen Klonsky, Ph.D., Lecturer
Mahlon Lang, Ph.D., Lecturer
Douglas M. Larson, Ph.D., Associate Professor
Philip L. Martin, Ph.D., Professor
Catherine J. Morrison, Ph.D., Professor
Quirino Paris, Ph.D., Professor
Richard J. Sexton, Ph.D., Professor
Lawrence E. Shepard, Ph.D., Senior Lecturer
Joe J. Stasulat, Ph.D., Lecturer
Daniel A. Sumner, Ph.D., Professor
J. Edward Taylor, Ph.D., Professor
James E. Wilen, Ph.D., Professor

Emeriti Faculty

Oscar R. Burt, Ph.D., Professor Emeritus
Harold O. Carter, Ph.D., Professor Emeritus
Jerry Foytik, Ph.D., Professor Emeritus
Benjamin C. French, Ph.D., Professor Emeritus
Varden Fuller, Ph.D., Professor Emeritus
Warren E. Johnston, Ph.D., Professor Emeritus
Gordon A. King, Ph.D., Professor Emeritus
Sylvia Lane, Ph.D., Professor Emerita
Elmer W. Learn, Ph.D., Professor Emeritus
Samuel H. Logan, Ph.D., Professor Emeritus
Alexander F. McCalla, Ph.D., Professor Emeritus
Chester O. McCorkle, Jr., Ph.D., Professor Emeritus
Refugio I. Rochin, Ph.D., Professor Emeritus
J. Herbert Snyder, Ph.D., Professor Emeritus
Stephen H. Sosnick, Ph.D., Professor Emeritus

Major Program and Graduate Study. See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Studies section in this catalog.

Major Advisers. See the *Class Schedule and Room Directory.*

Related courses. See Environmental Biology and Management 110; Environmental Studies 160, 168A, 168B, 173; and courses in Economics.

Courses in Agricultural and Resource Economics (ARE)

Lower Division Courses

***1. Economic Basis of the Agricultural Industry** (4)
Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California. GE credit: SocSci.

15. Population, Environment and World Agriculture (4) I. Jarvis
Lecture—3 hours; discussion—1 hour. Economic analysis of interactions among population, environment, natural resources and development of world agriculture. Introduces students to economic thinking about population growth, its causes and consequences for world food demand, and environmental and technological limits to increasing food supplies. GE credit: SocSci, Div, Wrt.

18. Business Law (4) I, III. Alcauskas; summer. The Staff
Lecture—4 hours. Prerequisite: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system.

49A-49B-49C. Field Practice (1) I, II, III. Stasulat
Discussion—1 hour; three field trips. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding and awareness of economics and management and their application in agricultural production. (P/NP grading only.)

98. Directed Group Study
(1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in Charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100A. Intermediate Microeconomics: Theory of Production and Consumption (4) I. Farzin; II. Morrison; III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B; Mathematics 16B. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. (Not open for credit to students who have completed Economics 100 or the equivalent; however, Economics 100 will not serve as prerequisite to course 100B.)

100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) I. Farzin; II. Sexton; III. Caputo
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

106. Quantitative Methods in Agricultural Economics (4) I. Chalfant; II. Havenner; III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 103. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

112. Fundamentals of Business Organization (4) I. Weiss; III. Faber; summer. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing or consent of instructor. The role of organizational design and behavior in business and public agencies. Principles of planning, decision making; individual behavior, motivation, leadership; informal groups; conflict and change in the organization.

113. Fundamentals of Marketing Management (4) I. Butler
Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. (Not open for credit to students who have completed course 136.)

115A. Economic Development (4) I. The Staff (Economics); II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A and 1B. Major issues encountered in emerging from international poverty, problems of growth and structural change, human welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (Same course as Economics 115A.) GE credit: SocSci, Div.

115B. Economic Development (4) III. Woo (Economics)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A and 1B. Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (Same course as Economics 115B.) GE credit: SocSci.

118. Tax Management (4) III. B. Butler
Lecture—4 hours. Prerequisite: Management 11A, 11B; course 18 recommended. Development and application of a framework to understand the tax effects of typical management decisions on both entities and their owners. Impacts that different methods of taxation have on business entities with emphasis on tax planning, using income and deduction strategies, retirement plans, and choice of business entity for tax minimization.

120. Agricultural Policy (4) III. Alston
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of American agriculture. GE credit: SocSci, Wrt.

130. Agricultural Markets (4) II. L. Butler
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

132. Cooperative Business Enterprises (3) I. Lang
Lecture—3 hours. Prerequisite: Economics 1A. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation.

136. Managerial Marketing (4) II. Carman
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and statistics in the study of marketing. Marketing measurement and forecasting, market planning, market segmentation, determination of optimal product market mix, sales and cost analysis, conduct of marketing research, marketing models and systems.

138. International Commodity and Resource Markets (3) II. Whitney
Lecture—3 hours. Prerequisite: course 100A, Economics 100 or 104. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities.

139. Futures and Options Markets (3) I. Carter
Lecture—3 hours. Prerequisite: course 100A; Statistics 103. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools.

140. Farm Management (5) III. The Staff
Lecture—5 hours. Prerequisite: Economics 1A. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

141. Government Regulation of Business (4) III. Heien
Lecture—4 hours. Prerequisite: Economics 1A. The role of and rationale for government regulation of business activity; competitive markets and performance; sources of market failure; theories of regulation; process of government regulation; antitrust law; economic regulation; social regulation. (Students who have had or are taking course 100A or Economics 100 or the equivalent must enroll in course 141M.) GE credit: SocSci, Wrt.

141M. Government Regulation of Business (3) III. Heien
Lecture—4 hours. Prerequisite: Economics 1A. The role of and rationale for government regulation of business activity; competitive markets and performance; sources of market failure; theories of regulation; process of government regulation; antitrust law; economic regulation; social regulation. (Students who have had or are taking course 100A or Economics 100 or the equivalent must enroll in course 141M instead of 141.) GE credit: SocSci, Wrt.

142. Personal Finance (3) I. Shepard; II. Butler; summer. The Staff
Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning.

143. Investments (3) II. Shepard
Lecture—3 hours. Prerequisite: course 142 or consent of instructor. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor.

144. Real Estate Economics (3) III. Shepard
Lecture—3 hours. Prerequisite: course 100A. The economic theory, analysis, and institutions of real estate markets and related financial markets. Case studies drawn from the raw land, single family, multifamily, industrial and office real estate markets.

145. Farm and Rural Resources Appraisal (4) III. Johnston
Lecture—3 hours; laboratory—3 hours; field trip. Principles of farm and ranch appraisal; land utilization in

*Course not offered this academic year.

relation to problems of development and valuation. Real estate instruments and elements of real estate finance.

147. Resource and Environmental Policy Analysis (3) II. Underwood
Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, may receive only 2 units of credit, so must enroll in course 147M instead.) GE credit: SocSci.

147M. Resource and Environmental Policy Analysis (2) II. Underwood
Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, must enroll in this course (for 2 units) rather than course 147.)

150. Agricultural Labor (4) I. Martin
Lecture—3 hours; discussion—1 hour. Importance of family and hired labor in agriculture; farm labor market; unions and collective bargaining in California agriculture; simulated collective bargaining exercise; effects of unions on farm wages and earnings. GE credit: SocSci, Div, Wrt.

155. Quantitative Analysis for Business Decisions (4) I. Paris; II. The Staff; III. Howitt
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, and others.

156. Introduction to Mathematical Economics (4) I. Green
Lecture—4 hours. Prerequisite: courses 100A and 155; Mathematics 16C or 21C recommended (students should note that the formal mathematical content of this course is higher than other courses in the curriculum). Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatlier principle; applications to production and consumer models.

157. Analysis for Production Management (4) III. Carman
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and quantitative methods in analyzing production management problems including inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.

171A. Financial Management of the Firm (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106; Management 11A-11B. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. (Students who have had or are taking Economics 134 may not receive credit for this course.)

171B. Financial Management of the Firm (4) II. Hazlett
Lecture—3 hours; discussion—1 hour. Prerequisite: course 171A. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance.

175. Natural Resource Economics (3) II. Farzin
Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations), and non-renewable resources (minerals and energy resources, soil). (Same course as Environmental Studies 175.) GE credit: SocSci.

176. Environmental Economics (3) III. Larson
Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Analytical treatment of the role of the environment in economic activity and methods for protecting and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SocSci.

192. Internship (1-6) I, II, III, summer. The Staff (Chairperson in charge)
Internship—3-18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural and Resource Economics. Internships are supervised by a member of the staff. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (3-3) I-II. Martin
Independent study—2 hours; seminar—1 hour. Prerequisite: course 100B; 106 or 155. The remaining course (106 or 155), if any, may be taken concurrently with 194HB. Open to seniors majoring in Agricultural and Managerial Economics with a minimum GPA of 3.50. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of course.)

197T. Tutoring in Agricultural Economics (1-3) I, II, III. The Staff (Chairperson in charge)
Hours and duties will vary depending upon the course being tutored. Prerequisite: senior standing in Agricultural and Resource Economics and consent of Department Chairperson. Tutor will lead small discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of the instructor in charge of the course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Microeconomic Theory (5) I. The Staff (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Economics 200A.)

200B. Microeconomic Theory (5) II. Helms (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failures. (Same course as Economics 200B.)

200C. Microeconomic Theory (5) III. Makowski (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Economics 200C.)

202A. Introduction to Applied Research Methods (3) I. Wilen
Lecture/discussion—3 hours. Prerequisite: courses 204 and 256, or the equivalent; 200A concurrently. Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism.

202B. Applied Microeconomics I: Consumer and Producer Behavior (3) II. Larson
Lecture/discussion—3 hours. Prerequisite: courses 200A and 202A; course 200B concurrently. Application of consumer and producer theory in models of individual behavior and market-level phenomena. Implications of consumer and producer theory for specification of empirical models of supply and demand for inputs and outputs and market equilibrium displacement models.

202C. Applied Microeconomics II: Welfare Analysis and Imperfect Competition (3) III. Alston
Lecture/discussion—3 hours. Prerequisite: course 202B; course 200C concurrently. Methods of applied welfare economics with emphasis on problems arising in agriculture and the environment. Models of imperfectly competitive markets and their application to industries and institutions in the agricultural sector.

204. Microeconomic Analysis (5) I. Sexton
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or courses 100A-100B and Mathematics 16A-16B; open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Economics 204.)

214. Development Economics (4) I. The Staff
Lecture—4 hours. Prerequisite: course 100A, 100B, Economics 101; course 204 and Economics 160A, 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Economics 214.)

215A. Agriculture and Economic Development (4) I. Taylor
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A or 204 and 214. Agricultural development theory and application. Analysis of rural-urban linkages and their role in economic development, food price policy, and interactions between economic development and the environment. Analytical focus on household-farm and intersectoral models. (Same course as Economics 215A.)

215B. Open Macroeconomics of Development (4) II. Kaneda (Economics)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A or 204, 200D or 205, and 214 or 215A. Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Economics 215B.)

215C. Empirical Approaches to Development Analysis (4) III. Taylor
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 215A, 215B. Extension of development models for policy analysis including Household-Farm models, models of resource allocation under uncertainty. Social Accounting Matrix and Computable General Equilibrium models. Analysis and case studies of methods of project evaluation with and without income-distribution weights. (Same course as Economics 215C.)

221. Agricultural Policy in Developed Countries (4) III. Sumner
Lecture/discussion—4 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, rural poverty, and resource adjustment; international trade policies for temperate zone agricultural commodities.

222. International Agricultural Trade and Policy (3) II. Carter
Lecture—3 hours. Prerequisite: course 100B or 204; Economics 160A or the equivalent. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the

impacts of national intervention on world markets, national policy choice in an open economy and multinational policy issues. Offered in alternate years.

240A. Econometric Methods (4) II. Green
Lecture—4 hours. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Economics 240A.)

240B. Econometric Methods (4) III. Chalfant
Lecture—4 hours. Prerequisite: course 240A. Topics include analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regression, classical hypothesis tests, and identification and estimation of simultaneous equation models. (Same course as Economics 240B.)

240C. Econometric Theory (4) I. Havenner
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; nonlinear and dynamic econometric models; asymptotic distribution theory. (Same course as Economics 240C.)

240D. Topics in Econometrics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Economics 240D.)

252. Applied Linear Programming (4) II. Howitt
Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing uses for business decisions: production, diet, blending, network and related problems.

253. Optimization Techniques with Economic Applications (4) I. Paris
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200C. Optimization techniques and methods including linear and nonlinear programming. Empirical applications to household, firm, general equilibrium and economic growth problems.

254. Dynamic Optimization Techniques with Economic Applications (4) II. Caputo
Lecture—4 hours. Prerequisite: course 253 and elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics.

***255. Advanced Topics in Economic Dynamics** (3) III. Caputo, Howitt
Lecture—3 hours. Prerequisite: course 254. Local stability analysis, steady state comparative statics and comparative dynamics, dynamic duality theory and the principle of optimality, differential games, numerical solution of deterministic and stochastic dynamic models using GAMS, stochastic optimal control, plus other advanced topics in economic dynamics. Offered in alternate years.

256. Applied Econometrics (4) II. Heien
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106, Economics 140 or the equivalent, or consent of instructor. Application of statistical tools to economic and business analysis. Emphasis on regression analysis, problems of specification, and model development. (Same course as Economics 256.)

***257. Analysis and Applications in Production Economics** (4) III. The Staff
Lecture—4 hours. Prerequisite: courses 204, 252, and 256 or the equivalent. Micro-level analysis of decision problems in agricutural production processes, e.g., investment, resource conservation, pest management, and irrigation scheduling. Covers static and dynamic models under risk and uncertainty and some aggregate aspects of production.

258. Demand and Market Analysis (3) III. Morrison
Lecture—3 hours. Prerequisite: courses 204 and 256 or consent of instructor. Quantitative and theoretical analysis of the factors affecting supply, demand and price determination for agricultural products. Emphasis on analytical tools for assessing the impacts of changes in government policies and macroeconomic variables.

***261. Case Problems in Management** (3) II. Carman
Lecture—1 hour; discussion—2 hours. Case problem analysis and discussion of business policy and strategy including organization, planning, production, marketing, and financing issues. Emphasis is on problem definition and solution using current examples drawn primarily from agriculturally oriented firms.

275. Resource and Environmental Economics of Agriculture (3) III. Weinberg
Lecture/discussion—3 hours. Prerequisite: course 204/Economics 204. Development of externality theory and market failure in agricultural production; use of discounting, welfare economics, and political economic models in analyzing agricultural public policies; exploration of theory of renewable and nonrenewable resources in agricultural issues.

276. Institutional and Economic Analysis of Natural Resources (3) I. Larson
Lecture—2 hours; discussion—1 hour. Prerequisite: course 204/Economics 204 or consent of instructor. Natural resources are developed and allocated in a milieu of institutional arrangements that significantly affect their economic yields: definition/enforcement of property rights; information and search costs; market externalities, transactions and adjustment costs. Applications to land/water policy.

280. Analysis of Research in Production Economics (4) II. Paris
Lecture—3 hours; discussion—1 hour. Current problems and methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

281. Analysis of Research in Agricultural Marketing (4) III. The Staff
Lecture—4 hours. Current problems and methods in agricultural market analysis with emphasis on marketing sector firm behavior. Topics include market definition, marketing margins and derived demand, spatial markets, technology analysis, models of imperfect competition, cooperatives, and marketing orders.

283. Analysis of Research in Natural Resource Economics (3) III. Wilen
Lecture—3 hours. Prerequisite: course 254. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and use planning including efficiency and welfare criteria, technological externalities, public goods, extramarket goods, indivisibilities, and intertemporal problems, benefit cost analysis and public and private investment criteria.

***284. Applied Demand Analysis** (4) I. The Staff
Lecture—4 hours. Prerequisite: courses 200A, 240A, and 240B. Issues, techniques and methodology currently used in applied demand analysis. Demand parameter estimates will be used to answer various policy questions. Problem identification, model specification, hypothesis stipulation, and econometric estimation of various demand models.

293. Analysis of California Agriculture and Resources (3) III. Johnston
Lecture—1.5 hours; fieldwork—45 hours total of field trip, including one 5-day summer field trip. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of economic theory and measurement to individual firm and industry decisions in an applied setting. (S/U grading only.)

293M. Analysis of California Agriculture and Resources (2) III. Johnston
Lecture—0.5 hours; fieldwork—45 hours total, including one 5-day summer field trip. Prerequisite: Ph.D. level standing. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. (S/U grading only.)

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Advanced study through special seminars, informal group studies, or group research on problems for analysis and experimentation. Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis.

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis; and (7) Dissertation Research Prospectus. (S/U grading only.)

299D. Special Study for Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Agricultural Computing and Information Systems

(College of Agricultural and Environmental Sciences)

This minor is for students interested in applying modern computer technology to management problems in agriculture, resource management, and other areas. Course work provides knowledge of the use of information technology and the methodology of applied quantitative and systems analysis. The minor program in Agricultural Computing and Information Systems is offered by the Department of Agronomy and Range Science.

Minor Program Requirements:

UNITS

Agricultural Computing and Information Systems 18-19

Two or three of the following courses: Agricultural Systems and Environment 120, 121, 122, Animal Science 128 7-11

The third course may be taken in substitution for a course from either of the elective groups.

Select the remainder of the units from courses in one or both of the following groups:

Computer systems, statistics, and simulation:
Agricultural and Resource Economics 106, 112, 155, Community and Regional Development 160, Applied Biological Systems Technology 180, Biological Systems Engineering 165, Hydrologic Science 154, Statistics 108, 110, 141 7-11

Communication and business organization:
Agricultural and Resource Economics 112, Agricultural Education 171, Community and Regional Development 168, Rhetoric and Communication 103, 136 7-11

Minor Adviser. R.E. Plant *(Agronomy and Range Science),* J. Fadel *(Animal Science).*

Advising Center is located in 152 Hunt Hall (916-752-1715).

Agricultural Education

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Agronomy and Range Science.

Major Program. An undergraduate program leading to a bachelor of science degree is offered in Agricultural Systems and Environment with a specialization in Agricultural and Environmental Education.

Advising Center for the major is located in 152 Hunt Hall (916-752-1715).

Teaching Credential Subject Representative. You may make an appointment with a credential counselor and obtain a statement of the complete requirements for the credential at the Agricultural Education Program Office, 132 or 255 Hunt Hall (916-752-3040 or 4369). Since many majors in the College do not offer the minimum preparation necessary for entering the Agriculture Teaching Credential program, you are encouraged to seek counseling as early as possible. See also the Teacher Education Program.

Graduate Study. For graduate study refer to the Graduate Studies section in this catalog. The Department of Human and Community Development offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the *Graduate Announcement.*

Graduate Adviser. L.S. Whent *(Agronomy and Range Science).*

Courses in Agricultural Education (AED)

Questions pertaining to the following courses should be directed to the instructor or to the Agricultural Education Program Office, 152 Hunt Hall.

Lower Division Courses

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Concepts in Agricultural and Environmental Education (3) I. Zilbert
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Philosophy and nature of formal and non-formal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs. GE credit: SocSci, Wrt.

160. Vocational Education (3) II. Whent
Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry. GE credit: SocSci, Wrt.

***163. Measurement and Evaluation in Teaching** (3) II. The Staff
Lecture—3 hours. Prerequisite: elementary statistics; upper division standing. Development of selection, use and assessment of evaluation procedures for measuring cognitive, affective and psychomotor growth.

171. Audiovisual Communications (2) II. Zilbert
Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Theory and principles of audiovisual communications. Comparison of audiovisual materials such as transparencies, slides, computer-generated graphics, and videos. Operation and use of audiovisual equipment is stressed.

172. Multimedia Productions (3) III. Zilbert
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 recommended. Design and production of educational, technical, and professional multimedia presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics. GE credit: SocSci, Wrt.

190. Seminar in Agricultural Education (2) II. Whent
Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Professional Courses

300. Directed Field Experience in Teaching (2) I, III. Zilbert
Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. (P/NP grading only.)

301. Planning for Instructional Programs (3) II. Zilbert
Lecture—3 hours. Prerequisite: course 100; course 300 (may be taken concurrently). Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and resources.

302. Teaching Methods in Education (3) I. Whent
Lecture—1 hour; discussion—2 hours. Prerequisite: courses 100, 300 and 301. Development of teaching strategies, with special emphasis on the designing of learning experiences, instructional execution, teaching aids.

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) I, III. Whent
Lecture/discussion—2 hours; field work—6 hours. Prerequisite: acceptance into the Teacher Education Program; course 306B (concurrently). Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

306B. Field Experience in Teaching Agriculture (5-18) I, II, III. Whent
Student teaching (corresponds with public school session). Prerequisite: acceptance into the Teacher Education Program; course 306A (concurrently); courses 100, 300, 301, 302. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges. May be repeated for credit up to a maximum of 18 units.

***307. Teaching in Secondary Schools** (5-18) I. The Staff
Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. (Deferred grading only, pending completion of course.)

323. Resource Development: Agricultural Education (3) III. Whent
Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

390. Seminar: Issues in Agricultural Education (2) III. Whent
Discussion/laboratory—4 hours. Prerequisite: acceptance into the Teacher Education Program and courses 306A-306B. Discussion and evaluation of current issues, theories and research in agricultural education. (S/U grading only.)

Agricultural Systems and Environment

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Agronomy and Range Science, Pomology, and Vegetable Crops.

The Major Program

This major is for students who are interested in understanding agricultural systems as they relate to the environment and society. The selected courses provide an interdisciplinary background that encompasses both natural science and social science disciplines. Students will acquire a core understanding of agricultural production systems as managed ecosystems, how they function, how they interact with the natural environment and how they are intimately connected with human society and social changes. In addition, students will develop an area of specialization. Within each of these areas of specialization, students choose between a broad-based education and one focused in selected areas.

The Program. Specialization in Sustainable Production Systems covers food and agricultural production, agroecology, pest ecology and management, crop improvement and propagation. Students may also develop an emphasis in particular production areas such as agronomy, environmental horticulture, pomology, vegetable crops or viticulture. The Range and Natural Resources specialization emphasizes the theory and practice of natural resource management in grazed ecosystems. The Agricultural and Enviromental Education specialization provides preparation in educational foundations, planning and teaching strategies, with development of an agriculture and environment emphasis. Specialization in Agricultural and Environmental Communication and Information offers preparation in agricultural and environmental science, along with in-depth understanding of communication and information management.

All students will gain practical experience through a a combination of internships and practica. Students may also pursue an Honors thesis in their senior year.

Career Alternatives. Graduates from this program will be prepared to pursue a wide range of careers, including various technical and management positions in agricultural and business enterprises; farming; consulting; private, state and federal agencies concerned with rangeland and natural resource management; Cooperative Extension; international development; teaching; agricultural and environmental journalism, information and communication services. Students will also be qualified to pursue graduate studies in the natural and social sciences, such as agroecology, environmental studies, pest management, education, business management.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

Written/Oral Expression 3-12
See college English requirement 7-8
Additional English requirement (English 102 or 104A or 104E).....3-4

Perspectives on Agriculture and the Environment 14
Agriculture, nature and society (Agricultural Systems and the Environment 1) 3
Botany of agricultural plants (Agricultural Systems and the Environment 2) 4
Agriculture and the environment (Agricultural Systems and the Environment 101) 3
Animals and people (Animal Science 1 or 2) 4

Preparatory Subject Matter 41-43
Biological sciences (Biological Sciences 1A-1B) 10
General chemistry (Chemistry 2A-2B) 10
Physics (Physics 1A-1B or Physics 7A-7B; see specializations) 6-8
Mathematics (Mathematics 16A) 3
Computer skills (Agricultural Systems and the Environment 21) 3
Statistics (Agricultural Systems and the Environment 120 or Statistics 13 or 102).....4
Economics (Economics 1A).....5

Breadth/General Education.....18-40
See General Education requirement

Depth Subject Matter 14-15
Crop biology and ecology (Agricultural Systems and the Environment 150 or Plant Biology 117 or 142).....4
Agricultural economics (Agricultural and Resource Economics 113 or 140).....4-5
Agricultural practicum (Agricultural Systems and the Environment 92, 99, 137; Agricultural and Resource Economics 49A, 49B, 49C; Animal Science 49A, 49B, 49C; Applied Biological Systems Technology 16, 49, 52, 145).....3
Internship (Agricultural Systems and the Environment 192, 199).....3

Area of Specialization
Select one of the following areas of specialization.

Sustainable Production Systems 53-57
Includes food and agricultural production, agroecology, crop improvement, propagation, and pest management. Students may choose between a broad education in sustainable agriculture or focus on one or two areas of agriculture (e.g., agricultural management, agronomy, crop improvement, environmental horticulture, pest management, pomology, vegetable crops, viticulture).

Crop biology and ecology depth requirement must be met with Plant Biology 142.
Genetics (Plant Biology 152 or Biological Science 101) 4
Organic chemistry (Chemistry 8A, 8B) 6
Pest management (Agricultural Systems and Environment 105).....3
Soils (Soil Science 100).....4
Agricultural production systems (Agricultural Systems and Environment 107, 110A, 110B, 110C, 112, 134, 135, 150, 160, 170A, 170B; Environmental Horticulture 120, 125, 130, 133; International Agricultural Development 102; Plant Biology 173, 174; Viticulture and Enology 101A, 101B, 101C, 111, 115, 116) 12-16
Restricted elective courses chosen with approval of the academic adviser from the following groups .....(minimum 24 units)
Plant improvement and propagation
(Agricultural Systems and Environment 118; Plant Biology 143, 152, 153, 154, 160, 171)
Plant physiology or plant nutrition
(Environmental Horticulture 102; Plant Biology 111, 146, 157, 158, 172; Viticulture and Enology 110)
Atmospheric, soil or water science
(Atmospheric Science 133; Hydrologic Science 100, 110, 124; Soil Science 107, 109, 111)
Pest ecology and management
(Applied Biological Systems Technology 134; Plant Biology 176, 177; Entomology 110, 135; Nematology 100; Plant Pathology 120; Viticulture and Enology 118)
Agricultural economics
(Agricultural and Resource Economics 101A, 120, 130, 131, 147)
Agricultural management
(Agricultural and Resource Economics 100B, 140, 145, 150, 157; Applied Biological Systems Technology 147; Agricultural Systems and Environment 121; Management 100)
Animal production
(Animal Science 41, 41L, 102, 104)
Policy, social science and ethics
(Agricultural and Resource Economics 147, 176; Agricultural Systems and Environment 121; Economics 123; Environmental Studies 161, 175; Hydrologic Science 150; Plant Pathology 140; Political Science 107)
Unrestricted Electives 0-37
Recommended courses: Mathematics 16B, Physics 5A-5B, Agricultural Biological Technology 49 and courses listed under Plant, Animal and Environmental Sciences.

Range and Natural Resources 54-55
This specialization provides a unified understanding of the interaction between livestock production and environmental quality in rangelands.

Computer and quantitative skills (Agricultural Systems and Environment 121) 4
Statistics (Agricultural Systems and Environment 120, Statistics 13, 100).....4
Soil science (Soil Science 100).....4
Watershed management (Hydrologic Science 141) 4
Wildlife biology (Wildlife, Fish and Conservation Biology 110, 111, 120, 151) 6
Animal Nutrition (Animal Science 41, Nutrition 115) 6
Forage systems (Agricultural Systems and Environment 112) 3
Remote sensing/GIS (Geography 106, Hydrologic Science 186, Applied Biological Systems Technology 180).....3-4
Plant indentification/systematics (Plant Biology 102, Agricultural Systems and Environment 131) 7
Ecology and conservation of rangelands (Agricultural Systems and Environment 130) 3
Comparative ecology of grazing ecosystems (Agricultural Systems and Environment 134) 3
Ecology of grassland and savanna herbivores (Agricultural Systems and Environment 135) 3
Public lands management (Environmental Studies 172) 4
Unrestricted Electives 1-36
Recommended courses: Biological Sciences 1C, Mathematics 16B, Physics 7A-7B, Atmospheric Science 133, Plant Biology 111, Environmental Studies 123, and courses listed under Plant, Animal and Environmental Sciences.

Agricultural and Environmental Education 38-45
This specialization includes preparation in educational foundations, planning and teaching strategies, and development of an agricultural and environmental science emphasis. Along with a broad preparation in the natural sciences, social sciences and agriculture, this specialization prepares the student for entry into the graduate agriculture teaching credential program, for employment in the private sector in areas of training and human resource development, for working in nonformal educational programs involving environmental education, outdoor education, 4-H and other youth organizations, and pursuing further graduate studies in the social or natural sciences.

Soil science (Soil Science 10 or 100) 3-4
Concepts in agricultural and environmental education (Agricultural Education 100)...3
Directed field experience in teaching (Agricultural Education 300) 2
Educational foundations (Education 110 and 120) 8
Planning and teaching strategies (Agricultural Systems and Environment 122 or Education 180; Agricultural Education 171, 301 and 302).....12-13
Agricultural and environmental science emphasis 10-15
Courses to be selected in consultation with academic adviser. Students typically will select one area of agriculture to develop a strength by taking three to four courses. Students pursuing the Graduate Agricultural Teaching Credential Program need at least 10 units of Animal Science, 10 units of Plant and Soil Science, 8 units of Agricultural and Resource Economics, and 8 units of Agricultural Mechanics. See adviser for list of required courses.
Unrestricted Electives 11-52
Recommended courses listed under Plant, Animal and Environmental Sciences.

Agricultural and Environmental Communications and Information Management 43-53
This specialization provides broad preparation in the agricultural and environmental sciences along with in-depth understanding of communications and information management. The option prepares individuals for careers in agricultural and environmental science journalism, newscasting, information services and industrial communications.

Soil science (Soil Science 10 or 100) 3-4
Management of information (Agricultural Systems and Environment 122) 4
Technical writing (English 104A) 4
Upper division internship (Agricultural Education 192) 6-9
Information media (Agricultural Education 171, 172; Rhetoric and Communication 140, 142A, 142B) 12-13
Communications and information transfer (Rhetoric and Communication 130, 136) 4
Agricultural and environmental communications and information emphasis 10-15
Courses to be selected in consultation with academic adviser. Students typically will select one area of agriculture to develop a strength by taking three to four courses.
Unrestricted Electives 3-47
Recommended courses listed under Plant, Animal and Environmental Sciences.

Total Units for the Major 180

Honors. The Senior Honors Thesis (Agricultural and Environmental Sciences 194H) includes two or three successive quarters of guided, scientific and/or scholarly research on an agricultural and/or environmental subject of special interest to the student.

With adviser approval the Senior Thesis can satisfy up to 12 units of restricted electives in the major.

*Course not offered this academic year.

Major Adviser: R. Plant.

Advising Center located in 152 Hunt Hall (916-752-1715).

Minor Program Requirements:

UNITS

Agricultural Systems and Environment.....18

Preparatory material: Statistics 13, 32, Agricultural Systems and Environment 120 or Sociology 42B, or the equivalent.

Select one of the two following tracks:

Sustainable Agriculture track

Agricultural Systems and Environment 105, 150, Plant Biology 142, Soil Science 100 15

Minimum of three units from the following: Agricultural Systems and Environment 107, 110A, 110B, 110C, 112, 170A, 170B.....3

Range and Natural Resources track

Agricultural Systems and Environment 121, 130 7

Minimum of 11 units from the following: Agricultural Systems and Environment 131, 134, 135, 150, Environmental Studies 123, 172.....11

Minor Advisers: R.E. Plant *(Agronomy and Range Science),* K.J. Rice *(Agronomy and Range Science).*

Advising Center is located in 152 Hunt Hall.

Courses in Agricultural Systems and Environment (ASE)

Lower Division Courses

1. Agriculture, Nature and Society (3) I. Gradziel (Pomology)
Lecture—2 hours; discussion/laboratory—1 hour. Multiple perspectives and connections between the natural sciences, social sciences, and agriculture. Emphasis on agriculture's central position between nature and society and its key role in our search for a productive, lasting and hospitable environment. Several full-period field trips provide hands-on learning. Not open for credit to students who have completed Agrarian Studies 2.

2. Botany and Physiology of Cultivated Plants (4) II. Saltveit (Vegetable Crops)
Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: high school course in biology and chemistry recommended. A holistic introduction to the underlying botanical and physiological principles of cultivated plants and their response to the environment. Includes concepts behind plant selection, cultivation, and utilization. Laboratories include discussion and interactive demonstrations.

7. Molecules, Risk and Public Policy (3) II. Phillips
Lecture—3 hours. Natural functions of molecules, their effects on humans, and their regulation through public policy. Students will learn about molecules that are discussed daily in newspapers. GE credit: SciEng, Wrt.

21. Applications of Microcomputers in Agriculture (3) I. Plant; II. Laca; III. The Staff (Agronomy and Range Science)
Lecture—1.5 hours; laboratory/discussion—2 hours; autotutorial—2 hours. Prerequisite: high school algebra. Concepts of computing and applications using personal computers, spreadsheets, database management, word processing and communications. Not open for students who have completed Computer Science Engineering 15, 30, 35 or Engineering 5.

90X. Agricultural Systems and Environment Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

92. Internship (1-12) I, II, III. The Staff (Director in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in all subject areas pertaining to agricultural and environmental sciences. Internship supervised by faculty member in the animal, plant, and environmental sciences. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Primarily intended for lower division students. (P/NP grading only.)

Upper Division Courses

101. Agriculture and the Environment (3) II. Hill (Agronomy and Range Science)
Lecture—2.5 hours; Saturday field trip. Prerequisite: course 22 and consent of instructor. Focus on the interaction between agriculture and environment to address the principles required to analyze conflict and develop solutions to complex problems facing society.

105. Concepts in Pest Management (3) III. Norris (Weed Science Program)
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Biological Sciences 1C or course 2, Chemistry 8B. Introduction to the ecological principles of integrated pest management, biology of different classes of pests and the types of losses they cause, population assessment, evaluation of advantages and disadvantages of different techniques used for pest management, IPM programs.

107. Small Fruit Production (2) II. Shaw (Pomology)
Lecture—2 hours; two field trips arranged at mutual convenience. Prerequisite: Biological Sciences 1C or the equivalent. Strawberries (Fragaria), blackberries-raspberries (Rubus), blueberries-cranberries (Vaccinium) as important nutritional resources; their origin, production and utilization with emphasis on recent progress in integrated management. Offered in alternate years. Not open for credit to students who have taken Pomology 107. (Former course Pomology 107.)

110A. Principles of Agronomic Crop Production in Temperate and Tropical Systems (3) II. Travis, Rains (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: course in general botany and/or course 2. Fundamentals of field crop production in temperate and tropical climates. Resource utilization and economic, political and social problems are considered in relation to technological problems and their influences on agricultural development.

110B. Management of Agronomic Crops in Temperate and Tropical Systems (3) III. Travis, Rains (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: course in general botany and/or course 2; course 110A. Application of agronomic principles in production of temperate and tropical crops. Specific crops discussed with reference to management and efficient use of physical and biological resources.

110C. Crop Management Systems for Vegetable Production (4) I. The Staff (Vegetable Crops)
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 2; course 110A recommended. Horticultural principles applied to production and management systems for vegetable crops. Laboratory and discussion will illustrate efficient field management and resource use practices.

110L. Principles of Agronomy Laboratory (1) III. Travis, Rains (Agronomy and Range Science)
Laboratory—3 hours. Prerequisite: course 110B (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production. Not open for credit to students who have completed Agronomy 100L. (Former course Agronomy 100L.)

***112. Forage Crop Ecology** (3) III. Teuber (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: Biological Sciences 1C or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock. Offered in alternate years. Not open for credit to students who have completed Agronomy 112. (Former course Agronomy 112.)

***118. Seed Production and Quality** (4) III. Bradford (Vegetable Crops)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C; Plant Biology 152 recommended. Principles of crop seed production, storage and utilization. Biological and environmental factors influencing seed quality. Measurement and preservation of seed vigor and viability. Technological aspects of crop establishment from seeds. Laboratories include field trips to seed industry facilities. Offered in alternate years. Not open for credit to students who have completed Vegetable Crops 118. (Former course Vegetable Crops 118.)

120. Applied Statistics in Agricultural Science (4) I. Geng (Agronomy and Range Science)
Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: upper division standing. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical methods. Specialized laboratory sections cover procedures, data processing and interpretations. Not open for credit to students who have completed Agricultural Science and Management 150. GE credit: SciEng.

121. Systems Analysis in Agriculture and Resource Management (4) II. Foin (Agronomy and Range Science)
Lecture—2 hours; discussion/laboratory—2 hours. Prerequisite: course 21 or equivalent computer experience, and Mathematics 16A. The process of systems analysis and dynamic simulation of biological and environmental systems, use of systems analysis for development of optimal management strategies for agricultural and environmental systems. Not open for credit to students who have taken Agricultural Science and Management 121. GE credit: SciEng, Wrt.

***122. Management of Information for the Agricultural and Environmental Sciences** (4) III. Zilbert (Agronomy and Range Science)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 21 or consent of instructor. Introduction to systems and technology for acquiring, storing, manipulating and communicating various types of information including numerical data, text, graphics and multimedia images. Laboratory exercises introduce a wide variety of information management systems used in offices and laboratories. Not open for credit to students who have taken former course 101.

130. Rangelands: Ecology, Conservation and Restoration (3) II. Rice (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: Biological Sciences 1C; introductory ecology course and junior standing recommended. Introduction to the ecological principles and processes important for an understanding of the dynamics of range ecosystems. Emphasis on ecological and evolutionary concepts underlying management strategies for conserving biological diversity and environmental quality in rangelands. Offered in alternate years. GE credit: SciEng, Wrt.

***131. Identification and Ecology of Grasses** (2) III. Rice (Agronomy and Range Science)
Lecture—7.5 hours; laboratory—20 hours; discussion—5 hours (total for course). Prerequisite: Biological Sciences 1C or course 2; Plant Biology 102 and junior standing recommended. Taxonomy and identification of western grasses. Development of skills in using plant identification keys. Ecology and evolution of grasses in grazing ecosystems. Given the week following spring quarter.

***134. Comparative Ecology of Major Rangeland Systems** (3) II. The Staff
Lecture—3 hours; one Saturday field trip required. Prerequisite: course 130 or the equivalent; Environmental Studies 100 recommended. Study of vegetation struc-

ture, composition, and succession in North American rangeland communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of current rangeland management strategies. Offered in alternate years.

***135. Ecology and Community Structure of Grassland and Savannah Herbivores** (3) I. Demment
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B and course 2, or Biological Sciences 1C; general ecology course (Environmental Studies 100) recommended. Feeding ecology of grassland herbivores and its importance in evolution of herbivore communities and social systems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savannah systems. Offered in alternate years. Former course Range Science 135.

137. Field Course in Rangeland Monitoring and Management (2) III. The Staff
Lecture—1 hour; fieldwork—3 hours (week-long intensive field course given the week following spring quarter. Prerequisite: course 2 or the equivalent, Plant Biology 102 and junior standing. Introduction to rangeland vegetation monitoring methods and management strategies. Field sampling of vegetation composition and structure, soil st atus, and wildlife and fish habitat. Grazing management strategies to achieve desired future condition of rangelands.

150. Cropping Systems of the World (4) II. vanKessel (Agronomy and Range Science)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Biological Sciences 1C, and course 22 or Plant Biology 142. World food production systems: concepts and assessment of sustainability; evaluation of methodological approaches to study and improve farming systems; socioeconomic and gender considerations. Examination of case studies from selected annual and perennial cropping systems. One weekend session for simulation game.

160. Agroforestry: Global and Local Perspectives (2) I. Weinbaum
Lecture/discussion—2 hours. Prerequisite: course 2 or Biological Sciences 1C; Plant Biology 142 or a general ecology course (Environmental Studies 100). Explores traditional and evolving use of trees in agricultural ecosystems, their multiple roles in environmental stabilization and the production of food, fuel and fiber, and socioeconomic barriers to adoption. Offered in alternate years. (Same course as International Agricultural Development 160.)

170A. Fruit and Nut Cropping Systems (2) I. McGranahan, Ferguson (Pomology)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, or consent of instructor. Overview of production and handling systems of major pomological crops, analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Offered in alternate years. Not open for credit to students who have completed Pomology 170A. (Former course Pomology 170A.)

170B. Fruit and Nut Cropping Systems (2) III. Gradziel (Pomology)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, or consent of instructor. Overview of production and handling systems of major pomological crops, including analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Offered in alternate years. Not open for credit to students who have completed Pomology 170B. (Former course Pomology 170B.)

188. Undergraduate Research: Proposal (3) III. Bloom, Yoder (Vegetable Crops)
Lecture/discussion—3 hours. Prerequisite: upper division standing and consent of instructor. Through lectures, class discussion and individual mentoring, students will define a problem, identify objectives, conduct a literature survey, generate testable hypotheses, design experiments, plan data analysis, prepare an outline, and write a scientific proposal. (Same course as Plant Biology 188.)

189. Undergraduate Research: Experiment (3) I, II, III. The Staff
Laboratory/discussion—6 hours. Prerequisite: course 188 and consent of instructor. Experimental testing of the hypothesis developed in course 188. May be repeated for a total of 12 units of credit. (P/NP grading only.)

190. Seminar on Alternatives in Agriculture (2) II. Van Horn (Agronomy and Range Science)
Seminar—2 hours. Prerequisite: upper division standing. Seminar on topics related to alternative theories, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. (P/NP grading only.)

191. Current Topics in Agricultural Science Research (1) I. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Introduction to current areas of experimental investigation in the Agricultural and Plant Sciences. Seminar format with short presentations of current directions of research, followed by interactive discussions. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Director in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship on and off campus in agricultural and environmental sciences. (P/NP grading only.)

194H. Senior Honors Thesis (2-6) I, II, III. The Staff
Independent study. Prerequisite: Agricultural Systems and Environment major; senior standing; overall GPA of 3.25 or higher and consent of master adviser. Two or three successive quarters of guided research on an agriculturally related subject of special interest to the student. Not open for credit to students who have completed Agrarian Studies 188H. (P/NP grading only; deferred grading only, pending completion of thesis.)

195. Field Study of Vegetable Industry (1) III. Jackson, Mitchell (Vegetable Crops)
Field Study. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research institutions, farm operations, field stations, Extension Service, marketing, processors, equipment, etc. Given between winter and spring quarters. Considered a spring course for preenrollment. Not open for credit to students who have completed Vegetable Crops 195. (Former course Vegetable Crops 195.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Agronomy

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Agronomy and Range Science.

Major Program. See the major in Agricultural Systems and Environment.

Graduate Study. A program of study is offered leading to the M.S. degree in Agronomy. Information can be obtained in the Advising Office at 132 Hunt Hall. Also see the Graduate Studies section in this catalog.

Graduate Adviser. R. Plant.

Related Courses. Agronomy and Range Science faculty also teach the following courses that contribute to majors and graduate programs in Agriculture Teaching Credential, Agricultural Systems and Environment, Ecology, Genetics, International Agricultural Development, and Plant Biology:

Agricultural Education 100, 160, 163, 171, 172, 190, 300, 301, 302, 306A, 306B, 307, 323, 390, Agricultural Systems and Environment 21, 101, 110A, 110B, 110L, 112, 120, 121, 122, 130, 131, 134, 135, 137, 150, 190, Ecology 206, 207, Genetics 201A, 201B, International Agricultural Development 200, Plant Biology Graduate Group 220, Plant Biology 116, 142, 143, 146, 152, 161A, 161B.

Courses in Agronomy (AGR)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 152 Hunt Hall.

Lower Division Course

92. Agronomy Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

192. Internship (1-12) I, II, III. summer. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

197T. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student will assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 6 upper division units of agronomy. (P/NP grading only.)

Graduate Courses

205. Experimental Design and Analysis (4) II. Dubcovsky
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 120 or the equivalent. Graduate students in agricultural and environmental sciences will be introduced to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed course 205A. (Former course 205A.)

206. Multivariate Systems and Modeling (4) III. Laca
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 120 or the equivalent. Graduate students in the biological and environmental sciences will be presented multiple regression, multivariate and computer modeling methods needed to conduct research experiments and analyze multivariate data systems. Not open for credit to students who have completed course 205B. (Former course 205B.)

***207. Plant Population Biology** (3) II. Rice
Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Evolution and Ecology 125, Plant Biology 117, or Entomology 104); an advanced undergraduate course in genetics and/or evolution (e.g., Biological Scienes 101 or Evolution and Ecology 100). Provides entry-level graduate students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Ecology 207.)

*Course not offered this academic year.

211. Principles and Practices of HPLC (2) III. Goyal
Lecture—1 hour; laboratory—3 hours. Prerequisite: undergraduate physics and chemistry; Biological Sciences 102, 103 recommended. Principles and theory of HPLC involving various modes of separation and detection. Optimization of separation using isocratic and gradient elution. Develop practical knowledge about the use, maintenance and troubleshooting of HPLC equipment, including HPLC columns. Development of new HPLC methods.

221. Advanced Plant Breeding (4) III. Teuber
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 205; Genetics Graduate Group 201D or Animal Genetics 107; Plant Science 113. Philosophy, methods, and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data. Offered in alternate years.

***224. Chromosome Evolution** (3) I. Dvorak
Lecture—3 hours. Prerequisite: Genetics 201A and 201B or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in alternate years.

290. Seminar in Crop Growth, Production and Utilization (1-2) I. The Staff
Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of cultivated food, feed and fiber crops.

291. Seminar in Plant Breeding and Evolution of Cultivated Plants (1-2) III. Dvorák
Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins and evolution of cultivated plants.

297T. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: graduate standing; consent of instructor; and course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated for credit for a total of 5 units. Same course may not be tutored more than one time. (S/U grading only.)

298. Group Study
(1-5) I, II, III. The Staff (Chairperson in charge.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Agronomy and Range Science

(College of Agricultural and Environmental Sciences)

James E. Hill, Ph.D., Chairperson of the Department

Department Office, 133 Hunt Hall (916-752-1703)

Faculty

Montague W. Demment, Ph.D., Professor
R. Ford Denison, Ph.D., Associate Professor
Jorge Dubcovsky, Ph.D., Assistant Professor
Jan Dvorak, Ph.D., Professor
Shu Geng, Ph.D., Professor
Melvin R. George, Ph.D., Lecturer
Paul L. Gepts, Ph.D., Professor
Sham S. Goyal, Ph.D., Lecturer
Leland F. Jackson, Ph.D., Lecturer
Judy A. Jernstedt, Ph.D., Associate Professor
Stephen R. Kaffka, Ph.D., Lecturer
Emilio A. Laca, Ph.D., Assistant Professor
William C. Liebhardt, Ph.D., Lecturer
John W. Menke, Ph.D., Lecturer
Donald A. Phillips, Ph.D., Professor
Richard E. Plant, Ph.D., Professor
Daniel H. Putnam, Ph.D., Lecturer
D. William Rains, Ph.D., Professor
Kevin J. Rice, Ph.D., Associate Professor
Kenneth W. Tate, Ph.D., Lecturer
Steven R. Temple, Ph.D., Lecturer
Larry R. Teuber, Ph.D., Professor
Robert L. Travis, Ph.D., Professor
Chris vanKessel, Ph.D., Professor
Thea A. Wilkins, Ph.D., Associate Professor

Emeriti Faculty

Robert W. Allard, Ph.D., Professor Emeritus
R. William Breidenbach, Ph.D., Lecturer Emeritus
Ivan W. Buddenhagen, Ph.D., Professor Emeritus
William J. Clawson, M.S., Lecturer Emeritus
Beecher Crampton, M.S., Lecturer Emeritus
Ray C. Huffaker, Ph.D., Professor Emeritus
Subodh K. Jain, Ph.D., Professor Emeritus
Milton B. Jones, Ph.D., Lecturer Emeritus
Horton M. Laude, Ph.D., Professor Emeritus
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Loomis, Ph.D., Professor Emeritus
Vernon L. Marble, Ph.D., Lecturer Emeritus
Duane S. Mikkelsen, Ph.D., Professor Emeritus
Maurice L. Peterson, Ph.D., Professor Emeritus
Y. P. Puri, Ph.D., Lecturer Emeritus
Calvin O. Qualset, Ph.D., Professor Emeritus
Charles A. Raguse, Ph.D., Professor Emeritus
Charles W. Schaller, Ph.D., Professor Emeritus
Raymond C. Valentine, Ph.D., Professor Emeritus
Barbara D. Webster, Ph.D., Professor Emeritus
William A. Williams, Ph.D., Professor Emeritus

Affiliated Faculty

Mark Van Horn, M.S., Lecturer
Linda S. Whent, Ph.D., Lecturer, Supervisor of Teacher Education
Eric E. Zilbert, Ph.D., Lecturer

Courses. See the Agricultural Systems and Environment, Agricultural Education, Agronomy, Plant Biology, and the Range Science course listings.

American Studies

(College of Letters and Science)

Patrica Turner, Ph.D., Program Director

Program Office, 2201 Hart Hall (916-752-3377)

Committee in Charge

Clarence Walker, Ph.D. *(History),* Chairperson
Carole Blair, Ph.D. *(Rhetoric and Communication)*
Ruth Frankenberg, Ph.D. *(American Studies)*
Rosa Linda Fregoso, Ph.D. *(Women's Studies)*
Jay Mechling, Ph.D. *(American Studies)*
Judith Newton, Ph.D. *(Women's Studies)*
Kent Ono, Ph.D. *(American Studies, Asian American Studies)*
Patricia Turner, Ph.D. *(African American and African Studies, American Studies)*
John Wagner, Ph.D. *(Education)*
David Scofield Wilson, Ph.D. *(American Studies)*

Faculty

Carole Blair, Ph.D., Associate Professor
Ruth Frankenberg, Ph.D., Associate Professor
Jay Mechling, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Kent Ono, Ph.D., Assistant Professor
Eric Schroeder, Ph.D., Lecturer
Patricia Turner, Ph.D., Associate Professor

Emeriti Faculty

David Scofield Wilson, Ph.D., Senior Lecturer Emeritus

The Major Program

American Studies offers an alternative approach to the study of American experience for students who feel too limited by departmental approaches. Lower division, introductory classes explore the ways in which cultural systems shape and reflect life in the United States. These classes pay close attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and sexual orientation unevenly affect American lives.

The Program. American Studies majors take five upper division, in-depth classes (see below) and participate in three smaller proseminars limited to majors and devoted to close study of major thinkers and of issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to emphasize a period, a problem, or a subject tailored to his or her own individual education goals. Students have the option of writing a senior thesis within this emphasis.

Career Alternatives. As an interdisciplinary program, American Studies provides a good liberal arts and sciences undergraduate education. American Studies maximizes a student's contact with a variety of subject matter and approaches. This flexibility has meant that our graduates have been able to move into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, teaching, environmental planning, library science, museum curatorship, and business. Some students discover new career possibilities through their internships in American institutions.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24
One course from American Studies 1 series...4
One course from African American and African Studies 10, Asian American Studies 1, Chicana/o Studies 10 or 20, Native American Studies 10, or Women's Studies 50 4
Two courses chosen from History 17A, 17B, 72A, 72B 8
One course chosen from English 30A, 30B ...4
One course chosen from Anthropology 2, Sociology 2 4

Depth Subject Matter 46
American Studies 110, 120, and 130.....12
American Cultural Themes, choose any two courses from the 150 series.....8
Three Junior Proseminars (American Studies 180) 6
Emphasis.....20
In consultation with an American Studies adviser, the student designs a program of 20 units of upper division course work around a unifying theme, period, or subject matter in American civilization. The course work should come from at least two disciplines. The student may choose the **senior thesis option** (190A-190B) for 8 of these 20 units.

Total Units for the Major 70

Recommended
Completion of the College requirement in English composition before enrollment in American Studies 190A.

Minor Program Requirements:

UNITS

American Studies.....20
American Studies, upper division courses...20
No more than 8 units of course 192 may be counted toward this total.

Faculty Advisers. C. Blair, R. Frankenberg, J. Mechling, K. Ono.

Teaching Credential Subject Representative. J. Mechling. See also the Teacher Education Program.

Courses in American Studies (AMS)

Lower Division Courses

1A. Technology, Science, and American Culture (4) III. Mechling
Lecture—3 hours; discussion—1 hour. American science and technology as cultural systems, mutual influ-

ence and interaction of those systems with other cultural systems, including religion, social thought, art, architecture, literature, music, and common sense. GE credit: ArtHum or SocSci, Div, Wrt.

1B. Religion in American Lives (4) I. Frankenberg
Lecture—2 hours; discussion—1 hour; tutorials and field exercises. Examines ways Americans have ordered their lives with religion; how latter-day churches, imported faiths, and Indian cultures differ or converge; attention to "civil religion" and mass-media evangelism; genres of religious experience, such as testimony, song, dance, ritual, meditation, vision, trance. GE credit: ArtHum or SocSci, Div, Wrt.

***1C. American Lives through Autobiography** (4) III. Frankenberg
Lecture—2 hours; discussion—2 hours. American culture as understood through the individual life stories told by Americans, with attention to the roles of gender, race, ethnicity, social class, and sexual orientation in the individual's life course. GE credit: ArtHum or SocSci, Div, Wrt.

***1E. Nature and Culture in America** (4) III. The Staff
Lecture—3 hours; fieldwork—3 hours. Uses and abuses of nature in America; patterns of inhabitation, exploitation, appreciation, and neglect; attention to California; emphasis on metaphor as a key to understanding ourselves and the natural world; attention to models of healing: stewardship, ecology, the "rights" movement. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.

***1F. The Popular Image of Women in America** (4) II. Blair
Lecture—2 hours; discussion—1 hour; directed analysis of popular media. Lecture; media exposure; special projects. Examines the image of women as presented in popular media. Emphasis on the politics of gender roles and the connection between the popular feminine image and the demands of the larger American culture.

***2. Forms of American Wisdom** (2) III. Mechling
Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America: folk knowledge, popular belief, prophetic wisdom, public religion, common sense, science, literature; special attention to the grounding of wisdom in circumstance of race, gender, generation, ethnic identity, and region. (P/NP grading only.)

***4. Freshman Seminar** (2) II, III. The Staff (Program Director in charge)
Seminar—2 hours. Prerequisite: open only to students who have completed fewer than 40 quarter units. Investigation of a special topic in American Studies through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits). Emphasis on student participation in learning. Limited enrollment.

30. Images of America and Americans in Popular Culture (4) I. Blair
Lecture—3 hours; discussion—1 hour. Investigation of verbal and visual discourses about American identity in various popular culture products, including film, television, radio, music, fiction, art, advertising, and commercial experiences; discourses about the United States in the popular culture of other societies. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in Charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

***101A-H. Special Topics** (4) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours, intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for nonmajors as well as majors. Content will vary according to the instructor and in accord with the following titles: **(A)** Popular Culture Studies; **(B)** Women's Studies; **(C)** Material Aspects of American Culture; **(D)** American National Character; **(E)** American Lives Through Autobiography; **(F)** The Interrelationship Between Arts and Ideas; **(G)** New Directions in American Culture Studies; **(H)** Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area only.

***110. A Decade in American Civilization** (4) I. Schroeder
Lecture—2 hours; discussion—2 hours. Prerequisite: one of courses 1A, 1B, 1C, 1D, 1E or 1F. Close examination of a single decade in American civilization; the connections between the history, literature, arts, customs, and ideas of Americans living in the decade. GE credit: ArtHum or SocSci, Div, Wrt.

111. Theories and Practices of Everyday Life in the United States (4) I. Ono
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status; preparatory courses for the American Studies major or the equivalent interdisciplinary experience. Introduction to the cultural studies theories and to critical practices that seek to understand everyday life in the United States, with special attention to uncovering the vernacular theories governing these practices.

115. Living in Bodies: Body Politics in the United States (4) I. Frankenberg
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status; preparatory courses for the American Studies major or the equivalent interdisciplinary experience. Examination of human bodies as sites for cultural constructions of identities and "selves" in the United States; attention to bodily norms, crises, and transgressions; the relation between disciplining the body and controlling social categories, including race, gender, class and sexualities.

120. American Folklore and Folklife (4) I. Mechling
Lecture—3 hours; fieldwork—1 hour. Theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture; the uses and meanings of those traditions in various folk communities, including families, ethnic institutions, voluntary organizations, and occupational groups GE credit: ArtHum or SocSci, Div, Wrt.

***125. Corporate Cultures** (4) III. The Staff
Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: one course chosen from course 120, Anthropology 2, Psychology 16, or Sociology 1; or consent of instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with foreign corporations.

***130. American Popular Culture** (4) II. The Staff
Lecture/discussion—3 hours; fieldwork—1 hour. Prerequisite: course 1 or upper division standing. American popular expression and experience as a cultural system, and the relationship between this system and elite and folk cultures. Exploration of theories and methods for discovering and interpreting patterns of meaning in American popular culture. GE credit: ArtHum or SocSci, Div, Wrt.

151. American Landscapes and Places (4) II. Blair
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 1, upper division standing. Comparative study of several American cultural populations inhabiting a region, including their relationship to a shared biological, physical, and social environment, their intercultural relations, and their relationships to the dominant American popular and elite culture and folk traditions. GE credit: ArtHum or SocSci, Div, Wrt.

152. The Lives of Children in America (4) III. Mechling
Lecture—2 hours; discussion—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches. GE credit: ArtHum or SocSci, Div, Wrt.

***153. The Individual and Community in America** (4) II. Frankenberg
Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought. GE credit: ArtHum or SocSci, Div, Wrt.

***154. The Lives of Men in America** (4) III. Mechling
Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of the lives of boys and men in America, toward understanding cultural definitions of masculinity, the ways individuals have accepted or resisted these definitions, and the broader consequences of the struggle over the social construction of gender. GE credit: ArtHum or SocSci, Div, Wrt.

155. Symbols and Rituals in American Life (4) I. Blair
Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Interdisciplinary examination of selected, richly expressive events (parades, festivals, holidays) and symbols (flags, memorials, temples) which encode nationwide values and understandings (Thanksgiving, New Year's, etc.) or which realize more limited, special meanings (Mardi Gras, rodeo, Kwanza, graduation, bar mitzvah, etc.). Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.

156. Race, Culture and Society in the United States (4) II. Frankenberg
Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Interdisciplinary examination of the significance of race in the making of America; how race shapes culture, identities and social processes in the United States; the interweaving of race with gender, class and nationhood in self and community. GE credit: ArtHum or SocSci, Div, Wrt.

160. Undergraduate Seminar in American Studies (4) II, III. Mechling, Frankenberg
Seminar—3 hours; term paper. Prerequisite: open to junior and senior American Studies majors only. Intensive reading, discussion, research, and writing by small groups in selected topics of American Studies scholarship; emphasis on theory and its application to American material. Limited enrollment. May be repeated once for credit when content differs.

***180. Junior Proseminar** (2) I, II, III. Mechling, Turner, Frankenberg
Discussion—2 hours. Prerequisite: junior standing in American Studies major. A small-group, intensive study of works frequently cited in American Studies scholarship; emphasis on theory and its application to American materials. May be repeated for credit with consent of instructor.

190A-190B. Senior Thesis (4-4) I, II, III. Mechling, Turner, Frankenberg, Blair, Ono
Seminar—2 hours; independent study—2 hours. Prerequisite: senior standing in American Studies major. In consultation with adviser, student contracts to write an extended research paper on a topic mutually agreed upon and enunciated in a prospectus reviewed and accepted by faculty. (Deferred grading only, pending completion of sequence.)

192. Internship in American Institutions (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—1-12 hours. Prerequisite: enrollment dependent on availability of intern positions, with priority to American Studies majors. Supervised internship and study within and about key organizations in American civilization at archives, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant observation and the collection of ethnographical data. May be repeated for credit for a total of 12 units. (P/ NP grading only.)

197T. Tutoring in American Studies (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—1-5 hours. Prerequisite: consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge; reports and readings. May be repeated

*Course not offered this academic year.

for credit when the tutoring is for a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Chairperson of American Studies Program. (P/NP grading only)

Graduate Courses

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Anatomy

See Anatomy, Physiology and Cell Biology (below); and Cell Biology and Human Anatomy (Medicine, School of)

Anatomy, Physiology, and Cell Biology

(School of Veterinary Medicine)

Charles G. Plopper, Ph.D., Acting Chairperson of the Department

Department Office, 1321 Haring Hall (916-752-1174)

Faculty

Hilary P. Benton, Ph.D., Assistant Professor
Michael L. Bruss, D.V.M., Ph.D., Professor
Sharon L. Cummings, Ph. D., Assistant Professor
Leslie J. Faulkin, Jr., Ph.D., Professor
Dorothy W. Gietzen, Ph.D., Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
David E. Hinton, Ph.D., Professor
Dallas M. Hyde, Ph.D., Professor
Janine B. Kasper, D.V.M., Lecturer
K. C. Kent Lloyd, D.V.M., Ph.D., Associate Professor
Kent Pinkerton, Ph.D., Associate Professor in Residence
Charles G. Plopper, Ph.D., Professor
Susan M. Stover, D.V.M., Ph.D., Associate Professor
Fern Tablin, V.M.D., Ph.D., Associate Professor
Reen Wu, Ph.D., Professor in Residence

Emeriti Faculty

George H. Cardinet III, D.V.M., Ph.D., Professor Emeritus
Donald L. Curry, Ph.D., Professor Emeritus
Alfred A. Heusner, Docteur-es-Sciences, Professor Emeritus
Ralph L. Kitchell, D.V.M., Ph.D., V.M.D. (hc), Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Walter S. Tyler, D.V.M., Ph.D., Professor Emeritus

Affiliated Faculty

Howard C. Bailey, Ph.D., Assistant Adjunct Professor
Jeffrey M. Cheek, Ph.D., Assistant Research Toxicologist
Mary Anne Hickman, D.V.M., Ph.D., Research Associate
Edward S. Schelegle, Ph.D., Assistant Research Physiologist
William Thurlbeck, M.D., Adjunct Professor
Barbara Washburn, Ph.D., Research Associate

Courses in Anatomy, Physiology, and Cell Biology (APC)

Upper Division Courses

100. Comparative Organology of Vertebrates (4) II. Plopper
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1B. Integrative study of the organization of cells and tissues into organs and organ systems in vertebrates. The following organ systems will be compared between fish, birds, and mammals: musculoskeletal, gastrointestinal, cardiovascular, respiratory, integumentary, urinary, reproductive, and nervous.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

202. Organology (2) II. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite; course 100 or the equivalent and consent of instructor. Comparative development, growth patterns, and composition of selected organs: liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in alternate years.

205. Ultramicroscopic Anatomy (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: histology. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in alternate years.

207. Perspectives in Morphological Research (3) III. The Staff (Wu, Tablin in charge)
Lecture—2 hours; discussion—1 hour. Consideration of the principles and applications of modern morphological methods and their role in biomedical research. Examples of specific methods include stereology, computer analysis of images, scanning and transmission electron microscopy, histochemistry, autoradiography, rapid freezing, and vascular injections. Offered in alternate years.

215. Veterinary Histology (6) II. The Staff (Chairperson in charge)
Lecture—3 hours; laboratory—9 hours. Prerequisite: Biological Sciences 1B. The microscopic anatomy of tissues and organs of mammalian and avian species of veterinary significance.

220. Physiology and Pathophysiology of the Liver (3) I. Bruss
Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: systemic physiology; biochemistry or physiological chemistry. Topics in functional morphology, physiology, intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxin metabolism; circulation; carbohydrate, lipid and protein metabolism; trace minerals; basic pathological processes; and function tests. (Same course as 420.)

230. The Secretory Process (2) I. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and intracellular events involved in secretion with emphasis on physiological initiators and modifiers. All secretory systems, but emphasis on the beta cell of the endocrine pancreas as role model. Offered in alternate years.

283. Tumor Biology (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Growth, invasion and metastasis of tumors; mechanisms of carcinogenesis; intrinsic and extrinsic etiologic factors. Offered in alternate years.

284. Ruminant Nutrition and Physiology (3) III. Bruss, Morris
Lecture—2.7 hours, laboratory—0.9 hours. Prerequisite: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division systemic physiology (e.g., Neurobiology, Physiology and Behavior 110), Biochemistry (e.g., Biological Sciences 102 and 103) or the equivalent. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants. (Same as course 484.)

285. Morphometry of Cells, Tissues and Organs (2) III. Hyde
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent, and Statistics 13. At the end of the course, students will be able to define what critical data need to be collected to estimate volumes, surfaces and lengths of organs and their components (e.g., vessels, ducts and airways). Students will also learn how to estimate the number of cells in an organ or tissue, their volumes, products and gene expression using morphometry. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)

291. Topics in Biology of Respiratory System (1) I, II, III. Hyde, Plopper, Wu, Pinkerton
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.)

292. Topics in Neuroscience Research (1) III. Cummings
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate rationale, methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neuroendocrinology, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-15 hours. Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-36 hours. Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

397T. Tutoring in Veterinary Anatomy, Physiology and Cell Biology (1-5) I, II, III. The Staff
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

Professional Courses

410. Equine Locomotor Anatomy (2) III. Stover
Lecture—10 sessions; laboratory—10 sessions. Prerequisite: Veterinary Medicine 401 with a grade of C– or better. Normal anatomy of the equine fore and hind limb bones, joints, muscles, ligaments, tendons, nerves and vessels with emphasis on clinically applicable structures.

420. Physiology and Pathophysiology of the Liver (3) I. Bruss
Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: systemic physiology; biochemistry or physiological chemistry. Topics in functional morphology, physiology, intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxin metabolism; circulation; carbohydrate, lipid and protein

metabolism; trace minerals; basic pathological processes; and function tests. (Same course as 220.)

443. Behavior Clinic (1-2) I, II, III. Hart
Clinical activity—2-4 hours. Prerequisite: first-year standing in the School of Veterinary Medicine, course 458 and consent of instructor. Clinical training in behavioral therapy. Students work with clients and animal patients through the Behavioral Service Outpatient Clinic. Case record work-ups with selected presentations of cases during discussion sessions. May be repeated for credit. (S/U grading only.)

458. Behavioral Therapy (1) II. Hart
Lecture—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Clinical application of management, conditioning procedures, hormonal manipulation and drug therapy to resolve common behavioral problems of dogs and cats.

484. Ruminant Nutrition and Physiology (3) III. Bruss, Morris
Lecture—2.7 hours, laboratory—0.9 hours. Prerequisite: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division systemic physiology (e.g., Neurobiology, Physiology and Behavior 110), biochemistry (e.g., Biological Sciences 102 and 103) or the equivalent. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants. (Same as course 284.)

Anesthesiology

See Medicine, School of

Animal Behavior (A Graduate Group)

Alexander H. Harcourt, Ph.D., Interim Chairperson of the Group

Group Office, Center for Animal Behavior (916-752-4863; Fax: 916-752-8391; e-mail: jmtrevitt@ucdavis.edu)

Faculty. The Group includes faculty from eleven departments in three schools and colleges.

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program that trains students for teaching and research in a variety of areas, including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students choose one of the four areas of specialization: (1) ethology and evolutionary bases of animal behavior, (2) physiological basis of animal behavior, and (3) behavior and conservation of wild animals, and (4) behavior and management of domestic animals. All four specializations emphasize the adaptive and evolutionary bases of animal behavior. Resources available to students, in addition to various departmental facilities, include those of the California Regional Primate Research Center, Bodega Bay Marine Biology Laboratory, and the Agricultural Field Stations.

There is an early application deadline of January 15 for fall quarter.

Preparation. Appropriate preparation is a bachelor's or master's degree in one of the several disciplines relevant to behavior, such as psychology, zoology, entomology, anthropology, physiology, wildlife biology, ecology, animal science, veterinary medicine, genetics, or animal behavior. In addition, at least one course from each of the following four areas must be taken before admission into the program or before the end of the first year in the program.

General genetics: Genetics 100 or the equivalent
Statistics: Statistics 102 or Psychology 103, or the equivalent
Evolution: Genetics 103 or Evolution and Ecology 100, or the equivalent
Animal behavior: Psychology 150, Wildlife, Fish and Conservation Biology 140, or Neurobiology, Physiology and Behavior 155, or the equivalent

Students are encouraged to engage in some form of research as early as possible during the first year. This pre-dissertation research may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.

Breadth Requirement. The following core courses or the equivalent (22 to 24 units) are required of all students.

Systemic physiology: Neurobiology, Physiology and Behavior 110 or 142
Statistical analysis: one course from Psychology 206, 207, Statistics 106, or 110
Scientific approaches to animal behavior research: Animal Behavior 201
Seminar in animal behavior: Animal Behavior 290
Ecology: Entomology 104, Environmental Studies 100, or Evolution and Ecology 101
College teaching: Biological Sciences 310 or Psychology 390
Comparative psychology: Psychology 250

Specialization. In addition to the requirements listed above, students must also take courses in one of the three areas of specialization with substitution as approved by the adviser.

Courses in Animal Behavior (ANB)

Graduate Courses

201. Scientific Approaches to Animal Behavior Research (3) I. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Philosophical issues, goals, strategies and tools in field and laboratory research. May be repeated for credit when topics differ.

220. Behavioral Aspects of Animal Domestication (3) III. Price (Animal Science)
Lecture—3 hours. Prerequisite: graduate standing and a course in animal behavior, or consent of instructor. History of animal domestication, the role of natural and artificial selection in domestication, the influence of environment and experience on domestic animal behavior and human-animal interrelations. Offered in alternate years.

230A. Interdisciplinary Approaches to Animal Behavior (3) II. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Analysis of literature in behavior and an allied discipline or disciplines that offer the potential, in combination, to advance the understanding of a topic in animal behavior conceptually and empirically. Topics will vary from year to year.

230B. Interdisciplinary Approaches to Animal Behavior (5) III. The Staff
Workshop—4 days total; discussion—3 hours; term paper. Prerequisite: course 230A the previous quarter. Development of an empirical or theoretical interdisciplinary approach to research on a current topic in animal behavior.

270. Research Conference in Behavioral Ecology (1) I, II, III. Eadie, Page, Caro, Borgerhoff Mulder, Stamps
Conference—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of current literature and ongoing research in behavioral ecology. Limited enrollment. May be repeated for credit. (S/U grading only.)

290. Seminar in Animal Behavior (1-3) I, II, III. The Staff
Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: graduate standing and consent of instructor.

299. Research (1-12) I, II, III. The Staff
Prerequisite: and consent of instructor. (S/U grading only.)

*Course not offered this academic year.

Animal Biology

(College of Agricultural and Environmental Sciences)

Faculty

Faculty includes members of the Departments of Animal Science; Avian Sciences; Biological and Agricultural Engineering; Entomology; Nematology; and Wildlife, Fish, and Conservation Biology.

The Major Program

This major will open for enrollment in 1998-1999.

The Animal Biology Major offers students training in the biological and natural sciences as they apply to animals. The major covers the basic biological sciences that explain animal evolution, systematics, ecology, physiology and molecular biology. Emphasis is on the application of these biological principals in solving societal problems associated with animals in agriculture, urban areas or natural environments.

The Program. The Animal Biology major consists of core courses in the basic biological sciences that build an understanding of animal biology from the molecular to the ecological and evolutionary levels of organizational. After completing these core courses, students have the option of specializing in various interdisciplinary aspects of animal biology. In consultation with their adviser, they plan their chosen emphasis of study. This program includes a senior thesis, which the student designs to bridge the disciplines of the major.

Internships and Career Alternatives. The Animal Biology major offers a wide range of internship opportunities for study both on campus and off campus at field stations and with government agencies, private industry and international programs. A degree in Animal Biology prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, pest management, agriculture, conservation, environmental management, and industry. Students in the major will gain research experience and may choose to continue their training at the graduate level in a variety of biological disciplines.

B. S. Major Requirements

UNITS

English Composition Requirement 8
See College requirement

Preparatory Subject Matter 69-71
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C, 8A-8B or 118A-118B 21-23
Mathematics 16A-16B-16C 9
Physics 7A-7B-7C 12
Statistics 13 or 100 or 102 or Agricultural Systems and Environment 120 4
Animal Biology (courses under development) 8

Breadth/General Education 6-24

Depth Subject Matter 57-60
Molecular core: Biological Sciences 101, 102, 103 or the equivalent 10
Physiological core 6-9
Physiology: Neurobiology, Physiology and Behavior 101 or 117 or Entomology 102 or Wildlife, Fish and Conservation Biology 121
Anatomy: Anatomy, Physiology and Cell Biology 100 or Entomology 101
Evolution/ecology: Evolution and Ecology 100 or 101 or Environmental Studies 121 and a course in population genetics 8
Major proposal, Animal Biology (course under development) 2

Restricted Electives 25
(Focused specialty as outlined in the student's proposal with approval of an advisor; 18 units must be in Divisional courses)

Senior Practicum, Animal Biology (courses under development) 6

Unrestricted Electives 17-40

Total Units for the Major 180

Advising. For information about the major, contact G.P. Moberg, Dean's Office, 234 Mrak Hall (916-752-0233).

Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Animal Science.

Major Program. See the major in Animal Science.

Related Courses. See Agronomy 221, 224; Plant Pathology 215X; Plant Biology 154; Vegetable Crops 220.

Courses in Animal Genetics (ANG)

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 1202 Meyer Hall (916-752-6118).

Upper Division Courses

101. Animal Cytogenetics (2) I. Delany
Laboratory/discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 101, 102. Principles and techniques of cytogenetics applied to animal systems; chromosome harvest techniques, analysis of mitosis and meiosis, karyotyping, chromosome banding, cytogenetic mapping, chromosome structure and function, comparative cytogenetics.

107. Genetics and Animal Breeding (5) III. Medrano
Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101. Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices.

108. Methods in Quantitative Animal Breeding (3) II. Famula
Lecture—3 hours. Prerequisite: course 107. Methods and procedures in quantitative animal breeding, including: expected value, single and multiple trait selection index, restricted selection, embedded traits, categorical traits, and best linear unbiased prediction.

109. Introduction to Parameter Estimation (1) II. Famula
Lecture—1 hour. Prerequisite: course 107 or the equivalent; course 108 recommended. Procedures for estimation of repeatability, heritability, and genetic and environmental correlations. Concept of expected value, estimation of variance components and the simulation of biological data.

111. Molecular Biology Laboratory Techniques (4) II. Murray, Oberbauer
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Biological Sciences 101, 102, 103. Introduction to the concepts and techniques used in molecular biology; the role of this technology in both basic and applied animal research, and participation in laboratories using some of the most common techniques in molecular biology.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

***204. Theory of Quantitative Genetics** (3) I. Gall
Lecture—3 hours. Prerequisite: course 107 or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Offered in alternate years.

206. Advanced Domestic Animal Breeding (3) III. Famula
Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; course 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and multiple traits. Methods of estimating genetic trends. Offered in alternate years.

208. Estimation of Genetic Parameters (3) III. The Staff (Animal Science)
Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection.

211. Genetic Engineering of Animals (2) III. Murray
Lecture—1 hour; lecture/discussion—1 hour. Review of techniques for the genetic engineering of animals and their limitations and applications. Student-led discussions of recent papers in the field and possible future applications of genetically engineered animals in basic research and applied agricultural and medical research. Offered in alternate years. (S/U grading only.)

***212. Sequence Analysis in Molecular Genetics** (2) II. Medrano
Lecture/laboratory—2 hours. Prerequisite: Genetics 201A, 201B, 201C, or the equivalents. The use of computer algorithms and on-line databases to analyze nucleic acid and protein sequences in molecular genetics research. Offered in alternate years. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.)

299. Research in Animal Genetics (1-12) I, II, III. The Staff (Bradford in charge)
(S/U grading only.)

Animal Physiology

See Animal Biology; Animal Science (below); Biological Sciences—Neurobiology, Physiology and Behavior; and Physiology (A Graduate Group)

Animal Science

(College of Agricultural and Environmental Sciences)

Edward O. Price, Ph.D., Chairperson of the Department

James D. Murray, Ph.D., Vice Chairperson of the Department

Department Office, 2223 Meyer Hall (916-752-1250)

Undergraduate Advising, 1202 Meyer Hall (916-752-6118)

Graduate Advising, 1202 Meyer Hall (916-752-2382)

Bodega Marine Laboratory (BML)
Bodega Bay, CA (707-875-2211)

Faculty

Thomas E. Adams, Ph.D., Professor
Gary B. Anderson, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
R. Leland Baldwin, Jr., Ph.D., Sesnon Professor of Animal Science
Patricia J. Berger, Ph.D., Professor
C. Christopher Calvert, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor *(Biological Sciences, Bodega Marine Laboratory)*
Douglas E. Conklin, Ph.D., Associate Professor
Mary E. Delany, Ph.D., Assistant Professor
Edward J. DePeters, Ph.D., Professor
Serge Doroshov, Ph.D., Professor
James G. Fadel, Ph.D., Associate Professor
Thomas R. Famula, Ph.D., Professor
Graham A. E. Gall, Ph.D., Professor
Silas S. O. Hung, Ph.D., Professor
Yu-Bang Lee, Ph.D., Professor
Juan F. Medrano, Ph.D., Associate Professor
Joy A. Mench, Ph.D., Professor
Gary P. Moberg, Ph.D., Professor
James D. Murray, Ph.D., Professor
Anita M. Oberbauer, Ph.D., Associate Professor
Edward O. Price, Ph.D., Professor
Janet F. Roser, Ph.D., Associate Professor
Roberto D. Sainz, Ph.D., Assistant Professor
Richard A. Zinn, Ph.D., Professor

Emeriti Faculty

C. Robert Ashmore, Ph.D., Professor Emeritus
G. Eric Bradford, Ph.D., Professor Emeritus
Floyd D. Carroll, Ph.D., Professor Emeritus
Wallis H. Clark, Jr., Ph.D., Professor Emeritus
Perry T. Cupps, Ph.D., Professor Emeritus
William N. Garrett, Ph.D., Professor Emeritus
Robert C. Laben, Ph.D., Professor Emeritus
Glen P. Lofgreen, Ph.D., Professor Emeritus
James H. Meyer, Ph.D., Professor Emeritus, Chancellor Emeritus
Wade C. Rollins, Ph.D., Professor Emeritus
Robert W. Touchberry, Ph.D., Professor Emeritus
William C. Weir, Ph.D., Professor Emeritus

Affiliated Faculty

Fred S. Conte, Ph.D., Lecturer
Ian Garnett, Ph.D., Senior Lecturer
Dennis Hedgecock, Ph.D., Lecturer *(Bodega Marine Laboratory)*
James W Oltjen, Ph.D., Lecturer
Dana Van Liew, Lecturer

The Major Program

The Animal Science major develops skills and knowledge in the sciences central to understanding the biological function of domestic animals, their care, management, and utilization by people for food, fiber, companionship and recreation. Animals have always occupied a traditional place in human societies. Advances in science and technology and an ever-growing human population have increased the complexity of issues surrounding the care and management of non-human animals. Specializations students choose within the major allow them to develop expertise on, as well as an appreciation for, a particular class of animals, how it functions for companionship, recreation, or in agricultural or aquacultural food production, or in laboratory research, and to gain an understanding of its influence on and contribution to the environment. Graduates from the Animal Science major will be able to advance the science and technologies of animal care and management in an objective and effective manner for the betterment of human society and domestic animals.

The Program. The curriculum provides the opportunity to develop depth of understanding in the biological, physiological and social sciences, while allowing students to specialize within the broad field of applied animal science. Study begins with introductory courses in animal science, biological science, chemistry, mathematics, and statistics. Students then undertake advanced courses in animal behavior, biochemistry, genetics, nutrition, and physiology and the integration of these sciences to animal function, such as growth, lactation, and reproduction. Students complete the curriculum by choosing a specialization in either an animal biology discipline, such as animal behavior, biochemistry, animal genetics, nutrition, physiology, or an area of animal production, such as

companion and captive animals, livestock and dairy production (beef, dairy, sheep, and swine), laboratory animals, horses or aquatic animals. Students also have the flexibility within each specialization to combine study of both a discipline area and an area of animal production. The specializations cover a range from the molecular and cellular levels to the whole animal and populations of animals.

Career Alternatives. Career opportunities for graduates cover a wide range of options. Primary goals of the major are to prepare students for graduate study leading to the M.S. and Ph.D. degree, for continued study in a professional school such as veterinary medicine and medicine, and for careers in agricultural production, laboratory research, or the many related industries, from farming, ranching and animal management to positions in business, management, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research.

B.S. Major Requirements

Units

Written and Oral Expression.....0-8
See College Requirements

Preparatory Subject Matter.....56-60
Animal Science (Animal Science 1, 2, 41, 41L) 12
Biological Science (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A, 2B and 8A, 8B or 118A, 118B).....16-18
Computer Science (Agricultural Systems and Environment 21) 3
Mathematics (Mathematics 16A, 16B or 21A, 21B) 6-8
Statistics (Agricultural Systems and Environment 120 or Statistics 100) 4
Note: Some professional and graduate schools may require additional preparatory subject matter. Please consult the advising center.

Breadth/General Education.....16-24
See General Education requirement

Depth Subject Matter 39
Biology (Biological Sciences 101, 102, 103, Animal Genetics 107, Neurobiology, Physiology and Behavior 101, Nutrition 110) 25
Integrative Animal Biology (Animal Science 123, 124, and Neurobiology, Physiology and Behavior 121 and121L) 12
Laboratory Course (Select one from Animal Genetics 111, Animal Science 106, 135, Molecular Biology 120L, Neurobiology Physiology and Behavior 101L) 2-4

Area of Specialization.....20
Choose one Area of Specialization below; the program of study must be approved in advance by your faculty adviser.

Livestock and Dairy Management 20
Select two of Animal Science 143, 144 and 146; one of Animal Science 145 and 147; Nutrition 115.
Select additional upper division units from any Animal Genetics or Animal Science course, or from Nutrition 122, 123, or other courses approved by your faculty adviser.

Equine Management 20
Animal Science 15, 115, 141 and one of Animal Science 125 or 126.
Select additional units from any Animal Genetics or Animal Science course, or from Nutrition 115, 122, or other courses approved by your faculty adviser.

Laboratory Animal Management 20
Animal Science 42, 140, Nutrition 123 and Veterinary Medicine 170.
Select additional units from any Animal Genetics, Animal Science course, or from Nutrition 115, 122, or other courses approved by your faculty adviser.

Companion and Captive Animal Management 20
Animal Science 42, 142, Nutrition 123 and Veterinary Medicine 170.
Select additional units from any Animal Genetics or Animal Science course, or from Nutrition 115, 122, Avian Science 100, or other courses approved by your faculty adviser.

Aquatic Animal Management 20
Animal Science 18, 131 and 136; Nutrition 124; and one of Animal Science 118 or 119.
Select additional units from any Animal Genetics or Animal Science course, or other courses approved by your faculty adviser.
Students in this specialization may elect to substitute any of Biological Science 104, Evolution and Ecology 112, or Wildlife Fish and Conservation Biology 120 and 121 for the 12-unit requirement under Integrative Animal Biology, with approval of your faculty adviser.

Animal Biology Discipline 20
Select a minimum of 12 upper division units to form a series of disciplinary courses in one of: animal behavior, biochemistry, genetics, nutrition, or physiology, in consultation with your faculty adviser.
Select an additionalal 8 upper division units of animal science courses related to the chosen discipline, in consultation with your faculty adviser.

Unrestricted Electives 27-49

Total Units for Degree 180

Master Adviser. G.A.E. Gall.

Advising Center for the major, including peer advising, is located in 1202 Meyer Hall, 916-752-6118. *Students must secure their academic adviser through this office upon entering the major.*

Minor Program Requirements

The Department of Animal Science offers five minor programs open to students majoring in other disciplines who wish to complement their study programs with a minor in Animal Science. Some courses have required prerequisites not included as part of the minor, and students are expected to plan accordingly.

UNITS

Animal Science—Dairy/Livestock 20
Animal Science 41, 41L 4
Animal Science 104 3
Additional upper division courses.....13
Select 4 or 8 units from Animal Science 143, 144, 146.
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology and Behavior 121, 121L, Nutrition 115, 122, 123.

Animal Science—Equine 21
Animal Science 15 4
Animal Science 103 or 104.....3
Animal Science 115, 141 8
Animal Science 125 or 126 3
One additional upper division course 3
Select from from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology and Behavior 121, 121L, Nutrition 115, 122, 123.

Animal Science—Animal Biology 20
Animal Science 15, 42, or 41 and 41L.....3-4
Animal Science 103 or 104 3
Animal Science 123, 124, or Neurobiology, Physiology and Behavior 121 and 121L 4
Additional upper division courses 9-10
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology and Behavior 121, 121L, Nutrition 115, 122, 123.

Animal Science—Aquaculture 20
Animal Science 18 4
Animal Science 118, 119 8
Additional upper division courses.....8
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Applied Biological Systems Technology 161, Nutrition 124, Wildlife, Fish and Conservation Biology 121.

Animal Science—Animal Genetics 20
Animal Science 15, or 41 with 41L, or 42....4
Animal Science 107, 111 9
Additional upper division courses.....7
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Avian Science 103, Neurobiology, Physiology and Behavior 121, 121L, Nutrition 115, 122, 123.

Minor Adviser. G.A.E. Gall.

Graduate Study. The Department of Animal Science offers a program of study and research leading to the M.S. degree. In addition, the Master of Agriculture and Management (M.A.M.) is offered by the Department of Animal Science in conjunction with the Graduate School of Management. Detailed information about each of these programs may be obtained by contacting the Advising Center listed above.

Graduate Adviser. T.R. Famula (M.S. degree); I. Garnett (M.A.M. degree).

Courses in Animal Science (ANS)

Lower Division Courses

1. Domestic Animals and People (4) I. Famula
Lecture—3 hours; laboratory—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, horses, meat and dairy products. GE credit: SciEng, Wrt.

2. Introductory Animal Science (4) III. Berger
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 and Biological Sciences 1A recommended. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals and species used in aquaculture; the application of sciences to animal production. GE credit: SciEng, Wrt.

15. Introductory Horse Husbandry (3) II. Roser
Lecture—3 hours. Prerequisite: course 2 recommended. Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals.

18. Introductory Aquaculture (4) I. Conklin
Lecture—3 hours; discussion—1 hour. Historical and contemporary aquacultural practices. Interaction between the aqueous culture environment and the biology of aquatic animals. Impact of economics and governmental policies on the development of aquaculture. Interaction of aquacultural practices with larger societal goals. GE credit: SciEng.

21. Livestock and Dairy Cattle Judging (2) III. Van Liew
Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production.

22A. Animal Evaluation (2) I. Van Liew
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 21 or the equivalent. Study of domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance

*Course not offered this academic year.

information. Accurate written and oral descriptions and occasional weekend field trips required. This course is prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.)

22B. Animal Evaluation (2) II. Liew
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 22A or the equivalent. Continuation of course 22A with emphasis on specific species: visual appraisal, carcass evaluation, and application of performance information. Accurate written and oral descriptions and occasional weekend field trips required. This course is prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.)

41. Domestic Animal Production (2) I. DePeters
Lecture—2 hours. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction.

41L. Domestic Animal Production Laboratory (2) I. DePeters
Laboratory—6 hours. Prerequisite: course 41 (may be taken concurrently). Animal production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (P/NP grading only.)

42. Introductory Companion Animal Biology (4) II. Oberbauer
Lecture—3 hours; discussion—1 hour. Companion animal domestication. Historical, contemporary perspectives. Legislation concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific methods in studying the human-animal bond. Discussions: application of biological concepts to problems related to companion animals. GE credit: SciEng, Wrt.

49. Animal Management Practices (2) I, II, III. Van Liew
Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the art and science of management of a specific animal species. Each quarter students will be able to choose from the following sections: beef, dairy cattle, dairy goats, horses, sheep, swine, laboratory animals. May be repeated up to four times with a different species. (P/NP grading only.)

92. Internship in Animal Science (1-12) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-18 hours. Prerequisite: consent of instructor. Internship off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Request form must be met. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

103. Animal Welfare (3) II. Mench
Lecture/discussion—3 hours. Prerequisite: basic course in general/animal biology (e.g., Animal Science 2 or Biological Sciences 1B or 10) and upper division standing. The application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress, cognition, motivation, emotions, and preferences, as well as environmental enrichment methods.

***104. Principles of Domestic Animal Behavior** (3) II. Price
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B or the equivalent. Basic principles of animal behavior as applied to domesticated species. Emphasis will be placed on behavioral development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. Offered in alternate years. GE credit: SciEng.

105. Domestic Animal Behavior (2) II. Price
Lecture—2 hours. Prerequisite: an introductory animal behavior course (e.g., course 104, Psychology 150, Neurobiology, Physiology and Behavior 102) or consent of instructor. Application of the principles of animal behavior in the management of domestic animals. Includes reproductive behavior, feeding behavior, agonistic behavior, animal handling and human-animal interactions. Offered in alternate years. GE credit: SciEng.

***106. Domestic Animal Behavior Laboratory** (2) II. Price
Laboratory—6 hours. Prerequisite: course 104 or the equivalent. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results. GE credit: SciEng, Wrt.

115. Advanced Horse Production (4) I. Roser
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15; Biological Sciences 101; Nutrition 110 or 115; Neurobiology, Physiology and Behavior 101; or consent of instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry. GE credit: SciEng.

118. Fish Production (4) II. Beer, Doroshov
Lecture—3 hours; discussion—1 hour. Prerequisite: Wildlife, Fish and Conservation Biology 120 and 121. Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California.

119. Invertebrate Aquaculture (4) III. Conklin
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B. Management, breeding and feeding of aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies.

120. Principles of Meat Science (3) III. Bandman (Food Science and Technology), Lee
Lecture—3 hours. Prerequisite: Biological Sciences 1A. Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products. (Same course as Food Science and Technology 120.) GE credit: SciEng.

***120L. Meat Science Laboratory** (2) III. Lee, Bandman (Food Science and Technology)
Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1A; course 120 (may be taken concurrently). Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant. (Same course as Food Science and Technology 120L.)

123. Animal Growth and Development (4) III. Sainz
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1B; Biological Sciences 104 and Molecular and Cellular Biology 150 recommended. Growth and development of animals from conception to maturity, viewed from practical and biological perspectives; includes genetic, metabolic, nutritional control of cell and organism function. GE credit: SciEng.

124. Lactation (4) II. Baldwin
Lecture—3 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101; Nutrition 110; or the equivalent background knowledge. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. GE credit: SciEng, Wrt.

125. Equine Exercise Physiology (3) II. Roser
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101. Distance learning class broadcast from Cal Poly, Pomona, on basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning. (Students and instructor have two-way communication capabilities.)

126. Equine Nutrition (3) I. Roser
Lecture—3 hours. Prerequisite: course 15; Nutrition 110 or 115. Distance learning class broadcast from Cal Poly, Pomona and CSU Fresno on equine nutrition. Includes equine digestion, digestive physiology, diet development and evaluation, and the relationship of the topics to recommended feeding practices and nutritional portfolios.

128. Agricultural Applications of Linear Programming (3) II. Fadel
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing and Agricultural Systems and Environment 21 or the equivalent. Applications of linear programming in agriculture, emphasizing resource allocation problems and decision making. Problems include crop production, ration formulation, and farm management. Hands-on experience in developing linear programs and interpreting the results.

131. Reproduction and Early Development in Aquatic Animals (4) III. Doroshov
Lecture—3 hours; laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 150; Wildlife, Fish and Conservation Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture.

***135. Experimental Biochemistry Laboratory** (4) I. Calvert
Lecture—2 hours; laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology; consent of instructor. Course designed to introduce student to concepts of research. Experience in research animal care, tissue sampling and handling techniques, a variety of commonly used laboratory analytical methods, cost analysis, literature review and publication writing are provided. Not open to students who have received credit for Molecular and Cellular Biology 120L.

136. Aquatic Animal Laboratory (2) III. Hung
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 102; basic understanding of general biology, chemistry and biochemistry. Care and maintenance of fish culture in research, production, and personal use. Students conduct an 8-week growth trial with proper experimental design, care and maintenance of fish, and data collection, interpretation and reporting.

140. Management of Laboratory Animals (4) I. Weisker
Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 or 115; Neurobiology, Physiology and Behavior 101. Application of the concepts of nutrition, physiology, and genetics to maintenance of experimental animals. Management procedures will be examined in view of experimental needs, government regulations, and animal health.

141. Equine Enterprise Management (4) II. Roser/Garnett
Lecture/discussion—4 hours. Prerequisite: course 115; Economics 1A, 1B recommended. Examination of the concepts and principles involved in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equine law, marketing, cash flow analysis, and impact of state and federal regulations. GE credit: SocSci, Wrt.

143. Pig and Poultry Care and Management (4) I. Garnett, Ernst, Berger
Lecture—3 hours; laboratory—3 hours; Saturday field trips. Prerequisite: Nutrition 115 or 110; Neurobiology, Physiology and Behavior 101. Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction.

144. Beef Cattle and Sheep Production (4) I. Sainz
Lecture—3 hours; laboratory—3 hours; one or two Saturday field trips. Prerequisite: course 41, Animal Genetics 107, Nutrition 115, or consent of instructor; a course in Range Science and a course in microcomputing are recommended. Genetics, physiology, nutrition, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock enterprises.

***145. Meat Processing and Marketing** (4) II. Lee
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 143 or 144 or consent of instructor. Distribution, processing and marketing of meat and meat products. Meat and meat animal grading and pricing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. Includes poultry.

146. Dairy Cattle Production (4) III. DePeters
Lecture—3 hours; laboratory—3 hours; one mandatory Saturday field trip. Prerequisite: course 124, Animal Genetics 107, and Nutrition 115, or consent of instructor. Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal biology considering the environment and animal well-being. GE credit: SciEng, Wrt.

147. Dairy Processing and Marketing (3) II. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146 or consent of instructor. Examination of distribution systems, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives, and product development.

148. Enterprise Analysis in Animal Industries (4) III. Garnett
Lecture/discussion—4 hours. Prerequisite: course 141 or 145 or 147 or consent of instructor. Examination and application of decision making and problem solving in the production enterprise. The areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise. GE credit: SocSci, Wrt.

190C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.)

192. Internship in Animal Science (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Request Form must be met. (P/NP grading only.)

193. Introduction to Animal Science Research (2) I, III. Gall in charge
Lecture—1 hour; discussion—1 hour. Prerequisite: upper division standing. Consideration of ethics in animal research; basic elements of a research plan, project design, and literature review; preparation of a research proposal. Mid-term report and preparation of a brief research proposal. GE credit: Wrt.

194. Research in Animal Science (3) I, II, III The Staff
Laboratory—6 hours; discussion—1 hour. Prerequisite: upper division standing, course 193, one laboratory course in animal biology and consent of instructor. Research with a faculty mentor. Weekly discussion and laboratory on specific research topic. May include a seminar to research group. Choose from sections: (1) Animal Behavior; (2) Animal Genetics; (3) Animal Nutrition; (4) Animal Physiology. May be repeated for credit for a total of four times.

***194HA-194HB-194HC. Undergraduate Honors Thesis in Animal Science** (4-4-4) I-II-III. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—9 hours. Prerequisite: Neurobiology, Physiology and Behavior 101, Biological Sciences 102, 103 and Nutrition 110; minimum cumulative GPA of 3.2 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. (Deferred grading only, pending completion of sequence.)

195. Senior Project in Animal Science (3) I, II, III. Gall
Studio—6 hours. Prerequisite: senior standing in animal science and consent of instructor. Project analysis of a specific area of animal science; industry, communication, outreach, business and marketing, animal welfare, food safety and research are examples. May be repeated for credit for a total of three times. Limited enrollment.

197T. Tutoring in Animal Science (1-2) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-2 hours. Prerequisite: Animal Science or related major; advanced standing; consent of instructor. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge.)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Strategies in Animal Production (4) I. Garnett
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Examines the forces and issues in animal agriculture through the strategic management process.

***206. Models in Agriculture and Nutrition** (3) II. Fadel
Lecture—2 hours; laboratory— 3 hours. Prerequisite: Mathematics 16B; Statistics 108. Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition. Offered in alternate years.

***235. Advanced Techniques in Animal Nutrition Research** (2) I,II,III. The Staff (Calvert in charge)
Lecture—1 hour; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Application of advanced laboratory techniques to animal nutrition research; use of mechanistic models for experimental design and data analyses; surgical preparations useful in nutrition research; review of current literature. May be repeated for credit when topics differ. (S/U grading only.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (S/U grading only.)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (S/U grading only.)

291. Current Research in Animal Science (1) I, II, III. Medrano
Seminar—1 hour. Prerequisite: graduate standing. Current research in animal science explored at weekly seminars presented by guest lecturers. Discussion of research presented. May be repeated for credit. (S/U grading only.)

297. Supervised Teaching in Animal Science (2) I, II, III. The Staff (Chairperson in charge)
Supervised teaching—6 hours. Prerequisite: consent of instructor. Practical experience in teaching Animal Science at the University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. An evaluation letter sent to the Graduate Adviser with a copy to the student. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Sect. 1, 2, 3—letter grading; from Sect. 4 on—S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Animal Science and Management

(College of Agricultural and Environmental Sciences)

The Major Program

The animal science and management major combines a thorough education in the basic biology of domestic animal species with a strong background in managerial economics. Graduates of this program manage farms and participate in a wide variety of other businesses related to agriculture. Many graduates enter graduate, veterinary and medical schools, while others become teachers and extension personnel.

The Program. The interdisciplinary program in animal science and management is for students who want a fundamental background in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), as well as in economics and humanities. After completion of preparatory courses, students focus on both the animal species that interest them (horses, cattle, sheep, companion animals, goats, fish, crustaceans or mollusks, among others) and priniciples of managerial economics (marketing, finance, business organization or systems analysis).

Career Alternatives. Job opportunities for successful animal science and management graduates are plentiful. Banking and financial institutions, agribusiness, Peace Corps, farms of all scales, and related businesses are eager to interview graduates with this major. Most animal science and management graduates are well prepared for professional school (medical, law, veterinary, and graduate business schools) as well as graduate research programs leading to the M.S. or Ph.D. degrees. Advanced degrees open doors to work as extension specialists, farm advisers, school teachers, and prepare students for international service and a host of other fulfilling careers. Graduates of this interdisciplinary major will be well positioned to adjust to our rapidly changing world and job market.

B.S. Major Requirements:

For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal courses or more comprehensive courses on the same subjects are acceptable. Students preparing for medical or veterinary school can meet professional entrance requirements with those of this major if they plan ahead.

UNITS

English Composition Requirement 7-8
See College requirement 7-8

Preparatory Subject Matter 73-74
Animal science (Animal Science 1 and 2, and either 15 or 18 or 41-41L or 42) 11-12
Biological sciences (Biological Sciences 1A,

*Course not offered this academic year.

1B, 1C).....15
Chemistry (Chemistry 2A, 2B, 8A, 8B).....16
Computer science (Agricultural Systems and Environment 21).....3
Economics (Economics 1A, 1B, Management 11A, 11B).....18
Mathematics (Mathematics 16A-16B or the more advanced mathematics courses)..6
Statistics (Agricultural Systems and Environment 120 or Statistics 100, or other courses in quantitative skills with prior approval of the Master Adviser).....4

Breadth/General Education Subject Matter...6-24

Depth Subject Matter 43-44
Biological Sciences 101.....4
Nutrition 115.....4
Neurobiology, Physiology and Behavior 101...5
Buisiness Management.....19-20
Agricultural and Resource Economics 100A, 130, 140, Animal Science 128;
Plus at least *one* course from: Agricultural and Resource Economics 18, 112, 113, 118A, 118B, 136, 145, 157, 171A, 171B.
Production/Management/Processing/Marketing 11
Animal Science 148;
At least *one* course from: Animal Science 115, 118, 119, 140, 143, 144, 146;
At least *one* course from: Animal Science 141, 145, 147.

Restricted Electives 5-9
At least two additional courses (minimum 5 units; duplicate from Depth courses not counted) selected with approval of adviser from: Animal Science 103, 104, 105, 106, 115, 118, 119, 120, 120L, 123, 124, 125, 126, 131, 135, 136, 140, 141, 143, 144, 145, 146, 147, 148, 192, 193, 194, 195, Avian Sciences 149, Animal Genetics 107, 108, 109, 111, Nutrition 122, 122L, 123, 124, Biological Sciences 102 (strongly recommended), Neurobiology, Physiology and Behavior 121, 121L, 130, Wildlife, Fish and Conservation Biology 131.

Unrestricted Electives 21-46

Total Units for the Degree.....180

Major Adviser. J.G. Fadel.

Advising Center for the major (including peer advising) is located in 1202 Meyer Hall (916-752-6118). *Students must secure their academic adviser through this office upon entering the major.*

Anthropology

(College of Letters and Science)

Peter S. Rodman, Ph.D., Chairperson of the Department

Department Office, 330 Young Hall (916-752-0745/0746)

Faculty

John M. Beaton, Ph.D., Associate Professor
Robert L. Bettinger, Ph.D., Professor
Monique Borgerhoff-Mulder, Ph.D., Associate Professor
David J. Boyd, Ph.D., Associate Professor
Richard T. Curley, Ph.D., Senior Lecturer
ALexander H. Harcourt, Ph.D., Professor
Lynne A. Isbell, Ph.D., Assistant Professor
Suad Joseph, Ph.D., Professor *(Anthropology, Women's Studies)*
Smadar Lavie, Ph.D., Associate Professor *(Anthropology, Critical Theory)*
Martha J. Macri, Ph.D., Associate Professor *(Anthropology, Native American Studies)*
Henry M. McHenry, Ph.D., Professor
Peter S. Rodman, Ph.D., Professor
G. William Skinner, Ph.D., Professor *(Anthropology, Center for Comparative Research)*
Carol A. Smith, Ph. D., Professor
David G. Smith, Ph.D., Professor
Janet S. Smith, Ph.D., Professor
Margaret B. Swain, Ph.D., Adjunct Assistant Professor
John T. Walton, Ph.D., Professor *(Anthropology, Sociology)*
Aram A. Yengoyan, Ph.D., Professor

Emeriti Faculty

Daniel J. Crowley, Ph.D., Professor Emeritus
William G. Davis, Ph.D., Professor Emeritus
Jack D. Forbes, Ph.D., Professor Emeritus
Sarah B. Hrdy, Ph.D., Professor Emerita
David L. Olmsted, Ph.D., Professor Emeritus
Delbert L. True, Ph.D., Professor Emeritus

The Major Program

Anthropology is the systematic study of human beings as they live in groups. It is a diverse field and the courses at UC Davis are subdivided into four categories—biological, social/cultural, linguistics, and archaeology. The student of anthropology learns about human social life—past and present—and gains a broad understanding of humans and society.

The Program. Students interested in the scientific study of human origins, primate studies and the fundamentals of biology as these relate to *Homo sapiens* should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas or linguistics (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeology (prehistory and the techniques and methods of archaeology) should consult an adviser before choosing one degree program or the other.

Career Alternatives. Although most practicing anthropologists teach in colleges and universities, a bachelor's degree in anthropology can lead to work in museums, in the Park Service, or in other aspects of public archaeology. A Bachelor of Science degree is a suitable major for premedical and predental preparation. A degree in anthropology with appropriate courses in education also can be good preparation for high school teaching in social sciences or natural sciences.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20
Anthropology 1, 2, 3, 4.....16
Statistics 13 or 102.....4

Depth Subject Matter 44
Anthropological linguistics: one course.....4
Social-Cultural Anthropology: one course from 121N, 122, 123A, 123B, 124, 125A, 125B, 126, 127, 128, 129, 130, 131, 132N, 133, 135, 136, 138, 139.....4
Anthropology 137.....4
Ethnography: one course from 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 149A, 149B, 178 4
Biological anthropology: one course.....4
Archaeology and prehistory: one course....4
Select 8 units from any upper division Anthropology courses chosen in consultation with an adviser.....8
Select an additional 12 units in an area of emphasis:
(a) Anthropological Linguistics
Anthropology 110.....4
Select two additional courses in anthropological linguistics 8
(b) Social-Cultural Anthropology
Select one course from: 128, 129, 130, 131, 139.....4
Select two additional courses in social-cultural anthropology 8
(c) Biological Anthropology
Anthropology 152.....4
Select two additional courses in biological anthropology 8
(d) Archaeology and Prehistory
Anthropology 170.....4
Select two additional courses in archaeology and prehistory 8

Total Units for the Major 64

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-56
Anthropology 1, 2.....8
Anthropology 3 or 4.....4
Biological Sciences 1A, 1B, 1C 15
Chemistry 2A, 2B, 8A-8B 16
Mathematics 16A-16B-16C 9
Statistics 13, 32, 100, or 102.....3-4

Depth Subject Matter 45
Six courses in anthropology, including courses 152, 153 and 154A, and the remaining three chosen in consultation with major adviser.....22-25
Biological Sciences 101 and Evolution and Ecology 100 8
Additional units from the list below to achieve a minimum of 45 upper division units. Anthropology 151, 154B, 155, 156, 157, 157L, 158; Anatomy 100; Biological Sciences 102, 103; Environmental Studies 100, 125; Evolution and Ecology 101, 102, 105, 133, 136, 136L, 138, 141, 147, 149, 170, 170L; Geography 117; Geology 106, 107, 107L, 144, 145, 146; Cell Biology and Human Anatomy 101, 101L; Molecular and Cellular Biology 120L, 121, 146, 150, 150L, 151, 160L, 161, 162, 163, 164; Neurobiology, Physiology and Behavior 101, 101L; Exercise Science 103, 115; Psychology 108, 112, 150; Statistics 104, 106, 108, 110, 130A, 130B.

Total units for the Major 100-101

Recommended
Anthropology 4, 15; Geology 1, 1L, 3, 3L; Physics 5A, 5B, 5C, or 7A, 7B, 7C; Psychology 1.

Major Advisers. A.B. degree: R. Curley; B.S. degree: H.M. McHenry.

Honors Program. Candidates for high or highest honors in Anthropology must write a senior thesis under the direction of a faculty member. The thesis project will have a minimum duration of two quarters. Honors candidates must take at least six units of Anthropology 194H. Only students who, at the end of their junior year (135 units), have attained a cumulative grade point average of 3.5 in Anthropology courses will be eligible for the honors program. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Minor Program Requirements:

UNITS

Anthropology 19-24

General emphasis **..... 22-25**
One course from Anthropology 117, 119, 120 4
One course from Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158.....2-5
One course from Anthropology 170, 171, 172, 178, 179, 181 4
One course from Anthropology 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 149A, 149B.....4
Two courses from Anthropology 101, 117, 119, 120, 121, 122, 123A, 123B, 124, 125A, 126, 127, 128, 129, 130, 131, 132N, 133, 134, 135, 136, 137, 138, 139.....4
One additional course from remaining upper

division Anthropology courses.....4

Biological emphasis **.....18-21**
Anthropology 152, 153, 154A.....13
Two additional upper division Anthropology courses chosen in consultation with B.S. degree undergraduate adviser.....5-8

Social–Cultural emphasis **.....18-21**
Anthropology 137.....4
One course from Anthropology 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 149A, 149B.....4
Two courses from Anthropology 101, 117, 119, 120, 121, 122, 123A, 123B, 124, 125A, 126, 127, 128, 129, 130, 131, 132N, 133, 135, 136, 138, 139.....8
One additional upper division Anthropology course chosen in consultation with A.B. degree undergraduate adviser.....2-5

Teaching Credential Subject Representative. ————. See also the Teacher Education Program.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department Office and at Graduate Studies.

Graduate Adviser. C.A. Smith; J.S. Smith.

Courses in Anthropology (ANT)

Lower Division Courses

1. Human Evolutionary Biology (4) I. Isbell; II. Rodman; III. Isbell
Lecture—3 hours; discussion—1 hour. Introduction to human evolution. Processes and course of human evolution; man's place in nature and the study of primates; the biological variability of living man and the genetic background. GE credit: SciEng, Div, Wrt.

2. Cultural Anthropology (4) I. Yengoyan; II. The Staff; III. Curley
Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relations, economic activities, politics, gender, and religion in a wide range of societies. Current problems in tribal and peasant societies. GE credit: SocSci, Div, Wrt.

3. Introduction to Archaeology (4) I, III. Beaton
Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology. GE credit: SocSci, Div.

4. Introduction to Anthropological Linguistics (4) I. Macri; II. J.S. Smith
Lecture—3 hours; discussion—1 hour. Exploration of the role of language in social interaction and world view, minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language in sociocultural issues. GE credit: SocSci, Div, Wrt.

5. Proseminar in Biological Anthropology (4) III. Rodman
Seminar—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment. GE credit: SciEng, Wrt.

15. Behavioral and Evolutionary Biology of the Human Life Cycle (5) II. Harcourt
Lecture—3 hours; discussion—1 hour; term paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected cases. GE credit: SciEng, Div, Wrt.

20. Comparative Cultures (4) III. Curley
Lecture—3 hours; discussion—1 hour. Introduction to the anthropological study of cultural diversity. Case studies of eight societies will be presented to illustrate and compare the distinctive features of major cultural regions of the world. Concludes with a discussion of modernization. GE credit: SocSci, Div.

***21. Anthropological Perspectives on the Politics of Culture in the United States** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Primarily for non-majors. Examines what comparative anthropological analysis can contribute to an understanding of the high-profile issues of cultural politics (the so-called "culture wars") in our own society. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***23. Introduction to World Prehistory** (4) III. Beaton
Lecture—3 hours; discussion—1 hour. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. GE credit: SocSci, Div, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Primarily intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Human Ecology (4) II. Richerson/Borgerhoff-Mulder
Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 1, 2, Environmental Studies 30, Genetics 10, or the equivalent. Critical variables in the processes that relate to humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Environmental Studies 101.) GE credit: SocSci.

(a) Anthropological Linguistics

***110. Elementary Linguistic Analysis** (4) III. Macri
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Analytical techniques of articulatory phonetics, phonemics, morphophonemics, and morphology. GE credit: SocSci.

***112. Comparative Linguistics** (4) I.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and reconstruction. GE credit: SocSci.

***113. Indigenous Languages of North America** (4) II. Macri
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, Linguistics 1, or consent of instructor. Survey of indigenous languages of North America, including their classification, linguistic characteristics, areal features, and socio-cultural aspects. GE credit: SocSci, Div.

***117. Language and Society** (4) III. J.S. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or Linguistics 1 and course 2. Consideration of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory GE credit: SocSci, Div, Wrt.

119. World Writing Systems (4) I. Macri
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Survey of major world writing systems, including pictographic, syllabic, and alphabetic scripts used in both the Old and New Worlds in ancient and modern times, examined from linguistic and socio-political aspects. GE credit: SocSci.

120. Language and Culture (4) II. Yengoyan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4; or course 2 and Linguistics 1. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective. GE credit: SocSci, Div, Wrt.

(b) Social-Cultural Anthropology

121N. Indigenous Peoples and Resource Conservation (4) III. Borgerhoff-Mulder
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Geology 1 or Environmental Studies 30. Integration of the interests of resident and indigenous peoples with the conservation of natural resources and ecosystems, using case study examples from both the developing and developed world. Offered in alternate years. GE credit: SocSci.

***122. Economic Anthropology** (4) III. Davis
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies; its social and cultural setting and its modern changes. GE credit: SocSci, Div, Wrt.

***123A. Anthropology and Political Economy** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to the study of political organizations; interrelationships among political institutions, economic infrastructures and cultural complexity. GE credit: SocSci, Div, Wrt.

123B. Resistance, Rebellion, and Popular Movements (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or the equivalent. Analysis of popular protest in Third World and indigenous societies ranging from covert resistance to national revolts. Comparative case studies and theories of peasant rebellions, millenarian movements, social bandits, Indian "wars", ethnic and regional conflicts, gender and class conflicts. GE credit: SocSci, Div, Wrt.

***123C. Multiculturalism and Minority Identity** (4) I. Lavie
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Recent developments in conceptions of minority identity from the point of view of minority populations in the Third World, Europe, and the United States. Challenges to existing categories of gender, race, and class, as well as to nationalism and imperialism. Offered in alternate years.

124. Religion in Society and Culture (4) II. Curley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: SocSci, Div, Wrt.

***125A. Structuralism and Symbolism** (4) I. Yengoyan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Focus on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences. (Former course 125.) GE credit: SocSci, Div.

125B. Postmodernism(s) and Culture (4) II. Lavie
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The U.S.–European postmodern condition. "Modernity" as an incomplete project for subordinated groups. The economic, social, technological and political conditions leading to postmodern aesthetics, in comparison with postcolonialism, feminism and minority discourse. GE credit: SocSci, Div, Wrt.

126. Anthropology of Development (4) I. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Social and economic consequences of technological innovation. Application of anthropological theory to case studies of rural economy and society. GE credit: SocSci, Div, Wrt.

***127. Urban Anthropology** (4) II. Walton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of approaches to urban living: political structures, organi-

zation of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies. GE credit: SocSci, Div, Wrt.

128. Kinship and Social Organization (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical discussion of social organization with primary emphasis on typology and classification of family and kinship systems. GE credit: SocSci, Div, Wrt.

***129. Self, Identity, and Family** (4) I. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Exploration of self, identity, and family systems cross-culturally. Impact of class, gender, race, ethnicity, ruralization, urbanization, and globalization on notions of selfhood in different social/cultural systems. Offered in alternate years. GE credit: SocSci, Div, Wrt.

130. Gender and Sexuality (4) III. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Gender and sexuality in foraging bands, horticultural and pastoral tribes, agricultural and industrial states. Debates on cultural evolution and distribution of gender hierarchies. Impact of politics, economics, religion, social practices, women's movements on gender and sexuality. Culture, nature and sexuality. GE credit: SocSci, Div, Wrt.

***131. Women and Development** (4) III. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Current Third World and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world system, and international feminism on women and development. GE credit: SocSci, Div, Wrt.

***132N. Ethnohistory** (4) I, II. Walton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 and one other course in either history or anthropology. Course focuses on method and interpretation involved in reconstructing the history and cultural experience of those "people without history" who left no documentary record (pre-literate societies, slaves, peasants). Emphasizes cross-cultural comparison and complementary methods (archaeology, demography, oral history, travel accounts). GE credit: SocSci, Wrt.

133. Cultural Ecology (4) III. Orlove
Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Environmental Studies 133.) GE credit: SocSci, Div, Wrt.

***134. Race and Sex: Race Mixture and Mixed Peoples** (4) II. Forbes
Lecture—4 hours. Prerequisite: course 1, or 2, or one of Native American Studies 10, Chicano Studies 110, African American and African Studies 100 or Asian American Studies 110. The phenomena of racial, ethnic and interreligious intermixture and marriage, and of multi-ethnic peoples. Emphases on the Americas and upon the sociocultural effects of intermixture and on the lives of bicultural and multi-ethnic persons. (Same course as Native American Studies 134.) GE credit: SocSci, Div, Wrt.

***135. Peasant Society and Culture** (4) III. C.A. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban-rural relations; problems of economic development and culture change. GE credit: SocSci, Div, Wrt.

136. Ethnographic Film (4) II. Curley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Overview of the use of film in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential features of ethnographic films. Film production in anthropological research and problems encountered in producing films in the field. GE credit: SocSci, Wrt.

137. Theory in Social-Cultural Anthropology (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative overview of major theoretical orientations in social-cultural anthropology, including evolutionary, historical, functional, ecological, psychological, structural, symbolic, and Marxian approaches. Selected controversies are examined to clarify strengths and limitations of extant theories. GE credit: SocSci.

***138. Ethnographic Research Methods in Anthropology** (4) II. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 and 137. Basic concepts in and approaches to ethnographic field research. Problem formulation, research design, qualitative and quantitative data collection procedures, and techniques for organizing, retrieving, and analyzing information. Ethnographic description and constructed inference. Students will organize and conduct individual research projects. GE credit: SocSci.

139. Race, Class, Gender Systems (4) II. C.A. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative analysis of class/race/gender inequality, concentrating on the ways in which beliefs about descent, "blood," and biological difference interact with property and marital systems to affect the distribution of power in society. GE credit: SocSci, Div, Wrt.

***140A. Cultures and Societies of West and Central Africa** (4) I. Curley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of West Africa and Congo Basin with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be the continuities and discontinuities between periods prior to European contact and the present. GE credit: SocSci, Div, Wrt.

140B. Cultures and Societies of East and South Africa (4) I. Curley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of Eastern and Southern Africa with analyses of selected societies which illustrate problems of interest to anthropologists. Major consideration will be given to continuities and discontinuities between periods prior to European contact and the present. GE credit: SocSci, Div, Wrt.

***141A. Indians of North America** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introductory survey of the Indians of North America: origins, languages, civilizations, and history. GE credit: SocSci, Div, Wrt.

***141B. Ethnography of California and the Great Basin** (4) III. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Description and analysis of the native peoples of California and the Great Basin, and their lifeways at the time of European contact. (Former course 141C.) GE credit: SocSci, Div, Wrt.

142. Peoples of the Middle East (4) I. Lavie
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.) GE credit: SocSci, Div, Wrt.

***143A. Ethnology of Southeast Asia** (4) II. Yengoyan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Patterns of culture and social organization from prehistory to the present, in the context of historical, ecological, economic, and political settings. Emphasis on the relation of ethnic minorities to national states. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***143B. Philippine Societies and Culture** (4) III. Davis
Laboratory/discussion—4 hours. Prerequisite: course 2. Introduction to the ethnology of the Philippines. Nature and distribution of ethnic groups, social organizations, cultural patterns and social issues. Emphasis on ethnic minorities, rural populations, effects of modernization, and relation of the state to local groups. GE credit: SocSci, Div, Wrt.

***144. Contemporary Societies and Cultures of Latin America** (4) II. Orlove
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality: economic responses to poverty, sociocultural responses to discrimination, and political responses to powerlessness. GE credit: SocSci, Div, Wrt.

***145. Colonialism and Ethnicity in the Caribbean** (4) II. The Staff
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 2 or Afro-American Studies 10. Examination of the contemporary Caribbean nations, sketching their diverse geography, history, and economic life, then showing how selected nations have attempted to solve the problems arising from ethnic diversity in nation-building. GE credit: SocSci, Div, Wrt.

***146. Indigenous Peoples of Mexico and Central America** (4) II. C.A. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of the native peoples of Mexico and Central America: their histories, socio-political organization, mythologies, languages, material culture, writing systems. GE credit: SocSci, Div, Wrt.

147. Peoples of the Pacific (4) III. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional social organization of peoples of Polynesia, Micronesia, and Melanesia. Consideration of recent changes associated with colonialism and national independence. GE credit: SocSci, Div, Wrt.

148A. China: Anthropology of a Civilization (4) II. Skinner
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An analysis of the society and political economy of late traditional China to 1949. Special attention is given to spatial differentiation and historically specific social/cultural change. Offered in alternate years. GE credit: SocSci, Div, Wrt.

148B. Family, Gender, and Population in Contemporary China (4) III. Skinner
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of family process, gender relations, and population dynamics in relation to state power in China since 1949. GE credit: SocSci, Div, Wrt.

***148C. Ethnic Diversity of China** (4) III. Swain
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of China's ethnic diversity through time and space. Interethnic relations in changing state systems examined among Han majority subethnic groups (e.g., Cantonese, Hakka) and borderlands minorities (e.g., Hmong, Tibetan). Emphasizes intersections of gender and class with race/ethnicity/nationality. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***149A. Traditional Japanese Society** (4) III. J. S. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Patterns of culture and social organization from prehistoric to early twentieth-century Japan. Origins, prehistory, and traditional religious and political systems, marriage and kinship, language and culture. Changes and continuities in traditional and contemporary Japanese culture are addressed. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***149B. Contemporary Japanese Society** (4) III. J. S. Smith
Lecture—3 hours; discussion—1 hour. Introduction to contemporary Japanese social structure, social or-

ganization, and patterns of culture. Analysis of rural-urban cultural continuities and contrasts, class relations, political and economic systems, kinship, sex/gender systems, contemporary religious beliefs and behavior, conflict, consensus, and cultural stereotypes. Offered in alternate years. GE credit: SocSci, Div, Wrt.

(c) Biological Anthropology

151. Primate Evolution (4) III. McHenry
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Origin and relationships of the prosimians, monkeys, and apes. GE credit: SciEng, Wrt.

152. Human Evolution (4) II. McHenry
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or Biological Sciences 1B. Nature and results of the evolutionary processes involved in the formation and differentiation of humankind. GE credit: SciEng, Wrt.

153. Human Biological Variation (4) III. D.G. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention will be given to racial differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. GE credit: SciEng, Wrt.

154A. The Evolution of Primate Behavior (5) I. Rodman
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SciEng, Wrt.

***154B. Ecology and Sociobiology of Primates** (4) III. Rodman
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 154A, Statistics 13 (or the equivalent), and consent of instructor. Continuation of course 154A for students interested in methods of studying, describing and analyzing the ecology and sociobiology of primates. Laboratory consists of direct observation of captive primates and local birds with quantitative analysis of observations. GE credit: SciEng, Wrt.

***155. Comparative Primate Anatomy** (4) II. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1B. The functional anatomy of monkeys, apes, and man. Emphasis on the anatomical evidence for human evolution. GE credit: SciEng, Wrt.

156. Human Osteology (4) III. McHenry
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, dentition, and variations in race, sex, and age. GE credit: SciEng.

***157. Anthropological Genetics** (3) II. D.G. Smith
Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and Genetics 100, 103, 105, or 106. Processes of micro-evolution responsible for biological differences among human populations. Special attention will be given to the adaptive significance of genetic variation in blood group antigens, serum proteins and red cell enzymes. GE credit: SciEng.

***157L. Laboratory in Anthropological Genetics** (2) I. D.G. Smith
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and either Genetics 100 or enrollment in course 157 (concurrently or following). Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes (hemaglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide, immunodiffusion and immunoelectrophoresis on agarase. (P/NP grading only.) GE credit with concurrent enrollment in course 157: Wrt.

158. The Evolution of Females and Males: Biological Perspective (4) I. Isbell
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles. GE credit: SciEng, Div, Wrt.

(d) Archaeology and Prehistory

170. Archeological Theory and Method (4) II. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. Introduction to history and development of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Stress is on historical development of archaeology in the New World. GE credit: SocSci, Div, Wrt.

171. Geoarcheology (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Theories, methods, and techniques for studying the geomorphic context of archeological sites. Particular attention to sediment and soil attributes and analyses for understanding important local landform features and developmental histories of archeological sites. Offered in alternate years. GE credit: SocSci, Wrt.

***172. New World Prehistory: The First Arrivals** (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. Offered in alternate years. GE credit: SocSci, Div, Wrt.

173. New World Prehistory: Archaic Adaptations (4) III. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; course 170 recommended. Introduction to and survey of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***176. Prehistory of California and the Great Basin** (4) II.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. GE credit: SocSci, Div, Wrt.

178. Hunter-Gatherers (4) III. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Study and interpretation of the ancient and modern lifeway in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***179. Ethnoarchaeology** (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography by archeologists examines residence patterning, site-formation processes, hunting/foraging behavior and other artifact creating activities and how these contribute to modern archeological thinking. GE credit: SocSci, Div, Wrt.

181. Field Course in Archeological Method (9) Summer. The Staff
Lecture—6 hours; daily field investigation. Prerequisite: course 3. On-site course in archeological methods and techniques held at a field location in the western United States, generally California or Nevada. Introduces basic methods of archeological survey, mapping, and excavation. GE credit: SciEng.

***183. Laboratory in Archeological Analysis** (4) III. Bettinger
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment. GE credit: SciEng, Wrt.

***184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation** (4) II.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3. Examination of the role of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed. GE credit: SocSci.

(e) Special Study Courses

***191. Topics in Anthropology** (4) I. Bettinger
Lecture/discussion—3 hours; term paper. Prerequisite: junior or senior standing in anthropology. Intensive treatment of a special anthropological topic or problem. May be repeated once for credit when topic differs.

192. Internship in Anthropology (1-12) I, II, III. The Staff
Intership—3-36 hours. Prerequisite: Upper division standing; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Anthropology under the supervison of a member of the faculty. Limited to Anthropology majors. May be repeated for a total of 12 units including 192 courses taken in other departments. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. May be repeated for a total of 12 units. (P/NP grading only.)

197T. Tutoring in Anthropology (1-5) I, II, III. The Staff
Tutorial—1-5 hours. Prerequisite: upper division standing with major in Anthropology and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

201. History of Anthropological Theory (4) I. Yengoyan
Lecture—2 hours; discussion—1 hour; term paper. Historical development of the various fields of anthropology with emphasis upon their interrelationships.

202. History and Theory of Biological Anthropology (4) II. McHenry
Seminar—3 hours; term paper. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students lacking intensive preparation in biological anthropology.

203. History and Theory of Archaeology (3) I. Bettinger
Seminar—3 hours. History of thought in archaeology and analysis of research methods.

204. Contemporary Issues in Anthropological Theory (4) II. C.A. Smith
Seminar—3 hours; term paper. Prerequisite: course 2, 137 or consent of instructor. Advanced consideration of fundamental issues in anthropological theory. Emphasis on critical examination of major contemporary debates between proponents of competing theories.

205. History and Theory in Anthropological Linguistics (4) III. J.S. Smith
Seminar—3 hours; term paper. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodology.

*Course not offered this academic year.

206. Research Design and Method in Social Anthropology (5) III. Boyd
Seminar—4 hours; individual student-instructor session (in-depth work on proposal writing). Prerequisite: consent of instructor. Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, prefieldwork preparations, entering the community, field research techniques, and problems of ethics; intensive work on proposal writing. May be repeated once for credit. Limited enrollment.

207. Ethnographic Writing (4) II. Lavie
Seminar—3 hours; term paper. Prerequisite: courses 137, 201, or the equivalent. Relationship between conducting participant observation of others and writing it up, emphasizing the processual rift between the reality of fieldwork and its written representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated for credit. Offered in alternate years.

209. Objectives and Methods for College Teaching of Anthropology (2) I, II, III. The Staff
Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience in the classroom situation.

210. Aspects of Culture Structure (4)
Seminar—3 hours; term paper. Analysis of various phases of culture, such as religion, economics, law, and folklore. May be repeated for credit when topic differs.

***211. Advanced Topics in Cultural Ecology** (3) I. Orlove
Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Studies 133 or the equivalent or consent of instructor. Discussion and evaluation of theories which relate environment, culture, and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in alternate years. (Same course as Ecology 211.)

216. Problems in Archeological Method (4) II. Beaton
Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

***217. Andean Prehistory: Theory and Method** (4) II. Beaton
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-ceramic and early farming peoples.

***218. Topics in North American Prehistory** (4) I. Bettinger
Seminar—3 hours; term paper. Advanced study on current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of instructor.

***220. Field Course in Linguistics** (4) III. Macri
Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker.

***221. Rural Transformation in Postcolonial Societies** (4) I. Orlove
Seminar—3 hours; term paper. Prerequisite: courses 223, 265, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

***222. Problems in Urban Anthropology** (4) I. Walton
Seminar—3 hours; one paper. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on some of the following topics: class, minorities, poverty, migration, religion, politics, kinship, community, sex-roles, communication, ideology, consciousness in urban context. May be repeated for credit.

***223. Economic Anthropology** (4) III. Davis
Seminar—3 hours; term paper. Prerequisite: course 122 or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.

***224. Problems in Comparative Religion** (4) I. Curley
Seminar—3 hours; term paper. Advanced study of current problems in the anthropological study of religion.

***225. State and Nation in the Modern World** (4) III. C.A. Smith
Seminar—3 hours; term paper. A presentation of current anthropological theories of the origins and nature of the modern nation-state in both the First and Third Worlds, with special reference to state ideology (nationalism) and forms of control. Offered in alternate years.

***226. Consciousness and Resistance** (4) I.
Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work or consent of instructor. Consideration of approaches to the study of social inequality, and responses of subordinated groups. Emphasis on situating approaches to contemporary social theory, concrete research problems, and political strategies. Topics: formation of consciousness and identity; collective action, accommodation to frontal resistance. Offered in alternate years.

***227. Behavioral Ecology and Anthropology** (4) III. Borgerhoff-Mulder
Seminar—3 hours; term paper. Prerequisite: graduate standing. An exploration of the links between behavioral ecology and the study of human cultural variation, focusing on social organization, marriage, reproduction, inheritance and subsistence in traditional and historical populations. May be repeated once for credit. Offered in alternate years.

229. Gender, Identity, and Self (4) III. Joseph
Seminar—3 hours; term paper. Course covers intersections of gender, identity, and selfhood cross-culturally and historically. Explores how the self is feminized and masculinized, and interfaces with sexual, race, class, work, national, minority, and majority identities under different historical, cultural, and social structural conditions.

230. Family Systems and Reproduction: Theory and Comparisons (4) II. Skinner
Lecture—1.5 hours; seminar—1.5 hours; term paper. Prerequisite: graduate standing in one of the social sciences including History. Comparative examination of family systems in historical context and of reproductive behaviors and strategizing. A major theme is how family-system norms specify the relative desirability of differently configured offspring sets. Cases are drawn from Western Europe and South and East Asia.

***232. Political Movements** (4) I. Walton
Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work recommended. An interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization, state and culture, rational choice, moral economy, social class and gender.

***239. Problems in African Society and Culture** (4) I. Curley
Seminar—3 hours; term paper. Diachronic analyses of traditional institutions in sub-Saharan Africa.

***240. Problems in Afro-American Studies** (4) III.
Seminar—3 hours; term paper. Comparative studies of selected Black communities in the New World.

***241. Topics in North American Ethnology** (4) III. Forbes
Seminar—3 hours; term paper. Advanced study on current problems in North American ethnography and culture history. May be repeated for credit with consent of instructor.

***245. Ethnology of Northern and Central Asia** (4) II.
Seminar—3 hours; term paper. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available.

***246. Ethnology of Europe** (4) II.
Seminar—3 hours; term paper. Prerequisite: reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.

***252. Human Evolution Seminar** (4) II. McHenry
Seminar—3 hours; term paper. Prerequisite: course 152 or the equivalent; consent of instructor. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolutionary biology, Tertiary hominoids, *Australopithecus, Homo erectus,* archaic *Homo sapiens,* brain evolution. May be repeated for credit.

***253. Seminar in Human Biology** (4) II. D.G. Smith
Seminar—3 hours; term paper. Prerequisite: course 153, 157, or consent of instructor. Study of selected topics in human biology. May be repeated for credit when topics vary. Offered in alternate years.

254. Current Issues in Primate Sociobiology (4) II. Rodman; III. Harcourt
Seminar—3 hours; term paper. Prerequisite: course 154B or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies. May be repeated for credit when topic differs.

258. Evolution and Human Behavior (4) III. Isbel
Seminar—3 hours; term paper. Prerequisite: courses 15; 101;154 A or 154B; 158 or consent of instructor. Focus will be on reproductive strategies and parental investment. May be repeated for credit when topics vary.

***265. Concepts and Problems in Applied Anthropology** (4) II. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study in culture change; case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

270. Anthropology Colloquium Seminar (1) I, II, III. The Staff
Seminar—1 hour. Reports and discussions of recent advances in the four subfields of anthropology. To be presented by guest speakers. May be repeated twice for credit. (S/U grading only.)

***292. Seminar in Linguistic Anthropology** (4) II. J.S. Smith
Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topic differs.

298. Group Study (1-4) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Applied Behavioral Sciences

See Community and Regional Development

Applied Biological Systems Technology

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Biological and Agricultural Engineering.

Minor Program. The Department of Biological and Agricultural Engineering offers a minor in Applied Biological Systems Technology. This minor is for non-engineering students interested in becoming familiar with engineering terminology and procedures. course work provides knowledge of material properties, design procedures, fabrication principles, and hardware practices.

Minor Program Requirements:

UNITS

Applied Biological Systems Technology 20

Materials requirement, choose one from Applied Biological Systems Technology 15, 16, or 17 2

Design requirement, Applied Biological Systems Technology 170 3

Principles and Practices requirement 15

Select at least nine units from Applied Biological Systems Technology 101, 103, 105, 110L, 121, 134, 141, 141AT, 145, 147, 161, 163, 165.

Select the remaining units from: Agricultural Systems and Environment 110A, Animal Science 118, 119, 143, 146, Environmental Horticulture 125, Food Science and Technology 102A, 110A, 110B, 180, Hydrologic Science 110, Plant Biology 172, 172L, 196, Viticulture and Enology 140.

Minor Advisor. R.H. Piedrahita.

Courses in Applied Biological Systems Technology (ABT)

Lower Division Courses

15. Wood Properties and Fabrication (2) III. Grismer
Lecture—1 hour; laboratory—3 hours. Physical principles and properties of woods as related to strength, design procedures, and selection and use of woodworking equipment. Experience in working with wood. (P/NP grading only.)

16. Metal Properties and Fabrication (2) I. J. Rumsey
Lecture—1 hour; laboratory—3 hours. Study of metal properties and of techniques for fabricating in metal. Physical principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working with metal. (P/NP grading only.)

17. Plastic Properties and Fabrication (2) III. Jenkins
Lecture—1 hour; laboratory—3 hours. Study of the properties of plastic materials and the fundamentals of fabrication techniques. Experience in working with common plastics, with applications to biological systems. (P/NP grading only.)

49. Field Equipment Operation (2) I, III. J. Rumsey
Lecture—1 hour; laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of tilling, cultivating, thinning, and planting equipment. Typical sequences in cropping practices. (P/NP grading only.)

52. Field Equipment Maintenance (2) II. J. Rumsey
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 16 or consent of instructor. Troubleshooting and major repair of field equipment. Intermediate welding to include hardfacing and inert gas welding. Class projects on maintenance, repair and fabrication. (P/NP grading only.)

90C. Research Conference for Lower Division Students (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Research conference for specialized study in applied biological systems technology. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Hills in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Hills in charge)
(P/NP grading only.)

Upper Division Courses

101. Engine Technology (3) II. Upadhyaya
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction and operation. Ideal Otto and Diesel cycles. Engine efficiencies and power measurements. Study of valves, fuels, combustion, carburetion and fuel injection, conventional and electronic ignition, starting and charging, cooling, lubricating and emission control systems.

103. Electric Power Applications (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 1B or 5B. Principles of electric power involved in common home and light industrial applications; experience in techniques of wiring, motor and appliance selection, energy conservation and safety.

110L. Experiments in Food Engineering (2) II. Singh
Laboratory—6 hours. Prerequisite: Food Science and Technology 110B (may be taken concurrently). Use of temperature sensors; measurement of thermal conductivity and heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods.

121. Animal Housing and Environment Management (2) II. Zhang
Lecture—2 hours. Prerequisite: Animal Science 1 or 2. Optimal structures and environments for animal growth and comfort; heat and moisture transfer principles; heating, cooling, ventilating principles and equipment; animal housing design; environmental regulations and waste management practices.

134. Pest Control Practices (2) II. Giles
Lecture—2 hours. Prerequisite: Botany 120 or Entomology 100 or Environmental Toxicology 101 or Plant Pathology 125 or the equivalent. Physical aspects of agricultural pest control. Mechanical systems for safe and effective application of pest control materials. Biological, legal and environmental considerations of pest control and pesticide application. Not open for credit to students who have completed Agricultural Engineering Technology 134.

142. Equipment and Technology for Small Farms (2) III. Rumsey, Plant
Lecture—1 hour; laboratory—3 hours. Types of characteristics of agricultural equipment and technologies appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Same course as International Agricultural Development 142.)

145. Field Equipment Technology (2) III. J. Rumsey
Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing and Physics 1A or 5A. Function, construction, and operating principles of field equipment for harvesting fruit, nut, vegetable, and field crops. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling field equipment.

147. Field Equipment Management (2) I, II, III. J. Rumsey
Lecture—2 hours. Prerequisite: course 49 (may be taken concurrently) or consent of instructor. Fundamentals of field machinery management to include machinery capacity, selection from capacity and economic standpoints, scheduling, acquisition options, and trade-in considerations. Estimation of operating costs of field machinery.

161. Water Quality Management for Aquaculture (3) II. Piedrahita
Lecture—3 hours. Prerequisite: Biological Sciences 1B, Mathematics 16B, Chemistry 2B. Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems.

163. Aquaculture Systems Engineering (3) III. Piedrahita
Lecture—3 hours. Prerequisite: course 161. Design of aquacultural systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling.

165. Irrigation Practices for an Urban Environment (2) III. Hills
Lecture—2 hours. Prerequisite: Physics 1A or 5A. Basic design, installation, and operation principles of irrigation systems for turn and landscape: golf courses, parks, highways, public buildings, etc. Emphasis on hardware association with sprinkler and drip/trickle systems.

170. Design in Biological Systems Technology (3) II. Miles, Steinke
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 1A or 5A and course 15, 16, or 17. Introduction and application of design procedures and tools. Techniques are presented for solving design problems and selecting appropriate materials. Catalog and handbook utilization, government safety regulations, and environmental considerations are discussed.

180. Introduction to Geographic Information Systems (5) II. Plant, Wallender
Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: Agricultural Systems and Environment 21 or the equivalent computer experience. Management and analysis of geo-referenced data. Spatial database management and modeling. Cartographic modeling. Applications to agriculture and biological resource management. Using the ARC-INFO geographic information system.

181. Geographic Information Systems Modeling (5) III. Wallender
Lecture—2 hours; laboratory—9 hours. Prerequisite: course 180. Advanced topics in Geographic Information Systems (GIS), such as raster-based GIS (GRID), triangular irregular network (TIN), and networks. Use of GIS ARC/INFO for remote sensing and modeling of environmental terrain, transportation, hydrology, and site specific crop management.

182. Environmental Analysis with Geographical Information Systems (GIS) (5) I. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: course 180; course 181 recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment. Precision farming. Natural resource management. Spatial database structures. Remote sensing applications. Data quality and error analysis in GIS. (Same course as Hydrologic Science 182.)

190C. Research Conference for Advanced Undergraduates (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Research conferences for specialized study in applied biological systems technology. May be repeated for credit. (P/NP grading only.)

192. Internship in Applied Biological Systems Technology (1-5) I, II, III. The Staff (Hills in charge)
Internship—3-15 hours. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised internship in applied biological systems technology. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Applied Biological Systems Technology (1-5) I, II, III. The Staff
Tutorial—1-5 hours. Prerequisite: upper division standing and consent of instructor. To provide teaching experience to upper division undergraduate students. Activities will vary depending on the nature of

the course. May include (but not limited to) assistance in laboratory sessions, advising on projects, tutoring on course material, and grading of homework assignments. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Hills in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Hills in charge)
(P/NP grading only.)

Graduate Courses

233. Advanced Pest Control Practices (3) II.
Giles
Lecture—2 hours; laboratory—3 hours. Prerequisite: introductory class in entomology, plant pathology, weed science or similar discipline. Practical and theoretical considerations of pest control systems and techniques. Design, selection and use of mechanical systems for field, orchard, greenhouse and vector control use. Biological, legal and environmental considerations in pest control and pesticide application.

290C. Graduate Research Conference
(1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in applied biological systems technology. May be repeated for credit. (S/U grading only.)

298. Group Study
(1-5) I, II, III. The Staff (Hills in charge)

299. Research (1-12) I, II, III. The Staff (Hills in charge)
(S/U grading only.)

Professional Course

317. Teaching Agricultural Mechanics (2) II.
J. Rumsey
Lecture—1 hour; laboratory—3 hours. Prerequisite: a course in physics; 6 units related to agricultural mechanics; enrolled in Agricultural Education Teacher Credential Program. Preparation of the teacher to plan, organize, and conduct an agricultural mechanics program in secondary schools. Development of and presentation of lesson plans and teaching aids. Review of subject matter in metal fabrication, power and machinery and agricultural structures areas.

Applied Mathematics (A Graduate Group)

Angela Y. Cheer, Ph.D., Chairperson of the Group

Group Office, 570 Kerr Hall (916-752-8131)

Faculty. Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Biological Sciences; Chemistry; Engineering: Computer Science, Chemical and Materials Science, Civil and Environmental, Electrical and Computer, and Mechanical and Aeronautical; Environmental Studies; Epidemiology and Preventive Medicine; Evolution and Ecology; Land, Air and Water Resources; Management; Mathematics; Physics; Radiology; Statistics; and Wildlife, Fish and Conservation Biology.

Graduate Study. Students prepare for careers where mathematics is applied to problems in the physical and life sciences, engineering, and management. The degree requirements consist of rigorous training in applied mathematics, including course work and a research dissertation under the direction of a member of the Applied Mathematics Graduate Group. The M.S. degree provides preparation for further study in applied mathematics or an application area, or for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching, or in industrial or national research laboratories. Areas of research in the program include differential equations, fluid mechanics, numerical analysis, operations research, systems theory, probability and stochastic processes, mathematical biology, and mathematical physics. Detailed information may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

New applicants are admitted to the fall quarter *only.*

Preparation. The program encourages application from students who have prior training in engineering, physical and life sciences, mathematics, economics, and related fields. Applicants must have completed two years of undergraduate mathematics including linear algebra, differential equations, and vector calculus. A rigorous course in advanced calculus is strongly encouraged.

Graduate Advisers. A. Cheer (Mathematics); J. Hunter (Mathematics); T. Nathan (Land, Air, and Water Resources).

Applied Physics

See Physics

Aquaculture

See Animal Biology; Animal Science; Applied Biological Systems Technology; and Wildlife, Fish and Conservation Biology

Art History

(College of Letters and Science)

Jeffrey Ruda, Ph.D., Director, Program in Art History

Department Office, 111A Art Building
(916-752-0105)

Faculty

Dianne Sachko Macleod, Ph.D., Professor
Jeffrey Ruda, Ph.D., Professor

Emeriti Faculty

Mary H. Fong, Ph.D., Professor Emerita
Daniel J. Crowley, Ph.D., Professor Emeritus
Robert J. Grigg, Ph.D., Professor Emeritus
Seymour Howard, Ph.D., Professor Emeritus

The Major Program

Art History is the study of the visual arts in civilization. It examines changing aesthetic and cultural values and significant material and ideological developments as seen in works of art and architecture. It emphasizes visual as well as verbal intelligence, providing more than the standard advantages of liberal arts training.

The Program. The student majoring in art history begins with courses which survey the arts of Asia, Europe, and America. More specialized courses follow in ancient, Byzantine, medieval, Renaissance, baroque, modern, Non-Literate, East Asian, and American art and architecture. At the same time students are encouraged to take classes in related disciplines such as religion, history, philosophy, literature, and foreign languages.

Career Alternatives. The major prepares students for advanced study either in graduate school, or in professional programs. It can also serve as the foundation for careers in teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**20**
Three courses selected from Art History 1A, 1B, 1C, 1D	12
One art studio course in drawing, printmaking, painting, or photography.	4
One art studio course in sculpture or ceramics	4
Depth Subject Matter	**36**
Nine upper division art history courses, which must be taken in at least four of the following five areas	36
(a) Ancient/Medieval/Northern Renaissance, *(b)* Southern Renaissance/Baroque, *(c)* Modern, *(d)* China/Japan, *(e)* Non-Literate	
Total Units for the Major	**56**

Minor Program Requirements:

	UNITS
Art History	**20**
Five upper division art history courses	20
Courses must be chosen from at least three of the following subject areas with no more than two courses in any single area (one lower division substitute course permissible): *(a)* Ancient/Medieval/Northern Renaissance, *(b)* Southern Renaissance/Baroque, *(c)* Modern, *(d)* China/Japan, *(e)* Non-Literate	

Honors Program. An Honors Program is available to Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade point average of 3.7 in the major. In addition to meeting the standard major requirements, the honors student completes one quarter of language in German or Chinese, one seminar (courses 190 or 198), and writes an honors thesis (course 194H). Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest Honors. See the Academic Information chapter, Letters and Science honors section, of this catalog and consult the department for more information.

Teaching Credential Subject Representative. Department Chairperson. See also the Teacher Education Program.

Graduate Study. The Program in Art History offers studies leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. Further information may be obtained by writing to the Graduate Adviser or consulting the *Graduate Announcement.*

Courses in Art History (AHI)

Lower Division Courses

1A. Ancient Art (4) I. Roller
Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire. GE credit: ArtHum.

1AG. Writing: On Ancient Art (I) I. Roller
Discussion—I hour; short papers. Prerequisite: course 1A (concurrently). Small group discussions and preparation of short papers for course 1A. GE credit with concurrent enrollment in course 1A: Wrt.

1B. Medieval and Renaissance Art (4) II. Grigg
Lecture—3 hours; discussion—1 hour. Christian, Barbarian, Moslem, and Classical traditions in European Art from the fourth through the sixteenth centuries. GE credit: ArtHum.

1BG. Writing: On Medieval-Renaissance Art (1) II. Grigg
Discussion—1 hour; short papers. Prerequisite: course 1B (concurrently). Small group discussions and preparation of short papers for course 1B. GE credit with concurrent enrollment in course 1B: Wrt.

1C. Baroque and Modern Art (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter Reformation. GE credit: ArtHum, Div.

1CG. Writing: On Baroque-Modern Art (I) III. The Staff
Discussion—I hour; short papers. Prerequisite: course 1C (concurrently). Small group discussions and preparation of short papers for course 1C. GE credit with concurrent enrollment in course 1C: Wrt.

***1D. Asian Art** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Introduction to the arts of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in Mao's China. GE credit: ArtHum, Div.

***1DG. Writing: On Asian Art** (I) I. The Staff
Discussion—I hour; short papers. Prerequisite: course 1D (concurrently). Small group discussions and preparation of short papers for course 1D. GE credit with concurrent enrollment in course 1D: Wrt.

***25. Introduction to Architectural History** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Formal and social history of architecture, examining design principles, major traditions, and concepts of architectural history with a focus on issues in Western architecture. Emphasis on nineteenth and twentieth centuries GE credit: ArtHum.

***25G. Writing: Introduction to Architectural History** (1) II. The Staff
Discussion—1 hour. Prerequisite: course 25 concurrently. Small group discussions and preparation of short papers for course 25. GE credit with concurrent enrollment in course 25: Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

***150. Arts of Subsaharan Africa** (4) III. Crowley
Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of subsaharan Africa; particular attention to the relationships between sculpture and culture in West and Central Africa. GE credit: ArtHum, Div.

151. Arts of the Indians of the Americas (4) III. Crowley
Lecture—3 hours; term paper or gallery studies and review. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile. GE credit: ArtHum, Div.

***152. Arts of Oceania and Prehistoric Europe** (4) III. Crowley
Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East. GE credit: ArtHum, Div.

153. Art, Storytelling and Cultural Identity in the Pacific (4) II. Flavell
Lecture/discussion—3 hours; term paper. Representation of the cultural identities of indigenous and migrant groups of the Pacific in visual arts and storytelling. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

154A. Early Greek Art and Architecture (4) II. Roller
Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of history and significance of major monuments in Greek art and architecture from the Homeric, Geometric Age to the Golden Age and the death of Socrates. GE credit: ArtHum, Wrt.

***154B. Later Greek Art and Architecture** (4) III. The Staff
Lecture—3 hours; gallery studies and term paper. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander to the end of the Hellenistic Age and the death of Cleopatra. GE credit: ArtHum, Wrt.

***155. Roman Art** (4) III. Roller
Lecture—3 hours; term paper or gallery studies and review. The art of Republican and Imperial Rome. GE credit: ArtHum, Wrt.

163A. Chinese Art (4) III. Fong
Lecture—3 hours; term paper or gallery studies and review. A survey from the beginning to the twelfth century focusing on the major art forms that are traditionally known as well as newly discovered through archaeology in China. GE credit: ArtHum, Div, Wrt.

***163B. Chinese Painting** (4) III. Fong
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers-and-birds, and landscape—the favorite and enduring theme of the Chinese scholar-painter. GE credit: ArtHum, Div, Wrt.

163C. Painting in the People's Republic of China (4) II. Fong
Lecture—3 hours; term paper. Prerequisite: course 1D or upper division standing. Analysis of the interaction between art and politics in the emergence of China into the modern world. Integration of Western influence, implementation of Mao Zedong's thought on art, and the formation of contemporary Chinese painting. GE credit: ArtHum, Div, Wrt.

***164. The Arts of Japan** (4) III. The Staff
Lecture—3 hours; term paper and/or gallery studies and review (determined by instructor each quarter course offered). Study of the significant achievements in architecture, painting, sculpture, and decorative arts from prehistoric age to nineteenth century. GE credit: ArtHum, Div, Wrt.

168. Great Cities (4) II. The Staff
Lecture—3 hours; term paper. Transformation in architecture and urban form in Paris, London, and Vienna in the context of varying social, political, and economic systems as well as very different cultural traditions, concentrating on the years 1830-1914. Offered in alternate years. GE credit: ArtHum, Wrt.

176A. Art of the Middle Ages: Early Christian and Byzantine Art (4) I. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian era and Byzantine Empire: through the later Roman Empire in the West and to the final capture of Constantinople in the East. GE credit: ArtHum, Wrt.

***176B. Art of the Middle Ages: Early Medieval and Romanesque Art** (4) I. The Staff
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of western Europe in the early medieval era: from the rise of the barbarian kingdoms through the twelfth century. GE credit: ArtHum, Wrt.

***176C. Art of the Middle Ages: Gothic** (4) I. The Staff
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries.

***177A. Northern European Art** (4) III. The Staff
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France and the Lowlands, including such artists as Jan van Eyck and Hieronymus Bosch. GE credit: ArtHum, Wrt.

***177B. Northern European Art** (4) I. The Staff
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Germany, France and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel. GE credit: ArtHum, Wrt.

***178A. Italian Renaissance Art** (4) II. Ruda
Lecture—3 hours; term paper or gallery studies and review. Giotto and the origins of the Renaissance; painting and sculpture in Italy from Nicola Pisano through Lorenzo Monaco, with emphasis on Duccio, Giotto, and other leading artists of the early fourteenth century. GE credit: ArtHum, Wrt.

178B. Italian Renaissance Art (4) II. Ruda
Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence; fifteenth-century artists from Donatello and Masaccio through Botticelli, in their artistic and cultural setting. GE credit: ArtHum, Wrt.

178C. Italian Renaissance Art (4) III. Ruda
Lecture—3 hours; term paper or gallery studies and review. The High Renaissance: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice in the early sixteenth century. GE credit: ArtHum, Wrt.

179B. Baroque Art (4) I. Ruda
Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez. Offered in alternate years. GE credit: ArtHum, Wrt.

182. British Art (1750-1914) (4) III. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C. Analysis of the place of art in British culture—1750 to 1914. Topics include influence of class and gender on art education, patronage, and exhibition societies. Artists: Hogarth, Turner, Pre-Raphaelites, and lesser-known advocates of military, social realist, and colonial themes. GE credit: ArtHum, Div, Wrt.

183A. Art in the Age of Revolution (4) II. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Analysis of political and stylistic implications of European painting from 1750 to 1860. Artists studied include Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet. GE credit: ArtHum, Wrt.

183B. Impressionism and Post-Impressionism (4) III. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Social and cultural study of major European art movements between 1860 and 1900, including an examination of the paintings of Manet, Monet, Renoir, Whistler, Gauguin, van Gogh, Cezanne, and Redon. GE credit: ArtHum, Wrt.

183C. Modern Art: 1900-1945 (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Examination of modern movement in European art from Fauvism and Cubism to Surrealism and Abstract Expressionism (1900-1945). Artists studied include Picasso, Matisse, Kandinsky, Malevich, and Pollock. GE credit: ArtHum, Wrt.

***183D. Modern Sculpture** (4) III. The Staff
Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present.

183E. Contemporary Art: 1945 to the Present (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Painting and sculpture in Europe and America from 1945 to the present, with emphasis on the New York school, Pop art, Op art, Earthworks, and Feminist art. GE credit: ArtHum, Div, Wrt.

***184. Twentieth Century Architecture** (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged. GE credit: ArtHum, Wrt.

188B. Architecture of the United States (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. American architecture from the first

European settlers to Postmodernism. Technological and formal developments will be examined within the social, political, and economic context in which they emerged. Issues include ideals of domesticity and the development of the architectural profession. GE credit: ArtHum, Wrt.

188C. Painting of the United States (4) I. The Staff
Lecture—3 hours; discussion—1 hour; term paper or gallery studies and review. American pictorial development from 1650 to the present, with emphasis on twentieth-century developments. GE credit: ArtHum, Wrt.

***190. Undergraduate Seminar** (4) II. The Staff (Program Director in charge)
Lecture—3 hours; term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substantial paper in a particular area of art history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrollment.

192. Internship (2–12) I, II, III. The Staff (Program Director in charge)
Internship—term paper or catalogue. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/NP grading only.)

194H. Special Study for Honor Students (4) I, II, III. The Staff
Independent study—12 hours. Prerequisite: course 190 or the equivalent, as determined by the major adviser. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee.

198. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
(P/NP grading only.)

Graduate Courses

200. Introduction to Art Historical Research (4) I. McLeod
Seminar—4 hours. Introductory sampling of major writings, methods, and sources used for research in the discipline of art history.

250. Problems in Art Historical Research (4) II. The Staff
Seminar—3 hours; term paper. Major topics in art historical research, emphasizing special methods of investigation, and of historical and critical analysis. May be repeated for credit.

***251. Seminar in Tribal Arts** (4) II. The Staff
Seminar—3 hours; term paper. Selected topics in the art and aesthetics of small scale societies. May be repeated for credit when topic differs and with consent of instructor.

***254. Seminar in Classical Art** (4) III. The Staff
Seminar—3 hours; term paper. Selected areas of special study in classical art of the Greek and Roman tradition. Course may be repeated for credit with consent of instructor.

***263. Seminar in Chinese Art** (4) II. Fong
Seminar—3 hours; paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor.

***276. Seminar in Medieval Art** (4) III. Grigg
Seminar—3 hours; term paper. Selected areas of special study in medieval art from Early Christian to late Gothic. May be repeated for credit with consent of instructor.

278. Seminar in Italian Renaissance Art (4) III. Ruda
Seminar—3 hours; term paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor.

283. Seminar in Modern European Art (4) II. Macleod
Seminar—3 hours; term paper. Selected areas of special study in art since 1800 in Europe. May be repeated for credit with consent of instructor.

***288. Seminar in European and American Architecture** (4) II. The Staff
Seminar—3 hours; term paper. Exploration of selected topics in European and American architectural history with concentration on the Modern Period. May be repeated for credit with consent of instructor.

299. Individual Study (1-6) I, II, III. The Staff (Program Director in charge)
(S/U grading only.)

Professional Course

390. Introduction to Teaching Art History for Teaching Assistants (1) I, II, III. The Staff
Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (S/U grading only.)

Professional Courses

***401. Museum Training: Curatorial Principles** (4) II. Amerson
Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers.

402. Museum Training: Exhibition Methods (4) II. Amerson
Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms.

Note: *Various of the above courses are not offered each year; please check the quarterly Class Schedule and Room Directory.*

Art Studio

(College of Letters and Science)

Robert Sommer, Ph.D., Chairperson of the Department

Department Office, 111A Art Building (916-752-0105)

Faculty

L. Price Amerson, Jr., Ph.D., Lecturer *(Director, Nelson Gallery)*
Conrad Atkinson, R.A.S. (honors), Professor
Squeak Carnwath, M.F.A., Professor
William Henderson, M.F.A., Professor
Lynn Hershman, M.A., Professor
Harvey Himelfarb, M.A., Professor, *Academic Senate Distinguished Teaching Award*
David Hollowell, M.F.A., Professor
Malaquais Montoya, M.A., Cooperating Professor
Lucy A. Puls, M.F.A., Professor
Irit Rogoff, Ph.D., Associate Professor
Cornelia Schulz, M.F.A., Professor, *Academic Senate Distinguished Teaching Award*
Baochi Zhang, M.F.A., Asistant Professor

Emeriti Faculty

Richard D. Cramer, M.F.A., Professor Emeritus
Roy DeForest, M.A., Professor Emeritus
Roland C. Petersen, M.A., Professor Emeritus
Wayne Thiebaud, M.A., hon. D.F.A. (C.C.A.C., D.C.) Professor Emeritus, *UC Davis Prize for Teaching and Scholarly Achievement*

The Major Program

The studio art major provides the knowledge and experience necessary for a broad understanding of the visual arts.

The Program. For the beginning student, the major offers an introduction to drawing, composition, sculpture, and art history. Students may then advance to more specialization (painting, sculpture, printmaking, ceramics, photography, film making, electronic arts, as well as theory and criticism) in upper division work.

Portfolios. Admitted students, once at Davis, should keep a continuing portfolio of their art work which is subject to faculty perusal at such times as when the student is declaring the major, requesting independent study courses, and scheduling an exhibition in the student gallery.

Career Alternatives. The studio art graduate is prepared for graduate work or continuing development as a professional artist or art teacher. Students who have career aspirations in the commercial aspects of the visual arts can acquire a broad general education and a creative foundation in the art studio major, establishing a basis for further specialization in commercial art.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24
Three courses from Art Studio 2, 3, 4, 5, 16; see prerequisites required for upper division courses.....12
Three courses from Art History 1A, 1B, 1C, 1D, Art Studio 30.....12

Depth Subject Matter 40
Six courses, under three different instructors, chosen from Group A, Practice of Art ...24
Group A: Art Studio 101, 102, 103, 104, 110, 111, 113, 114,115, 116, 117, 120, 125, 126, 127, 128, 141, 142, 143, 144, 145, 146, 171
Two courses from Group B, Theory and Criticism.....8
Group B: Art Studio 131, 132A, 132B, 147, 148, 149, 150
Two upper division courses in art history....8

Total Units for the Major 64

Recommended
(a) Students interested in drawing and painting should take Art Studio 2, 3, 4 (course 5 is recommended);
(b) Students interested in sculpture should take Art Studio 2, 3, 5 (course 4 is recommended); and
(c) Students preparing for graduate work in any of the environmental design professions should take Art Studio 2, 5, 16.

Major Advisers. See the *Class Schedule and Room Directory.*

Minor Program Requirements:

UNITS

Art Studio.....20
Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.
Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permissible).....20

Teaching Credential Subject Representative. Department Chairperson. See also the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. Detailed information regarding graduate study may be obtained from the Graduate Admissions Office or the Art Office.

Courses in Art Studio (ART)

Lower Division Courses

2. Drawing I (4) I, II, III. Henderson, Hollowell, Carnwath, Atkinson, Schulz and staff
Studio—6 hours. Form and composition in black and white.

3. Drawing II (4) I, II, III. Henderson, Schulz
Studio—6 hours. Prerequisite: course 2. Form and composition in color.

4. Life Drawing (4) I, II, III. Hollowell, Zhang, Schulz
Studio—6 hours. Prerequisite: course 2. Form in composition using the human figure as subject.

5. Sculpture (4) I, II, III. Puls, Zhang and staff
Studio—6 hours. Form in space using plaster and other media.

10. Introduction to Art Appreciation (4) I, II, III. The Staff
Lecture—3 hours; term paper or gallery studies and review. Understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. Does not count towards major. (P/NP grading only.)

16. Descriptive Drawing (4) I, III. Hollowell, Schulz
Studio—6 hours. Objective drawing and rendering; representations of space.

30. Introduction to Contemporary Visual Culture (4) III. Rogoff
Lecture—3 hours; discussion/laboratory—1 hour. Establishing visual literacy across the media of fine art, photography, advertising, television and film; media culture; focus on critical decoding of contemporary visual culture. GE credit: ArtHum, Div, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

Note : Upper division courses are listed under three groups: **(A)** Practice of Art; **(B)** Theory and Criticism; **(C)** Special Study Courses.

Preenrollment in upper division courses is restricted to art majors. Art minors may obtain permission to preenroll by filling out a "Waiver of Restriction" form in the Art office.

101. Painting: Materials and Carriers (4) II, III. Atkinson, Carnwath
Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Experimentation in media and their supports.

102. Painting (4) I, II, III. Carnwath, Hollowell, Thiebaud
Studio—6 hours. Prerequisite: course 101 or consent of instructor. Advanced painting in various media including oil and polymers. May be repeated once for credit with consent of instructor.

103. Advanced Drawing (4) III. Carnwath
Studio—6 hours. Prerequisite: course 2, 3, 4, 16, or consent of instructor. Advanced drawing, composition and form in black and white and color. May be repeated once for credit with consent of instructor.

104. Figure Drawing and Painting (4) I, III. Schulz, Hollowell
Studio—6 hours. Prerequisite: courses 4 and 101, or consent of instructor. Advanced figure drawing and painting using the human figure as subject. May be repeated once for credit with consent of instructor.

110. Photography I (4) I, II, III. The Staff
Studio—6 hours. Prerequisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with camera and light sensitive materials.

111. Photography II (4) II. The Staff
Studio—6 hours. Prerequisite: course 110 or consent of instructor. Art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated once for credit with consent of instructor.

113. Interdisciplinarity (4) II. Hershman
Studio—6 hours. Prerequisite: one course in Art History or Art Studio. Focus on the uses of two or more art forms to make a unique art work; also, ideas of collaboration and reconfigured and integrated forms as new methods of expression that do not solely depend on unique authorship.

114. Identity and Technology (4) II. Hershman
Studio—6 hours. Prerequisite: one course in Art History or Art Studio. The notion of "self", "portraiture" and "identity" as it is defined in an electronic world in which media alters perceptions of belief as individuals and society. Hands-on projects plus theoretical analysis of media.

***115. Film-making I** (4) I. The Staff
Studio—6 hours. Prerequisite: courses 2, 3, 4, or consent of instructor. Film-making as an art form; 8 and 16 mm. cameras and sound track. May be repeated once for credit with consent of instructor.

116. Video Practice and Theory (4) III. Hershman
Studio—6 hours. Prerequisite: 12 units of lower division art studio classes. Production techniques of video, including shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques.

117. Experimental Documentary (4) III. Hershman
Studio—6 hours. Prerequisite: upper division standing. Study of the documentary form with particular attention to hybrid forms of film, video and computer genres. May be repeated once for credit with consent of instructor when topic differs.

***120. Intermedia Art** (4) III. Zhang
Studio—6 hours. Prerequisite: three courses chosen from the following: courses 2, 3, 4, 5, and 16. Use of multiple media in artmaking. Human body as artistic medium. Non-traditional visual media. Problem solving on conceptual and technical levels. Visual metaphors, narrative, intuition, meaning and expression in art. May be repeated once for credit when topic differs and with consent of instructor.

125. Printmaking: Relief (4) II. The Staff
Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials.

126. Printmaking: Intaglio (4) I, III. Atkinson
Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate etching, aquatint, hard- and soft-ground, burin engraving and related methods. May be repeated once for credit with consent of instructor.

127. Printmaking: Lithography (4) II. The Staff
Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal-plate lithography and other planographic methods. May be repeated once for credit with consent of instructor.

***128. Printmaking: Serigraphy** (4) III. The Staff
Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Silk screen and related stencil methods. May be repeated once for credit with consent of instructor.

131. Gender, Vision, and Difference (4) II. Rogoff
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 30 or Women's Studies 50. Examination of the way vision establishes power relations within cultures. How vision and visual culture determine who is visible and invisible, who is beautiful and who is ugly, and who is included and who is excluded within the languages of culture. GE credit: ArtHum, Div, Wrt.

***132A. The Tradition of Modernism** (4) I. Rogoff
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: one of course 30, or Art History 183A, 183B, 183C or 184. The emergence of modernism in painting and sculpture, from the early twentieth century to the 1940s. Critical examination of the emergence of modernism, the ideologies it supported, and the exclusions it practiced. Offered in alternate years. GE credit: ArtHum, Wrt.

***132B. The Theory of Modernism** (4) II. Rogoff
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 132A. Re-examination of materials of Modernist art through a set of critical analytical tools which will help in understanding what cultural and ideological beliefs these art forms sustained. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

141. Sculpture: Material Explorations (4) II. Puls
Studio—6 hours. Prerequisite: course 5. Primary application and exploration of a single sculptural material. Examination of its properties, qualities and characteristics for three-dimensional expression. May be repeated twice for credit in different subject area with consent of instructor.

142. Sculpture: Ceramics I (4) I, II. The Staff
Studio—6 hours. Prerequisite: course 2, 3, 4 and 5, or consent of instructor. Introduction to ceramic forms and processes.

143. Sculpture: Ceramics II (4) II. The Staff
Studio—6 hours. Prerequisite: course 142 or consent of instructor. Introduction to color, as well as glazing and use of kiln. May be repeated once for credit with consent of instructor.

144. Sculpture: Figure Modeling (4) III. Zhang
Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

145. Sculpture: Concepts (4) III. Puls
Studio—6 hours. Prerequisite: course 5 or consent of instructor. Investigation through the creation of sculpture of the relationship of idea to form and material. May be repeated once for credit in different subject area with consent of instructor.

146. Sculpture: Ceramics III (4) III. The Staff
Studio—6 hours. Prerequisite: course 141, 143, 144, or 145. Advanced form and color. Clay sculpture in relief and round. May be repeated once for credit with consent of instructor.

147. Theory and Criticism of Photography (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present. GE credit: ArtHum, Wrt.

148. Theory and Criticism: Painting and Sculpture (4) II. Thiebaud
Lecture—3 hours; term paper. Prerequisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces. GE credit: ArtHum, Wrt.

149. Introduction to Critical Theory (4) I. Rogoff
Lecture—3 hours; discussion—1 hour. Prerequisite: two of Art History 1B, 1C, or 183F. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture. GE credit: ArtHum, Div, Wrt.

150. Theory and Criticism of Electronic Media (4) I. Hershman
Lecture—3 hours; term paper. Prerequisite: course 116 or 117. The history of electronic media, stressing both critique, application and relationship to art practice. Analysis of the conceptual biases of electronic media as an artistic mode of expression. GE credit: ArtHum, Wrt.

171. Mexican and Chicano Mural Workshop (4) III. Montoya
Studio—8 hours; independent study—1 hour. Prerequisite: Chicana/o Studies 70 and/or written consent of instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated once for credit. (Same course as Chicana/o Studies 171.)

***Group C:** Special Study Courses*

192. Internship (2-12) I, II, III. The Staff (Chairperson in charge)
Internship—term paper or catalog. Supervised program of internships at professional art institutions such as museums, galleries, and art archives includ-

ing collections of slides and photographs. May be repeated once for credit. (P/NP grading only.)

***193. Seminar in Art Practice** (4) I, II, III. The Staff (Chairperson in charge)
Discussion/laboratory—8 hours; variable—4 hours. Prerequisite: courses 2 and 3; upper division standing: taking or having taken courses in upper division drawing, painting, and sculpture. Work (painting, sculpture, drawing, etc.) done for group discussion and criticism, as well as group discussion of contemporary topics in the visual arts. May be repeated once for credit.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

290. Seminar (4) I, II, III. Rogoff, Carnwarth, Atkinson
Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

291. Seminar: Critical Evaluation (1) II. The Staff (Graduate Adviser in charge)
Seminar—1 hour. May be repeated for credit. (S/U grading only.)

292. Seminar: Comprehensive Qualifying (1) I. The Staff (Graduate Adviser in charge)
Seminar—1 hour. Further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.)

299. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Comprehensive Project (9) III. The Staff (Graduate Adviser in charge)
An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.)

Professional Courses

***401. Museum Training: Curatorial Principles** (4) II. Amerson
Seminar—3 hours; papers. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums.

402. Museum Training: Exhibition Methods (4) II. Amerson
Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms.

Note: *Various of the above courses are not offered each year; please check the quarterly Class Schedule and Room Directory.*

Asian American Studies

(College of Letters and Science)

Stanley Sue, Ph.D., Director

Program Office, 3102 Hart Hall (916-752-3625)

Committee in Charge

Angela Y. Cheer, Ph.D. *(Mathematics)*
Roy H. Doi, Ph.D. *(Molecular and Cellular Biology)*
Isao Fujimoto, M.A. *(Human and Community Development, Asian American Studies)*
Darrell Y. Hamamoto, Ph.D. *(Asian American Studies)*
Wendy A. Ho, Ph.D. *(Asian American Studies, Women's Studies)*
Carl C. Jorgensen, Ph.D. *(Sociology)*
Peter C.Y. Leung, M.S. *(Asian American Studies)*
Beatriz Pesquera, Ph.D. *(Chicana/o Studies)*
Kent Ono, Ph.D. *(American Studies, Asian American Studies)*
Stanley Sue, Ph.D. *(Asian American Studies, Psychology)*
Stefano Varese, Ph.D. *(Native American Studies)*

Faculty

Darrell Y. Hamamoto, Associate Professor
Wendy A. Ho, Ph.D., Assistant Professor
Peter C.Y. Leung, M.S., Senior Lecturer
Kent A. Ono, Assistant Professor
Karen Shimakawa, Ph.D., Assistant Professor
Stanley Sue, Ph.D., Professor

Program of Study. Currently, Asian American Studies does not offer a major. A minor program in Asian American Studies is available to students interested in this field of study.

American History and Institutions. This university requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2. (See also under University Requirements.)

Related Courses. For courses in Asian languages, see Cantonese (below) and Chinese and Japanese. For other Asian courses, see Chinese and Japanese, and East Asian Studies.

Minor Program Requirements:

	UNITS
Asian American Studies	**20**
Asian American Studies 100, 110	8
An additional three courses from Asian American Studies 101, 111, 112, 130, 136, 150, 155, 192 (No more than 4 units of 192 may be counted toward this total)	12

Minor Adviser. P.C.Y. Leung.

Courses in Asian American Studies (ASA)

Direct questions pertaining to the following courses to the instructor or to Asian American Studies Program, 3102 Hart Hall (916-752-3625).

Lower Division Courses

1. Historical Experience of Asian Americans (4) II. Hamamoto
Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asians in America from the 1840s to the present within the context of the development of the United States. GE credit: SocSci, Div, Wrt.

2. Contemporary Experience of Asian Americans (4) I. Hamamoto; II. Ono
Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through analysis of relationships between ethnicity, race, and culture. Identity development of Asian Americans and their communities in the context of contemporary American institutional practices. GE credit: SocSci, Div, Wrt.

20. Calligraphic Expression in Asian American Culture (3) II. Leung
Lecture—2 hours; studio—3 hours. Survey the legacy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and appreciation of calligraphy through some basic writing. Trace origins, principles and styles of Chinese and Japanese calligraphy. Offered in alternate years.

92. Internship (1-3) I, II, III. The Staff (Director in charge)
Internship—3-9 hours. Prerequisite: enrollment dependent on availability of intern positions and consent of instructor. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Primarily intended for lower division students. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III The Staff (Director in charge)
(P/NP grading only.)

Upper Division Courses

100. Asian American Communities (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

***101. Language and Educational Issues of Asian Immigrants** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity issues in American society, especially in public schools. Overview of public policies on language and programs, particularly for Asian language minority students. Offered in alternate years.

110. Theoretical Perspectives in Asian American Studies (4) I. Hamamoto
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Theories of race and ethnic relations as tools for understanding the Asian American experience with the society as the unit of analysis. GE credit: SocSci, Div.

111. Ethnic Self and Identity (4) III. Sue
Lecture/discussion—4 hours. Prerequisite: course 101. Study of cultural and social psychological influences on Asian Americans, with the individual as the unit of analysis. GE credit: SocSci, Div.

112. Asian/Pacific American Women (4) II. Ho
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of the cultural, social, and political situation of Asian and Pacific American women using theoretical perspectives from social science disciplines: socialization, family dynamics, domestic and political power, economic production, and division of labor. GE credit: SocSci, Div.

120. Biracial and Multiracial Asian Pacific American Experiences (4) III. Ono
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Introduction to the experiences of biracial and multiracial Asian Pacific people in the U.S., concentrating on theories of race, racial identity formation, culture, media, and anti-racist struggles. Provides critical approaches to the analysis of popular media and academic representations. Offered in alternate years. GE credit: Div.

130. Asian American Literature (4) III. Ho
Lecture/discussion—4 hours. Prerequisite: course 1 or 2, or consent of instructor. Analysis of Asian American writings as expressions of various cultural themes, psychological issues, interpersonal relationships and sociopolitical influences on the Asian American experience.

136. Asian American Drama (4) III. Ho, Shimakawa
Lecture/discussion—4 hours. Prerequisite: courses 1, 2, or 130; or consent of instructor. Comparative introduction to the dramatic literature of Asian American playwrights such as Frank Chin, Philip Kan Gotanda, Velina Hasu Houston, David Henry Hwang, Wakako Yamauchi, and others from diverse socio-historical, artistic, and theoretical contexts.

150. Filipino American Experience (4) I. The Staff
Lecture/discussion—4 hours. Prerequisite: course 1 or 2. Examination of the relationship between the Filipino-American community, the Philippine home community and the larger American society through a critical evaluation of the historical and contemporary conditions, problems and prospects of Filipinos in the U.S.

155. Legal History and the Asian American (4) III. Shimakawa
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; consent of instructor. Legal history of Asian Americans beginning with the experience of Chinese

Americans in the mid-19th century. Includes an examination of laws affecting Asian American communities in immigration, economic activities, and World War II internment.

192. Internship (1-5) I, II, III. The Staff (Director in charge)
Internship—3-15 hours. Prerequisite: enrollment dependent on availability of intern position with priority to Asian American Studies minors. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.)

197T. Tutoring in Asian American Studies (1-5) I, II, III. The Staff (Director in charge)
Tutoring—1-5 hours. Prerequisite: upper division standing and completion of appropriate course with distinction; consent of instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated for credit once for a given course and also for a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. Primarily intended for upper division students. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Courses in Cantonese (CAN)

Lower Division Courses

1-2-3. Elementary Cantonese (5-5-5) I-II-III. Leung
Lecture—3 hours; recitation—3 hours. Introduction to Cantonese grammar and development of conversational skills in a cultural context. Approximately 250 Chinese characters will be introduced during Cantonese 2 and 3. (Not open to native speakers.)

4-5-6. Intermediate Cantonese (3-3-3) I-II-III. Leung
Lecture—2 hours; recitation—2 hours. Prerequisite: course 1-2-3 or the equivalent. Development of conversational skills in a cultural context. Community-oriented language materials in health care, social service, and bilingual education will be introduced.

Asian Studies

See Asian American Studies; and East Asian Studies

Astronomy

See Physics

Atmospheric Science

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Land, Air and Water Resources.

The Major Program

Atmospheric science is the study of the layer of air that surrounds the planet. It includes all weather phenomena, such as frontal systems and clouds, as well as severe weather events such as hurricanes and tornadoes. Concerns regarding the effects of human activity on the quality of the air we breathe, and on possible global warming are also central to this field of study.

The Program. Modern meteorology is a quantitative science that is becoming increasingly computer oriented. In addition to the study of daily weather events, the program deals with fundamental physical processes that involve the general circulation of the atmosphere; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; atmospheric interaction with the biosphere; climate variations; air pollution meteorology; and developments in modern meteorological instrumentation. As well as providing a broad background in meteorology, the major includes an informal minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science.

Internships and Career Alternatives. Atmospheric science students have participated in internships with the California Air Resources Board, various county Air Pollution Control Districts, and the National Weather Service. Numerous career opportunities exist in the federal and state governments, research and development in the private sector, and education. Examples of career areas are weather forecasting, agricultural meteorology, air-pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, environmental consulting, and weather research. About half of our graduates continue their education by seeking the M.S. or Ph.D. degree in atmospheric science.

B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 62
Biological sciences courses selected with adviser's approval 8
Chemistry (Chemistry 2A, 2B) 10
Computer science (Engineering 5 or the equivalent in FORTRAN programming) 3
Mathematics (Mathematics 21A, 21B, 21C, 21D, 22A, 22B) 22
Meteorology (Atmospheric Science 60) 4
Physics (Physics 9A, 9B, 9C) 12
Statistics (Statistics 32) 3

Breadth/General Education 28
Satisfaction of General Education requirement; additional units in social sciences and humanities to total 28 units.

Depth Subject Matter 32
Atmospheric Science 110, 111, 120, 121A, 121B, 124, 128 25
Upper division Atmospheric Science courses selected with adviser's approval 7
No more than 3 units of courses 192 and 199 may be counted.

Restricted Electives 21
Earth and planetary sciences (choose from Environmental Studies 116, 150A, 150B, Geography 117, Geology 108N, 115N, Environmental and Resource Sciences 103, Soil Science 100, Hydrologic Science 100, 141, or courses approved by adviser) 6
Coordinated group of courses (minor area) to be chosen with adviser's approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science (at least 10 upper division units) 15

Unrestricted Electives 29-37

Total Units for the Degree 180

Major Adviser. S. Soong *(Land, Air and Water Resources).*

Advising Center for the major, as well as for graduate studies, is located in 148 Hoagland Hall in the Land, Air and Water Resources Teaching Center (916-752-1669).

Minor Program Requirements:

Minor Program. The minor in Atmospheric Science provides a broad treatment of weather and climate, with the option to focus on such topics as climate change, meterological instrumentation, and satellite remote sensing. Students undertaking the minor should have completed minimum preparatory course work in calculus and physics (Mathematics 16A-16B, Physics 5A or 7A). Some upper division courses in Atmospheric Science have as prerequisites the Mathematics 21 and 22 series and the Physics 9 series.

UNITS

Atmospheric Science 20-24
Atmospheric Science 60, 110 8
Four courses selected with the approval of the minor program adviser from the following: upper division Atmospheric Science courses (excluding 192 or 199) or Environmental and Resource Sciences 131 12-16

Minor Adviser. S-T. Soong.

Graduate Study. You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees. For details see under the Graduate Group in Atmospheric Science. See also the Graduate Studies section in this catalog.

Related Courses. See Environmental Studies 150A; Physics 104A, 104B; Environmental and Resource Sciences 103, 131.

Courses in Atmospheric Science (ATM)

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center, 148 Hoagland Hall (916-752-1669).

Lower Division Courses

5. Global Climate (3) II. Shelton
Lecture—2 hours; discussion—1 hour. Introduction to the climate system and global climate patterns. Emphasis on principles, concepts, and fundamental processes underlying seasonal and regional climate differences. Examination of natural and human factors contributing to climate change. GE credit: SciEng, Wrt.

10. Severe and Unusual Weather (3) III. Carroll
Lecture—2 hours; discussion—1 hour. Prerequisite: high school physics. Introduction to physical principles of severe and unusual weather: flood, blizzards, thunderstorms, lightning, tornadoes, and hurricanes. Emphasis on scientific perspective and human context. Not open to students who have received credit for course 100. (Former course 100.) GE credit: SciEng, Wrt.

30. Issues in Atmospheric Science (2) II. Paw U, Weare
Lecture—1 hour; discussion—1 hour. Prerequisite: high school physics. Introduction to selected topics in atmospheric science, such as: meteorological aspects of air pollution, use of computer models in weather forecasting, theories of global climate change, impact of satellites on meteorology, and modern meteorological instrumentation. (P/NP grading only.)

60. Atmospheric Physics and Dynamics (4) I. Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A and Physics 5A. Composition and thermal structure of the atmosphere. Radiation and the heat budget of the earth and its atmosphere. Cloud formation and precipitation processes. The atmosphere in motion, thunderstorms and other severe weather phenomena.

92. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division

*Course not offered this academic year.

standing and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

110. Weather Observation and Analysis (4) II. Soong
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 60. Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stability indices, probability of local severe weather, weather map analysis. Use of National Weather Service analyses and forecast products. Laboratory makes use of computer-generated analyses.

111. Weather Analysis and Prediction (5) I. Grotjahn
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110, 121B, knowledge of FORTRAN (Engineering 5). Introduction to the tools used for analyzing and predicting mid-latitude weather systems. Quasi-geostrophic theory related to weather prediction and weather forecast model design and verification. Laboratory develops computer methods to illustrate topics in lecture.

115. Hydroclimatology (3) II. Shelton
Lecture—3 hours. Prerequisite: course 60. Examination of climate as the forcing function for the hydrologic system. Emphasis on seasonal variations in the relationship between precipitation and evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic fluctuations.

***116. Climate Change** (3) II. Shelton
Lecture—3 hours. Prerequisite: course 60. Climate trends and patterns spanning the recent past and the future. Emphasis on natural processes that produce climate variations and human influence on these processes. Evidence of climate change and the role of global climate models in understanding climate variability.

120. Atmospheric Thermodynamics and Cloud Physics (3) I. Weare
Lecture/discussion—3 hours. Prerequisite: Mathematics 21C; Physics 9A; course 60 (may be taken concurrently). Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud nucleation, cloud growth by condensation and collision, cloud models.

121A. Atmospheric Dynamics (3) II. Nathan
Lecture—3 hours. Prerequisite: course 120, Mathematics 21D, Physics 9B. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology.

121B. Atmospheric Dynamics (3) III. Nathan
Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems: Rossby waves; Helmholtz waves; the effect of turbulence; boundary layers; the Ekman layer. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes; cumulus models.

124. Meteorological Instruments and Observations (3) I. Shaw
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 60; Physics 5C. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.

128. Radiation and Satellite Meteorology (4) II. Weare
Lecture/discussion—3 hours; discussion/laboratory—2 hours. Prerequisite: course 60, Physics 9B, Mathematics 22B, 21D. Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness.

133. Biometeorology (4) II. Snyder
Lecture—3 hours; discussion—1 hour. Prerequisite: two courses in a biological discipline; Mathematics 16B and consent of instructor. Atmospheric and biological interactions. Physical and biological basis for water vapor, carbon dioxide and energy exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks.

149. Introduction to Air Pollution (3) I. Carroll, Chang, Raabe (Civil Engineering)
Lecture—3 hours. Prerequisite: Mathematics 22B, 21D; Chemistry 2B; course 121A or Engineering 103A. Examination of physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Civil and Environmental Engineering 149.)

***150. Computer Methods in Meteorology** (4) II. Grotjahn
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Engineering 5, Mathematics 22B, and a course in fluid dynamics (course 121A, Physics 104A or Engineering 103A), or consent of instructor. Numerical techniques and their applications to meteorological problems. Finite differencing and spectral (Fourier transform) methods. Advection equation, simple forecast models, eigenvalue matrices, time series. Students will write and run FORTRAN programs to illustrate these topics.

158. Boundary-Layer Meteorology (4) III. Shaw
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development and structure of the atmospheric layer directly influenced by the underlying surface and extending to a maximum of about two kilometers under convective conditions. Turbulent diffusion in the boundary layer. The microclimate at and near the ground surface.

160. Introduction to Atmospheric Chemistry (3) II. Anastasio
Lecture—3 hours. Prerequisite: Chemistry 2A, 2B. Quantitative examination of current local, regional, and global problems in atmospheric chemistry. Topics include photochemical smog, acid deposition, climate change, and stratospheric ozone depletion. Basic chemical modeling of atmospheric reaction systems.

192. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.)

Graduate Courses

***200. Atmospheric Processes** (3) I. Grotjahn
Lecture—3 hours. Prerequisite: Mathematics 22B-22C; Physics 9B. Advanced phenomenological and physical study of atmospheric structure and processes including radiation, statics, thermal structure and weather phenomena. Accelerated presentation of the major topics covered in courses 60, 110A-110B, 120, and 128. Credit not allowed to students having completed any two of these courses.

***221. Advanced Atmospheric Dynamics** (3) II. Nathan
Lecture—3 hours. Prerequisite: course 121B. Conditions for instability in stratified atmospheres; baroclinic instability; forced topographic Rossby Waves; wave-mean flow interaction theory; tropical dynamics; stratospheric dynamics.

223. Advanced Boundary-Layer Meteorology (3) III. Shaw
Lecture—3 hours. Prerequisite: course 230. Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Offered in alternate years.

***230. Atmospheric Turbulence** (3) III. Shaw
Lecture—3 hours. Prerequisite. course 121B or 158. Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence; Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Offered in alternate years.

***231. Advanced Air Pollution Meteorology** (3) III. Carroll
Lecture—3 hours. Prerequisites: Course 149A, 160 and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Offered in alternate years.

***233. Advanced Biometeorology** (3) II. Paw U
Lecture/discussion—3 hours. Prerequisite: course 133 or consent of instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Offered in alternate years.

240. General Circulation of the Atmosphere (3) II. Grotjahn
Lecture—3 hours. Prerequisite: course 121B. Large-scale, observed atmospheric circulations. Energy and momentum balances derived and compared with observations. Theoretical framework developed to synthesize observed features. Offered in alternate years.

241. Climate Dynamics (3) I. Weare
Lecture/discussion—3 hours. Prerequisite: course 121B. Dynamics of large-scale climatic variations over time periods from weeks to centuries. Description of the appropriate methods of analysis of atmospheric and oceanic observations. Conservation of mass, energy and momentum. Introduction to the range of climate simulations.

***250. Meso-Scale Meteorology** (3) I. Soong
Lecture—3 hours. Prerequisite: graduate standing, course 150, a course in partial differential equations; or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Offered in alternate years.

255. Numerical Modeling of the Atmosphere (4) III. Soong
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 121B and Engineering 5; course 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model develpment using the shallow water equations and the primitive equations. Operational forecast models. Offered in alternate years.

270A-G. Topics in Atmospheric Science (1-3) I, II, III. The Staff
Discussion—1-3 hours. Applications and concepts in **(A)** Meteorological Statistics; **(B)** Computer Modeling of the Atmosphere; **(C)** Design of Experiments and Field Studies in Meteorology; **(D)** Solar and Infrared Radiation in the Atmosphere; **(E)** Aerosol and Cloud

Physics; **(F)** Atmospheric Chemistry; **(G)** General Meteorology.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.)

291A-F. Research Conference in Atmospheric Science (1-3) I, II, III. The Staff
Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in: **(A)** Air Quality Meteorology; **(B)** Biometeorology; **(C)** Boundary Layer Meteorology; **(D)** Climate Dynamics; **(E)** General Meteorology; **(F)** Atmospheric Chemistry. May be repeated up to a total of 6 units per segment. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Atmospheric Science (A Graduate Group)

Terrence R. Nathan, Ph.D., Chairperson of the Group (916-752-1609)

Group Office, 151 Hoagland Hall (916-752-1406; World Wide Web: http://www-atm.ucdavis.edu)

Faculty. Includes eighteen faculty members from the Departments of Land, Air and Water Resources, Mechanical Engineering, Civil and Environmental Engineering, Physics, the Institute of Toxicology and Environmental Health, and the Division of Environmental Studies.

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. The student can place emphasis on graduate work in one or more of the following fields: air quality meteorology, atmospheric chemistry, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large scale dynamics, and mesoscale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Considerable flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

Graduate Adviser. K.T. Paw U *(Land, Air and Water Resources, 752-1510).*

Graduate Admissions Officer. T.R. Nathan *(Land, Air and Water Resources, 752-1609).*

Avian Medicine

See Medicine and Epidemiology

Avian Sciences

(College of Agricultural and Environmental Sciences)

Kirk C. Klasing, Ph.D., Interim Chairperson of the Department

Department Office, 2223 Meyer Hall (916-752-1300)

Faculty

Mary E. Delany, Ph.D., Assistant Professor
John M. Eadie, Ph.D., Assistant Professor
Annie J. King, Ph.D., Associate Professor
Kirk C. Klasing, Ph.D., Professor
Joy A. Mench, Ph.D., Professor
James R. Millam, Ph.D., Associate Professor
Kathryn Radke, Ph.D., Associate Professor
Wesley W. Weathers, Ph.D., Professor
Barry W. Wilson, Ph.D., Professor

Emeriti Faculty

Ursula K. Abbott, Ph.D., Professor Emeritus
Hans Abplanalp, Ph.D., Professor Emeritus
C. Richard Grau, Ph.D., Professor Emeritus
F. Howard Kratzer, Ph.D., Professor Emeritus
Frank X. Ogasawara, Ph.D., Professor Emeritus
Pran N. Vohra, Ph.D., Professor Emeritus
Wilbor O. Wilson, Ph.D., Professor Emeritus

Affiliated Faculty

Francine A. Bradley, Ph.D., Lecturer
Ralph A. Ernst, Ph.D., Lecturer
Alida Morzenti, M.S., Lecturer

The Major Program

Avian sciences is the study of birds and the ways in which they relate to and are useful to humans. The major combines the study of avian wildlife and their environments, production and marketing of domestic birds and eggs, caged exotic bird management, and basic and applied laboratory research on birds with a broad introduction to biological science.

The Program. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field give students a large role in selecting and designing their own course work. Students may specialize in a bachelor's program that qualifies them for a particular career or they may choose a program to meet other broader intellectual and cultural interests.

Internships and Career Alternatives. Independent study, undergraduate research, and internships are emphasized in the avian sciences program. Birds for laboratory or special study are housed within the main building as well as at the research farm and the experimental aviary. An avian sciences major has a variety of career options: health-oriented research, teaching biology, gamebird production, domestic and foreign agricultural extension and advisory services, governmental agencies, or the domestic or exotic bird industries. A recent survey has shown that the majority of avian sciences graduates enter graduate school or are employed by the domestic bird industry. The remainder of the graduates were evenly distributed in the categories of professional schools, avian biology agencies, educational fields, and individual jobs indirectly associated with birds.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 61
Avian sciences (Avian Sciences 11 or 13)...3-4
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A, 2B, 2C) 15
Computer science (Agricultural Systems and Environment 21) 3
Mathematics (Mathematics 16A, 16B, 16C) ..9
Physics (Physics 1A and 1B) 6
Statistics (Statistics 13) 4

Breadth Subject Matter 24
Satisfaction of General Education requirement 24

Depth Subject Matter 24
Biochemistry (Biological Sciences 102 and 103) 6
Genetics (Biological Sciences 101) 4
Nutrition (Avian Sciences 150-150L or Nutrition 110) 5
Physiology (Neurobiology, Physiology and Behavior 101) 5
Laboratory units in above listed subjects ...4
(Recommended courses include Animal Science 135, Avian Sciences 150L, Biochemistry 101L, or Neurobiology, Physiology and Behavior 101.)

Restricted Electives 31
Specialized courses related to avian species to supplement or expand depth subject matter courses.

Unrestricted Electives 26-38

Total Units for the Degree.....180

Major Adviser. K.L. Radke.

Advising Center for the major is located in 1202 Meyer Hall (916-752-6118).

Minor Program Requirements:

UNITS

Avian Sciences 18
Choose one from Avian Sciences 11, 13, 14L, 15L, 16L 2-3
Choose remaining units from Avian Sciences 100, 103, 115, 121, 123, 149, 150, Animal Science 143, Evolution and Ecology 137, Neurobiology, Physiology and Behavior 117, Wildlife, Fish and Conservation Biology 111.

Graduate Study. Further training is available through graduate or professional programs in animal physiology, genetics, nutrition, or veterinary medicine. The M.S. degree is offered in Avian Sciences. For details see under the Graduate Group in Avian Sciences. See also the Graduate Studies section in this catalog.

Related Courses. See Agricultural and Resource Economics 130; Animal Science 143; Food Science and Technology 120, 120L, 121; International Agricultural Development 102; Molecular and Cellular Biology 150, 150L; Nutrition 123.

Courses in Avian Sciences (AVS)

Lower Division Courses

11. Introduction to Poultry Science (3) II. Bradley
Lecture—3 hours; one field trip required. The mosaic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. GE credit: SciEng, Wrt.

13. Birds, Humans and the Environment (3) I. Wilson, Morzenti
Lecture—2 hours; discussion—1 hour; half-day field trip. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecotoxicology and conservation. Current environmental issues are emphasized. GE credit: SciEng, Wrt.

14L. Management of Captive Birds (2) II. Morzenti
Fieldwork—3 hours; lecture/discussion—1 hour. Prerequisite: consent of instructor. One weekly discussion and field trip to study practical captive management (housing , feeding, equipment, marketing, diseases). Visit facilities rearing birds such as com-

*Course not offered this academic year.

mercial parrots, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons.

15L. Captive Raptor Management (2) I, II, III. Morzenti
Laboratory—3 hours; independent study—3 hours; one field trip. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including their husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements.

16LA-16LB-16LC. Raptor Migration and Population Fluctuations (2-2-2) I-II-III. Morzenti
Fieldwork—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: consent of instructor. Identify raptors; study effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data; compare with previous years. Species, observations, emphasis are different each quarter.

92. Internship in the Avian Sciences (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Internship on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Problems in avian biology; nutrition, breeding, and physiology of poultry/wild birds and their products. (P/NP grading only.)

Upper Division Courses

100. Avian Biology (3) I. Weathers
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Survey of avian natural history and study of the diversity, functional morphology, behavior, ecology and evolution of birds.

103. Avian Development and Genetics (3) I. Delany
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101, Molecular and Cell Biology 150. Unique features of avian development and genetics. Development topics: gametogenesis, fertilization, pre- and post oviposital development, morphogenesis, sex differentiation, specialized organ systems, incubations, hatching. Genetic topics: genome organization, inheritance, sex determination, avian models. Laboratory exercises: embryology, genetics, model systems.

115. Raptor Biology (3) II. Morzenti
Lecture—3 hours; two Saturday field trips. Prerequisite: Biological Sciences 1A or the equivalent. Study of birds of prey: classification, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry.

***121. Avian Reproduction** (2) II. Millam
Lecture—2 hours. Prerequisite: Biological Sciences 1A, 1B. Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation. Offered in alternate years.

123. Management of Birds (3) II. Millam
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smuggling. Emphasis on exotic species and the role of captive propagation in conservation. Offered in alternate years.

***149. Egg Production Management** (2) III. Ernst
Lecture—2 hours; one Saturday field trip required. Prerequisite: course 11 or the equivalent, or consent of instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg processing and raising replacement pullets. Offered in alternate years.

150. Nutrition of Birds (1) III. Klasing
Lecture—1 hour. Prerequisite: Nutrition 110 (may be taken concurrently). Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. Offered in alternate years.

***150L. Nutrition of Birds Laboratory** (2) III. King
Laboratory—6 hours. Prerequisite: course 150. Feeding trials to show nutrient requirements. Metabolizable energy study and proximate analysis of feed. Determination of vitamins, minerals, fatty acids and other nutrients or substances in feed with emphasis on use of laboratory equipment.

160. Designing and Performing Experiments in Avian Sciences (2) I, II, III. The Staff
Laboratory—6 hours. Prerequisite: course 100 or Wildlife, Fish and Conservation Biology 111 or Evolution and Ecology 137 or consent of instructor. Experiments in current problems in avian biology. Introduction to experimental design. Student choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor.

***170. Advanced Avian Biology** (4) II. Weathers
Lecture/discussion—3 hours; term paper. Prerequisite: Agricultural Systems and Environment 21 and Statistics 13 or the equivalent courses; course 100 or Evolution and Ecology 137-137L or Wildlife, Fish and Conservation Biology 111-111L, or consent of instructor. Students use information technology, microcomputers and allometric analysis to conduct their own research into topics such as the evolution of clutch size, parental effort, locomotion, foraging, growth and development, and energetics. Analytical synthesis and critical thought emphasized. Offered in alternate years.

190. Seminar in Avian Sciences (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: upper division standing in Avian Sciences and consent of instructor. May be repeated three times for credit. (P/NP grading only.)

192. Internship in Avian Sciences (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

195. Topics in Current Research (1-3) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—variable. Hours will depend on instructor with the number of units being commensurate with time in class. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.

197T. Tutoring in Avian Sciences (1-3) I, II, III. The Staff (Chairperson in charge)
Hours and duties vary depending upon course being tutored. Prerequisite: Avian Sciences or related major; advanced standing; consent of instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of course; written critiques of teaching procedures. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

220. Cellular Proliferation and Oncogenes (4) I. Radke, Oberbauer
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101, 102, 103, 104; Genetics Graduate Group 201C or Molecular and Cellular Biology 221D or Microbiology 200C recommended. Regulation of growth and division of animal cells. The cell cycle, oncogenes, retroviruses and growth factors will be discussed in the context of normal and cancerous growth. Critical reading and writing are emphasized.

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

290C. Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion. (S/U grading only.)

297T. Supervised Teaching in Avian Sciences (1-4) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-4 hours. Prerequisite: graduate standing and consent of instructor. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Avian Sciences (A Graduate Group)

J.R. Millam, Ph.D., Chairperson of the Group

Group Office, 1202 Meyer Hall (916-752-1301)

Faculty. Consists of members from several departments in the College of Agricultural and Environmental Sciences, Division of Biological Sciences, and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. The areas of specialization that may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food chemistry, management, ecology, genetics, comparative incubation, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis or comprehensive examination, are available.

Preparation. It is expected that the student will have had undergraduate preparation in a field appropriate to the course of study selected. The student will be expected to have had courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

Graduate Adviser. C.C. Calvert *(Animal Sciences).*

Biochemistry

See Biological Sciences—Molecular and Cellular Biology; and Biochemistry and Molecular Biology (below)

Biochemistry and Molecular Biology (A Graduate Group)

Michael E. Dahmus, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9091)
World Wide Web:
http://www-ggc.ucdavis.edu/ggc/bmb

Faculty. Members of the group include faculty from the Colleges of Agricultural and Environmental Sciences and of Letters and Science, as well as the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Biochemistry and Molecular Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to Ph.D. applicants. Graduate work involves a broad overview of biochemistry and molecular biology in addition to specialization in one or more areas. Examples of areas of emphasis include gene expression, molecular basis of development, protein structure, molecular virology, protein synthesis, enzymology, signal transduction, membrane transport and structural biology. For more information contact the chairperson of the group.

Graduate Advisers. E. Bandman *(Food Science and Technology),* D.J. Klionsky *(Microbiology),* P. Ronald *(Plant Pathology),* R. Fairclough *(Neurology).*

Courses in Biochemistry and Molecular Biology (BMB)

Graduate Courses

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

Biological Chemistry

See Medicine, School of

Biological and Agricultural Engineering

(College of Agricultural and Environmental Sciences)

David J. Hills, Ph.D., Chairperson of the Department

Department Office, 2030 Bainer Hall (916-752-0102)

Faculty

Pictiaw (Paul) Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Professor
D. Ken Giles, Ph.D., Associate Professor
Mark E. Grismer, Ph.D., Professor
Bruce R. Hartsough, Ph.D., Professor
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
John M. Krochta, Ph.D., Professor
Miguel A. Mariño, Ph.D., Professor
Kathryn McCarthy, Ph.D., Associate Professor
Michael J. McCarthy, Ph.D., Professor
John A. Miles, Ph.D., Professor
Ning Pan, Ph.D., Associate Professor
Marc B. Parlange, Ph.D., Professor
Raul H. Piedrahita, Ph.D., Associate Professor
Richard E. Plant, Ph.D., Professor
James W. Rumsey, M.S., Lecturer
Thomas R. Rumsey, Ph.D., Professor
R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Associate Professor
Shrinivasa K. Upadhyaya, Ph.D., Professor
Jean S. VanderGheynst, Ph.D., Assistant Professor
Wesley W. Wallender, Ph.D., Professor
Ruihong Zhang, Ph.D., Assistant Professor

Emeriti Faculty

Norman B. Akesson, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor Emeritus
Robert B. Fridley, Ph.D., Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
John R. Goss, M.S., Professor Emeritus
George F. Hanna, M.Ed., Lecturer Emeritus
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
Robert A. Kepner, B.S., Professor Emeritus
Coby Lorenzen, Jr., M.S., Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor Emeritus
Henry E. Studer, M.S., Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

Affiliated Faculty

James M. Myers, Ph.D., Extension Specialist
William E. Steinke, Ph.D., Extension Specialist
James F. Thompson, M.S., Extension Specialist

Major Programs and Graduate Study. For the Bachelor of Science program see the major in Engineering; for graduate study see the Graduate Studies section in this catalog.

Courses. Courses are listed under Applied Biological Systems Technology, and Engineering: Biological and Agricultural (Biological Systems Engineering).

Minor Programs. The Department of Biological and Agricultural Engineering offers two minors through the College of Agricultural and Environmental Sciences: **Applied Biological Systems Technology** and **Geographic Information Systems.** Programs for these minors are listed separately in this catalog in alphabetical order.

The Applied Biological Systems program is for non-engineering students interested in engineering terminology and procedures. Course work provides knowledge of material properties, design procedures, fabrication principles, and hardware practices.
The minor in Geographic Information Systems is open to all majors, including those in engineering. This minor is ideal for students interested in information processing of spatial data related to remote sensing for geographical and environmental planning and related areas.

Biological Sciences

(College of Agricultural and Environmental Sciences and College of Letters and Science)

Mark G. McNamee, Ph.D., Dean of Biological Sciences

Thomas L. Rost, Ph.D., Associate Dean—Undergraduate Academic Programs

Division Office, Administration, 202 Life Sciences Addition (916-752-6764)

Division Office, Undergraduate Academic Programs, 202 Life Sciences Addition (916-752-0410)

The intercollege Division of Biological Sciences coordinates campuswide programs in basic biology and administers undergraduate programs in the core disciplines of biology on behalf of the College of Agricultural and Environmental Sciences and the College of Letters and Science.

The division has five sections that represent the major themes of modern biology: Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology. Core courses in biological sciences, the Biological Sciences major, and the Bodega Marine Laboratory Program are offered jointly by the sections of the division. Each section also offers courses and one or more majors focusing on the core disciplines.

The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. While emphasizing breadth, the major also features an area of emphasis requirement which provides concentrated attention to one facet of biology at the upper division level. Each area of emphasis coincides with one of the sections of the division.

Faculty

All faculty are primary members of one section and some faculty are secondary members of a second section as well. See "Sections of the Division," following, for a list of faculty in each section.

The Major Programs

Eight majors are offered leading to a B.S. degree in:

Biochemistry
Biological Sciences
Cell Biology
Evolution and Ecology
Genetics
Microbiology
Neurobiology, Physiology and Behavior
Plant Biology

Four majors leading to an A.B. degree are offered in:

Biological Sciences
Evolution and Ecology
Microbiology
Plant Biology

Choice of College. The Bachelor of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered by both the College of Letters and Science and the College of Agricultural and Environmental Sciences. The major requirements are the same in each college, but there are differences in the college requirements and policies. See the Undergraduate Education chapter college sections in this catalog for more information.

Student Services. Student affairs officers at the division's Undergraduate Academic Programs Office, 202 Life Sciences Addition, and advising staff in section offices provide information and counseling on the major programs and courses offered by the division.

The Biological Sciences Major

(Sections of Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology)

The Program. Students select either a Bachelor of Arts or Bachelor of Science program in Biological Sciences. The Bachelor of Science program includes mathematics, general and organic chemistry, and courses in biology that emphasize breadth as well as depth. This program can be used to satisfy requirements for admission to graduate schools, leading either to a variety of professional health careers, or further study in basic and applied areas of biology. The Bachelor of Arts program emphasizes organisms, evolution and ecology. This degree program prepares students for a variety of careers and professional/graduate programs. It is appropriate for students interested in teaching biology at the secondary school level, and for students interested in careers that bear on the ecological problems that require the development of public policy.

Career Alternatives. The biological sciences degree provides suitable preparation for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. It is an excellent background for students wishing to enter a graduate program in biology, a teacher training program, a health professional school, or other professional schools.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**40-53**
Biological Sciences 1A-1B-1C	15

*Course not offered this academic year.

Chemistry 2A-2B 10
Chemistry 8A-8B or 118A-118B-118C ...6-12
Physics 1A-1B or 7A-7B-7C 6-12
Statistics 13, 32, 100, or 102.....3-4
Recommended: Chemistry 2C and Mathematics 16A-16B.

Depth Subject Matter 38-47
Biological Sciences 101 and 102.....7
One course in evolution from Evolution and Ecology 100, 140; Geology 107; Plant Biology 116 4
One course in ecology from Environmental Studies 100; Evolution and Ecology 101, 121; Evolution and Ecology/Plant Biology 117 3-4
One course in philosophy of science from History and Philosophy of Science 130A, 130B; Philosophy 108 4
One course in physiology from Environmental Horticulture 102; Entomology 101, 102; Neurobiology, Physiology and Behavior 101; Plant Biology 111, 112 3-5
One course each in animal, microbial and plant diversity.....9-15

Animal diversity:
Entomology 100, 107, 109; Evolution and Ecology 105, 112, 134, 137; Nematology 110; Wildlife, Fish and Conservation Biology 110, 111, 120.

Microbial diversity:
Microbiology 105, 162; Pathology, Microbiology and Immunology 127, 128; Plant Biology 118, 148; Soil Science 111.

Plant diversity:
Evolution and Ecology 121, 140; Plant Biology 102, 108, 116, 121.

Additional upper division course work in biological sciences to achieve a total of 38 or more units (see "Approved Biology Electives" list below).
Upper division course work must include at least 2 units (6 hours per week) of laboratory and/or fieldwork.

Note: Although courses may be listed in more than one category, each course may be offered in satisfaction of only one requirement.

Total units for the major 78-100

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-67
Mathematics 16A-16B-16C 9
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C ...6-12
Biological Sciences 1A-1B-1C 15
Statistics 13, 32, 100, or 102.....3-4
Physics 7A-7B-7C 12

Depth Subject Matter 45
Biological Sciences 101, 102, 103, 104....13
Restricted Electives.....32

Breadth in the major is achieved by completing at least one course from each of the five field requirement lists, *(a)* through *(e),* below. See your area of emphasis for any specific course requirements.

Depth in the major is achieved by completing one area of emphasis listed below and additional upper division biology courses (see "Approved Biology Electives" list), as needed, to total to 32 units. See your faculty adviser regarding the choice of those courses.

Depth in the major must include at least 2 units (or 6 hours per week) of laboratory designated in the area of emphasis.

Note: Although courses may be listed in more than one category, each course may be offered in satisfaction of only one requirement.

Field Requirement Course List (Breadth):
(a) Evolution: Anthropology 151, 152, 154A; Evolution and Ecology 100; Geology 107; Plant Biology 143 3-5
(b) Ecology: Anthropology 154B; Biological Sciences 122; Entomology 104, 156; Environmental Studies 100, 121; Evolution and Ecology 101; Microbiology 120; Wildlife, Fish and Conservation Biology 151 3-4
(c) Microbiology: Food Science and Technology 104; Microbiology 102, 140, 150, 162; Pathology, Microbiology and Immunology 127, 128; Soil Science 111 3-5
(d) Neurobiology, physiology and behavior: Anthropology 154A, 154B; Entomology 102, 104; Neurobiology, Physiology and Behavior 100, 101, 102, 141.....3-5
(e) Plant biology: Environmental Horticulture 102, 105; Evolution and Ecology 117, 121, 140; Plant Biology 102, 105, 108, 111, 112, 116, 117, 118, 121, 143, 148, 176; Plant Pathology 120, 130 3-5

Areas of Emphasis (Depth):

Evolution and Ecology emphasis.....12-18
Field requirement: Students must take Evolution and Ecology 100 to satisfy Field requirement *(a),* and Evolution and Ecology 101 to satisfy Field requirement *(b).*
Evolution and Ecology 102 or 103 3-4
Biodiversity, six or more units, to include at least two units (or 6 hours per week) of laboratory, from the following: Entomology 100, 100L, 107, 109; Evolution and Ecology 112, 112L, 121, 134, 134L, 137, 137L; Geology 107, 107L; Microbiology 105; Nematology 110; Plant Biology 102, 108, 118, 148; Wildlife, Fish and Conservation Biology 110, 110L, 111, 111L, 120, 120L 6-9
Restricted electives.....3-5
Select one course from: Biological Sciences 122, 122P; Entomology 103, 104, 156, 156L; Environmental Studies 121, 123, 150A, 150B, 150C, 151, 151L; Evolution and Ecology 105, 117, 138, 140, 141, 147, 149, 170, 170L; Geology 107, 107L; Nematology 100; Neurobiology, Physiology and Behavior 102; Philosophy 108; Plant Biology 116, 117, 121; Wildlife, Fish and Conservation Biology 136.

Microbiology emphasis 13-15
Field requirement: Students must take Microbiology 102 to satisfy Field requirement *(c).*
Laboratory requirement: Students must take Microbiology 102L to satisfy the restricted elective lab requirement.
Clusters: Complete one of the four clusters *(a-d)* below, **or** complete an individual cluster with approval from your faculty adviser.

(a) Microbial Physiology and Molecular Genetics
Microbiology 102L 2
Select two courses from Microbiology 140, 150, 160 6
Select six or more units from: Microbiology 155L, 177; Molecular and Cellular Biology 121, 123, 141, 161 6

(b) Microbial Diversity and Ecology
Microbiology 102L, 105, 162 11
Select three or more units from: Microbiology 120, 120L; Plant Biology 118; Soil Science 111 3

(c) Biotechnology and Applied Microbiology
Microbiology 102L 2
Microbiology 140 or 150 3
Select one course from: Food Science and Technology 102A, 104, or Viticulture and Enology 186.....3-4
Select six or more units from: Chemical Engineering 161A; Microbiology 110, 155L; Molecular and Cellular Biology 121, 122, 123, 170L 6

(d) Medical Microbiology
Microbiology 102L 2
Pathology, Microbiology and Immunology 127 or Medical Microbiology 115-116 5
Microbiology 162 or Pathology, Microbiology and Immunology 128 3-4
Medical Microbiology 107 or Pathology, Microbiology and Immunology 126 3-4

Molecular and Cellular Biology emphasis...12-18
Molecular biology and gene expression: one course from Molecular and Cellular Biology 121, 141, 161 3-4
Laboratory experience: one or more laboratory courses from Biological Sciences 120P; Molecular and Cellular Biology 120L, 140L, 160L; or other laboratory course that emphasizes cellular or molecular biology with approval of your adviser.....3-6
Restricted electives.....6-8
Select two or more courses from Biological Sciences 120; Medical Microbiology 107; Molecular and Cellular Biology 122, 123, 126, 141, 142, 150, 151L, 162, 163; Neurobiology, Physiology and Behavior 103; Pathology, Microbiology and Immunology 126; Plant Biology 125; or other courses with adviser's approval.

Neurobiology, Physiology and Behavior emphasis.....15
Select courses from at least two of the following three areas and include one laboratory from Neurobiology, Physiology and Behavior 101L, 104L, 141P, or 160L ...15

(1) Neurobiology:
Neurobiology, Physiology and Behavior 100, 106, 112, 125, 126, 160, 160L, 161, 163; Psychology 108.

(2) Physiology:
Entomology 102; Evolution and Ecology 170, 170L; Exercise Science 101, 101L, 102, 110, 111; Medical Microbiology 107; Neurobiology, Physiology and Behavior 101, 101L, 103, 104L, 105, 106, 111C, 111L, 113, 114, 117, 119, 119L, 121, 121L, 127, 128, 130, 140, 141, 141P; Pathology, Microbiology and Immunology 126; Wildlife, Fish and Conservation Biology 121.

(3) Behavior:
Anthropology 154A, 154B; Entomology 104; Neurobiology, Physiology and Behavior 102, 152.

Plant Biology emphasis 13-16
Select one course from each of the following four areas and include one laboratory course from Plant Biology 105, 108, 111L, 116, 118, 148, 161A, 161B; **or** two laboratory courses from Evolution and Ecology 140, Plant Biology 153, 158, 171, 172L.

(1) Anatomy and morphology:
Evolution and Ecology 140; Plant Biology 105, 116, 118.....4-5

(2) Physiology and development:
Plant Biology 111, 112, 125; Plant Pathology 130 3

(3) Evolution and ecology:
Evolution and Ecology 100, 117; Plant Biology 117, 143 3-4

(4) Applied plant biology:
Agricultural Systems and Environment 110; Plant Biology 154, 160, 171, 172, 175.....3-4

Total Units for the Major 105-112

Approved Biology Electives

These are courses which are accepted without petition for upper division units in the Biological Science major. Many other biologically related courses may be substituted with consent of your adviser.

Agricultural Systems and Environment 135
Anatomy, Physiology and Cell Biology 100
Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157
Avian Sciences 100, 102, 150
Biological Sciences—All upper division courses
Cell Biology and Human Anatomy 101, 101L
Chemistry 107A, 107B, 108, 150
Entomology—All upper division courses
Environmental Horticulture 105, 107
Environmental Studies 100, 110, 121, 123, 124, 129, 129L, 150C, 151, 151L
Evolution and Ecology—All upper division courses
Exercise Science 101, 102, 110, 111, 113
Geology 107, 107L, 150C
Medical Microbiology 107, 115
Microbiology—All upper division courses
Molecular and Cellular Biology—All upper division courses
Nematology 100, 110
Neurobiology, Physiology and Behavior—All upper division courses
Nutrition 101, 110, 111
Pathology, Microbiology and Immunology 101, 101L, 102, 126, 126L, 127, 128
Philosophy 108
Plant Biology—All upper division courses, except 188
Plant Pathology 120, 130
Psychology 108, 150
Wildlife, Fish and Conservation Biology 110, 111, 120, 120L, 121, 122, 130, 136, 140, 151

Other Upper Division Courses
There is a limitation on variable-unit courses that may be counted toward the major. Of these courses, up to 4 units of 199 courses may be counted, and no units of 192 or 197T courses may be counted.

Minor Program Requirements:

The minor in Biological Sciences acquaints students with the range and variety of modern biology, including work in two or three areas: animal biology, plant biology, and microbiology; and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and biochemistry and cell biology. The list of required courses is restricted to those that are acceptable for the major program in Biological Sciences but which do not require extensive upper division preparatory work. Substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

UNITS

Biological Sciences 24
Biological Sciences 1C 5
Biological Sciences 101 4
Additional upper division units (as specified in the area requirements and group requirements below) 15

Area Requirement: one course in two of the area requirements below: animal biology, microbiology, and plant biology.

(a) Animal biology:
Anatomy 100; Anthropology 151, 152, 153, 154A, 155, 156; Avian Sciences 100; Biological Sciences 120, 122; Cell Biology and Human Anatomy 101; Entomology 101, 102, 103, 104, 109, 116, 119, 153; Environmental Studies 129; Evolution and Ecology 100, 101, 105, 112, 133, 134, 136, 137, 138, 147, 149, 170; Geology 111A; Molecular and Cellular Biology 150; Nematology 110; Neurobiology, Physiology and Behavior 102; Wildlife, Fish and Conservation Biology 110, 111, 120, 140, 151.

(b) *Microbiology:*
Entomology 156; Geology 111B; Medical Microbiology 107; all upper division Microbiology courses (excluding 190–199); Plant Biology 118, 119; Plant Pathology 120, 130; Veterinary Microbiology and Immunology 126, 127, 128, 132.

(c) *Plant biology:*
Environmental Horticulture 105, 107; Evolution and Ecology 121, 140, 144; all upper division Plant Biology courses, excluding 190–199 and Botany/Zoology 130; Plant Science 101, 103; Range Science 100; Vegetable Crops 105.

Note: Plant Biology 118 or 119 may be used for either microbiology or plant biology (not both).

Group Requirement: at least one course or course sequence from four of the five group requirements below:

(a) Organismal biology:
Evolution and Ecology 112, 136, 137; Microbiology 105; Molecular and Cellular Biology 150; Plant Biology 102, 105.

(b) *Population biology and ecology:*
Anthropology 154A; Environmental Studies 100; Evolution and Ecology 101, 121; Wildlife, Fish and Conservation Biology 151.

(c) *Evolutionary biology:*
Anthropology 151; Evolution and Ecology 100, 140, 149; Geology 107; Plant Biology 116.

(d) *Physiology:*
Neurobiology, Physiology and Behavior 101; Plant Biology 111, 112.

(e) *Biochemistry and cell biology:*
Biological Sciences 102 and 103, 104; Molecular and Cellular Biology 141.

Note: A course that appears on both the area and group requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a hyphen must be taken.

Advisers and Advising: Information on the Biological Sciences major or minor can be obtained from the Undergraduate Academic Programs Office, 202 Life Sciences Addition.

Teaching Credential Subject Representative. Associate Dean (Biological Sciences). See also the Teacher Education Program.

Honors and Honors Programs. Students who have met the minimum grade point average and the units-completed criteria, and who have obtained a sponsoring faculty supervisor may elect to participate in the Division of Biological Sciences Honors Program. The program entails completion of a research project and honors thesis through enrollment in course 194H.

The division additionally recommends students to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation.

Citation for Outstanding Performance. The Division of Biological Sciences confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade point average and participate in an appropriate research project.

Majors in the Core Disciplines of Biology

The Biochemistry Major Program

(Section of Molecular and Cellular Biology)

The biochemistry major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find biochemistry a rewarding field of study.

The Program. The biochemistry program begins with the four course upper division common curriculum that provides an introduction to the principles of biochemistry, genetics, and cell biology. Biochemistry majors then take a comprehensive and rigorous laboratory course to familiarize them with the most important aspects of biochemical research. Additional upper division courses in biochemistry examine detailed aspects of modern biochemistry. Students also are required to take courses in other biological sciences and a full year of physical chemistry.

Career Alternatives. The biochemistry program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. Positions are open to biochemists in biomedical, biotechnology, pharmaceutical, agricultural research and chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excellent preparation for advanced study in graduate or professional schools.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 54-58
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Mathematics 16A-16B-16C or 21A-21B-21C 9-12
Physics 7A-7B-7C 12
Statistics 13, 32, 100 or 102.....3-4

Depth Subject Matter 53-54
Biological Sciences 101, 102, 103, 104....13
Chemistry 118A-118B-118C or 128A-128B-128C, 129A-129B 12-13
Chemistry 107A-107B-108 9
Molecular and Cellular Biology 120L, 121, 122, 123 15
Restricted Electives.....4
Upper division courses in biological sciences or chemistry. Students are encouraged to obtain additional laboratory experience; however, no more than 3 units of 192, 193 or 199 may be counted toward Restricted Elective units.

Total Units for the Major 107-112

Master Adviser. L.R. Sprechman *(Section of Molecular and Cellular Biology),* 126 Briggs Hall.

Advising Center for the major is located in 156 Briggs (916-752-9032).

Graduate Study. See Biochemistry and Molecular Biology (A Graduate Group); and the Graduate Studies section in this catalog.

The Cell Biology Major Program

(Section of Molecular and Cellular Biology)

The Cell Biology major program provides students with a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms.

The Program. To understand living organisms, the biologist must understand the cell. Hence, cell biology lies at the core of the biological sciences. Students taking this major gain a solid foundation in biological principles. The major emphasizes the principles that govern how biomolecules interact with one another to organize themselves into higher order structures that comprise cells, and how cellular organization and function contribute to the development, maintenance and reproduction of adult organisms. The major illustrates the ways in which principles derived from the physical sciences, genetics, biochemistry and physiology are integrated in the study of living cells and emphasizes the experimental nature of the study of cell biology.

Career Alternatives. The major provides an excellent background for students wishing to enter postgraduate and professional programs in biological, medical or veterinary sciences, for students pursuing careers involving teaching or research in the biological sciences, and for students who are interested in careers

*Course not offered this academic year.

related to the administrative, legal or commercial aspects of biomedical science.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Mathematics 16A-16B-16C 9
Physics 7A-7B-7C 12
Statistics 13 or 100 (recommended).....4

Depth Subject Matter 52-57
Biological Sciences 101, 102, 103, 104....13
Chemistry 118A-118B-118C 12
Chemistry 107A-107B 6
Molecular and Cellular Biology 140L, 150, 150L 8
Molecular and Cellular Biology 141 (recommended) or 121 or 161 3-4
One additional upper division laboratory course from: Molecular and Cellular Biology 120L, 151L, 160L; Neurobiology, Physiology and Behavior 160L 4-6
Two additional courses from: Chemistry 108; Molecular and Cellular Biology 142, 146, 163; Neurobiology, Physiology and Behavior 160; Pathology, Microbiology, and Immunology 126; Plant Biology 125; or other courses in cell biology with the approval of the master adviser 6-8

Total Units for the Major 107-112

Master Adviser. J.E. Natzle (Molecular and Cellular Biology), 334 Briggs Hall.

Advising Center for the major is located in 156 Briggs (916-752-0202/9032).

The Evolution and Ecology Major Program

(Section of Evolution and Ecology)

The major in Evolution and Ecology offers the student a broad background in the theoretical and empirical basis of our understanding of the diversity and distribution of living organisms.

The Program. The program of study for the evolution and ecology major begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in evolution and ecology and various more specialized courses that allow the student to focus his or her studies. Evolution and ecology majors may earn either a Bachelor of Science or a Bachelor of Arts degree. The requirements for the B.S. degree program include more science courses, such as biochemistry, whereas those for the A.B. degree program allow room for more electives within the humanities and social sciences. The A.B. degree is especially appropriate for those students who wish to combine arts or languages with evolution and ecology for career preparation in such areas as scientific writing, translating or illustration.

Career Alternatives. A degree in evolution and ecology prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, agriculture, environmental management, and industry. Many students gain some research experience while at UC Davis and choose to continue their training at the graduate level. This track offers careers in academics, government, or business.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 41-45
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B, 8A-8B 16
Mathematics 16A-16B or Statistics 102 ...4-6
Physics 1A-1B or 7B-7C 6-8

Depth Subject Matter 36
Biological Sciences 101 4
Biological Sciences 104 or Botany/Zoology 130 (fall quarter 1993 only) or Zoology 121A and Molecular and Cellular Biology 141 (1993-94 only).....4-8
One course from Anthropology 151; Evolution and Ecology 100; Geology 107, 111A 3-4
Additional upper division course work in biological science to achieve a total of 36 or more units 20-25
Include at least 15 units in Evolution and Ecology (or Zoology) and one course from two of the four areas of study *(a-d).*

(a) Ecology and behavior:
Environmental Studies 100; Evolution and Ecology 101, 147, 149; Neurobiology, Physiology and Behavior 102.

(b) Systematics, morphology, and natural history:
Entomology 100; Evolution and Ecology 105, 112, 133, 134, 134L, 136, 136L, 137, 137L.

(c) Developmental biology:
Molecular and Cellular Biology 150, 150L, 151.

(d) Physiology:
Molecular and Cellular Biology 142; Neurobiology, Physiology and Behavior 110, 110L, 142, 142L, 143.

Note: A maximum of 5 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective requirements. Evolution and ecology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Total Units for the Major 77-81

Recommended
Biological Sciences 102-103; Geology 3; Physics 7A.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 57-66
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C ...6-12
Mathematics 16A-16B-16C or 21A-21B-21C 9-12
Physics 7A-7B-7C 12

Depth Subject Matter 49
Biological Sciences 101, 102, 103, 104....13
Evolution and Ecology 100, 101, and 102 or 103 11-12
Statistics 100 or 102 or 130A-130B 4-8
Additional upper division course work in biological science to achieve a total of 49 or more units 16-21
Include at least 2 units (6 hours per week) of laboratory and one course from each of the areas of study below *(a-b).*

(a) Biodiversity:
Entomology 100, 100L, 107, 109; Environmental Studies 124; Evolution and Ecology 112, 112L, 121, 134, 134L, 137, 137L; Plant Biology 108, 118, 148; Wildlife, Fish and Conservation Biology 110, 110L, 111, 111L, 120, 120L.

(b) Physiology and functional morphology:
Anatomy, Physiology and Cell Biology 100; Avian Sciences 100; Entomology 101, 102; Environmental Studies 129, 129L; Evolution and Ecology 105, 170, 170L; Neurobiology, Physiology and Behavior 101, 141, 141P; Plant Biology 111, 111L, 112, 116; Wildlife, Fish and Conservation Biology 121.

Note: A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective requirements. Evolution and ecology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Total Units for the Major 106-115

Biological Sciences Electives
The following courses are acceptable toward the fulfillment of the upper division biological sciences requirement in the A.B. and B.S. major programs and may be selected without adviser approval. Other elective courses are approved on an individual basis by petition through an adviser.

Anatomy, Physiology and Cell Biology 100
Anthropology 151, 152, 153, 154A, 154B, 155, 156
Biological Sciences, all upper division courses
Chemistry 107A, 107B
Entomology, all upper division courses except 110, 115
Environmental Studies 110, 116, 121, 123, 150C,151, 151L
Geology 106, 107, 107L, 145, 146, 150C
Microbiology, all upper division courses
Molecular and Cellular Biology, all upper division courses
Nematology 110
Neurobiology, Physiology and Behavior, all upper division courses
Nutrition 110, 111
Pathology, Microbiology and Immunology 101, 101L, 126, 126L, 128
Philosophy 108
Plant Biology, all upper division courses
Psychology 108, 129, 134, 150
Wildlife, Fish and Conservation Biology 120, 120L, 121

Major Advisers. Students transferring to Davis from another institution and majoring in evolution and ecology must consult an adviser immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Section of Evolution and Ecology Office for adviser assignment. Substitutions of courses not on the above list for major requirements are arranged through the adviser.

Advising Center for the major is located in 2320 Storer Hall (916-752-8523). Pre-professional students should establish contact with the Health Sciences Advising Office, 111 South Hall, to learn what specific courses are required on their transcripts.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the Department of Education in regard to preparation for certification. See also the section on the Teacher Education Program.

The Genetics Major Program

(Section of Molecular and Cellular Biology)

The genetics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Program. The genetics program begins with the four course upper division common curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Genetics majors then take additional upper division courses in specialized areas of modern genetics including gene expression, evolution, development, and human genetics, as well as a laboratory course in the principles of genetics. Additional upper division courses in biological sciences are required, including a second laboratory course.

Career Alternatives. The genetics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to enter a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-70
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C ...6-12
Mathematics 16A-16B-16C or 21A-21B-21C 9-12
Physics 7A-7B-7C 12
Statistics 13, 32, 100, or 102.....3-4

Depth Subject Matter 50-51
Biological Sciences 101, 102, 103, 104....13
Molecular and Cellular Biology 160L, 162, 163, 164 13
Evolution and Ecology 100.....4
One course from the following: Molecular and Cellular Biology 121, 141, 161.....3-4
One course from the following: Microbiology 102-102L; Molecular and Cellular Biology 120L, 170L 6
Restricted Electives.....11
Upper division courses in genetics or other fields relevant to the student's interest chosen in consultation with the adviser. No more than 4 units of 192, 193, 198, or 199 can be used for credit in this category.

Total Units for the Major 110-121

Master Adviser. Contact R.S. Hawley (Molecular and Cellular Biology), 345 Briggs Hall.

Advising Center for the major is located in 156 Briggs Hall (916-752-0202).

Graduate Study. The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics.

The Microbiology Major Program

(Section of Microbiology)

Microbiology is the branch of biology that deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology. The ease and power of simultaneous genetic and biochemical analysis of microbes led to the emergence of the new disciplines of molecular biology and molecular genetics, and spawned the new industry of biotechnology.

The Program. Both undergraduate major programs provide a balance of studies in microbiology, with appropriate courses in mathematics and physical sciences. The A.B. degree program emphasizes the biology of bacteria, while the B.S. degree program includes more biochemistry and related course work. Either program, with judicious course selection, is appropriate for students contemplating a career in medicine or various allied health professions including medical technology, or teaching. The B.S. program is especially well suited for students who want a professional career in microbiology, or who wish to pursue graduate education in a biological science discipline. The choice of a major program and its suitability for particular career options should be discussed with a major adviser.

Career Alternatives. A bachelor's degree in microbiology is excellent preparation for a career in biotechnology, pharmacology, agriculture, and the food industry. It also provides a strong background for students wishing to continue on to professional studies in medicine and the other health sciences.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 47-61
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B 10
Chemistry 8A-8B or 118A-118B-118C ...6-12
Mathematics 16A-16B or 21A-21B 6-8
Physics 1A-1B or 7A-7B-7C 6-12
Statistics 13 4

Depth Subject Matter 38-40
Biological Sciences 102, 103.....6
Microbiology 102, 102L, 105, 130A 14
Microbiology 162 or Pathology, Microbiology and Immunology 128 3-4
Two of the following: Microbiology 120-120L, 130B-130L, 177-177L 10-11
Additional units from Microbiology 110, 120, 120L, 130B, 130L, 177, 177L; Molecular and Cellular Biology 120L; Pathology, Microbiology and Immunology 126, 127; Plant Biology 114, 118, 119 5

Total Units for the Major 85-101

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-67
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C ...6-12
Mathematics 16A-16B-16C 9
Physics 7A-7B-7C 12
Statistics 13, 32, 100 or 102.....3-4

Depth Subject Matter 45-52
Biological Sciences 101, 102, 103, 104....13
Molecular and Cellular Biology 120L 6
Microbiology 102, 102L, 105.....11
Two courses from Microbiology 140, 150 or 160 6
Microbiology 162 or Pathology, Microbiology and Immunology 128 3-4
One of the following: Food Science and Technology 104-104L; Microbiology 120-120L, 155L, 177-177L; Molecular and Cellular Biology 161-170L; Pathology, Microbiology and Immunology 127; Soil Science 111 3-9
Three additional units from Food Science and Technology 104, 104L; Medical Microbiology 107; Microbiology 110, 120, 120L, 155L, 177, 177L, 199; Molecular and Cellular Biology 161, 170L; Pathology, Microbiology and Immunology 126, 127; Plant Biology 118, 148; Soil Science 111.....3

Total Units for the Major 105-119

Master Adviser. M.L. Wheelis *(Section of Microbiology),* 2202 Storer Hall.

Honors and Honors Program. M.L. Wheelis.

Teaching Credential Subject Representative. M.L. Wheelis. See also the Teacher Education Program.

Graduate Study. The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees in microbiology. The offerings of the Section of Microbiology are augmented by courses and faculty of the Departments and Sections of Evolution and Ecology; Food Science and Technology; Land, Air, and Water Resources; Molecular and Cellular Biology; Plant Pathology; Plant Biology; Viticulture and Enology; and the Schools of Medicine and of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Section of Microbiology.

Related Courses. For other courses related to Microbiology, see course offerings in the Division of Biological Sciences and departments of Medicine and Epidemiology; Food Science and Technology; Land, Air and Water Resources; Medical Microbiology; Pathology, Microbiology and Immunology; Plant Pathology; and Plant Biology.

Faculty of the Section of Microbiology also teach or participate in the following courses: Biological Sciences 1A, 10, and 19.

The Neurobiology, Physiology and Behavior Major Program

(Section of Neurobiology, Physiology, and Behavior)

Neurobiology, physiology and behavior is a major that emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions—they grow, reproduce, move, respond to stimuli and interact with their environment, maintaining homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated through the actions of the nervous and endocrine systems to determine behavior and the interaction between organisms and their physical and social environments. Students in this major study functional mechanisms; the control, regulation, and integration of these mechanisms; and the behavior that relates to those mechanisms. They do so at the level of the cell, the organ system, and the organism.

The Program. An understanding of neurobiology, physiology and behavior must be built on a broad scientific background. In the freshman and sophomore years, neurobiology, physiology and behavior majors take courses in chemistry, biology, physics, and mathematics. As juniors or seniors, majors can enroll in a variety of neurobiology, physiology and behavior courses, along with upper division courses in related sciences. Students can participate in a number of advanced laboratory courses or may design an individual, independent project guided by a member of the faculty.

Career Alternatives. Completion of the neurobiology, physiology and behavior major provides the foundations for a challenging career in physiology and/or neurobiology and also serves as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in high school teaching, research, and advanced teaching may use the program as preparation for continued study leading to advanced degrees.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-70
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C ...6-12
Mathematics 16A-16B-16C or 21A-21B-21C 9-12
Physics 7A-7B-7C 12
Statistics 13, 32, 100 (recommended), or 102 3-4

Depth Subject Matter 48-49
Biological Sciences 101, 102, 103, 104....13
Neurobiology, Physiology and Behavior 100, 101, 101L, 102, 104L 17
Select three or more units of laboratory course work from the following list.....3
Exercise Science 101L; Neurobiology, Physiology and Behavior 106, 111C, 111L, 160L, 194H; 199 courses or other courses with the approval of the master adviser.
Additional physiology depth unit requirement 12
All other Neurobiology, Physiology and Behavior courses not used in satisfaction of any other requirement; Anthropology 154A, 154B; Entomology 104; Exercise Science 101, 102, 111.
One course from Anthropology 151, Evolution and Ecology 100, Geology 107 3-4

Total Units for Major 108-119

Master Adviser. J. Goldberg *(Section of Neurobiology, Physiology, and Behavior),* 191 Briggs Hall.

Advising Center. 196 Briggs Hall (916-752-9696)

Graduate Study. The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information on graduate study may be obtained by writing the Graduate Adviser, Graduate Group Complex. See also the graduate course offerings in Animal Behavior Graduate Group, Neuroscience Graduate Group, and Physiology Graduate Group. See also the Graduate Studies section in this catalog.

*Course not offered this academic year.

The Plant Biology Major Program

Plant biology is the study of plants as organisms. It includes the disciplines of cellular and molecular plant biology and the traditional areas of botany, such as anatomy, morphology, systematics, physiology, mycology, phycology, ecology, and evolution.

The Program. The plant biology major consists of core courses in applied plant biology, plant anatomy, plant physiology, and plant ecology, as well as biochemistry, cell biology, and genetics. In addition, students complete a set of courses in one of the following areas: *(1)* general plant biology; *(2)* applied plant biology; *(3)* plant evolution and ecology; *(4)* plant genetics and breeding; and *(5)* plant physiology, development, and molecular biology. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization. Independent research opportunities in plant biology are available. Consult with an adviser.

Career Alternatives. A Plant Biology degree is an excellent credential for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. Plant biologists can work in the field, in the forest, in the laboratory, in botanical gardens or nurseries, in food or seed companies, or in pharmaceutical, energy or chemical industries, and pursue rewarding careers in the areas of biotechnology, environmental protection, or agribusiness. The program is also an excellent background for students wishing to enter graduate or other professional schools, including medicine, law or journalism.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 35
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B, 8A-8B 16
Agricultural Systems and Environment 120 or Statistics 13 or 100 or 102 4

Depth Subject Matter 41-42
Biological Sciences 101 4
Plant Biology 102 or 108 5
Evolution and Ecology 140 or Plant Biology 116 4
Plant Biology 105, 111, 112, 117 15
Additional upper division units in Plant Biology or related natural science courses ...13-14

Total Units for the Major 76-77

Recommended
Chemistry 2C; Evolution and Ecology 100; Plant Biology 118, 119.

For students with interests in specialized areas of plant biology (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other sections or departments, may be allowed on *prior* consultation with a Plant Biology major adviser.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-61
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Chemistry 8A-8B 6
Mathematics 16A-16B-16C 9
Physics 7A-7B-7C 12
Agricultural Systems and Environment 120 or Statistics 13, 32, 100, or 102 3-4

Depth Subject Matter 45
Biological Sciences 101 or Plant Biology 152 (Students completing the Applied Plant Biology option or the Plant Genetics and Breeding option should take Plant Biology 152) 4
Biological Sciences 102, 103, 104 9
Plant Biology 105, 111 8
Completion of one Option listed below 24
Research experience through internships or special studies is recommended.

General Plant Biology option
Evolution and Ecology 100, Plant Biology 112 7
Plant Biology 117 or 142 4
One course from the Applied Plant Biology course list (Plant Biology 175 recommended) 3-5
One course from the Evolution and Diversity course list 3-5
Additional upper division course work from any of the four course lists, chosen in consultation with an adviser, to achieve a total of 24 or more units. At least one course chosen from the option course lists must include a formal laboratory or fieldwork section 3-7

Applied Plant Biology option
Plant Biology 112 3
Plant Biology 142 or 143 3-4
Plant Biology 160, 175 8
Molecular and Cellular Biology 120L; Plant Biology 111L, 153, 158, 172L, 189, or Plant Pathology 120 3-6
Additional upper division course work from the Applied Plant Biology course list to achieve a total of 24 or more units 3-7

Plant Evolution and Ecology option
Evolution and Ecology 100 4
Plant Biology 117 or 142 4
One course from the Applied Plant Biology course list (Plant Biology 175 recommended) 3-5
Additional upper division course work from the Ecology and/or Evolution and Diversity course list to achieve a total of 24 or more units. At least one course chosen must include a formal laboratory or fieldwork section 11-13

Plant Genetics and Breeding option
Plant Biology 108 or 143 3-5
Plant Biology 154 4
Plant Biology 112 or 113 or 160 3
Plant Biology 161A or 161B 4
Addtion course work from the Plant Genetics and Breeding course list to acheive a total of 24 or more units 8-10

Plant Physiology, Development and Molecular Biology option
Plant Biology 112 3
Molecular and Cellular Biology 120L, 170L; Plant Biology 111L or 153 3-6
One course from the Applied Plant Biology course list (Plant Biology 175 recommended) 3-5
One course from the Ecology course list (Plant Biology 117 recommended) 3-4
One course from the Evolution and Diversity course list 3-5
Additional upper division course work from the Plant Physiology, Development, and Molecular Biology course list to achieve a total of 24 or more units 1-9

Total Units for the Major 105-106

Course Lists

Applied Plant Biology
Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 118, 150, 170A, 170B, 195; Atmospheric Science 133; Entomology 100, 100L, 110, 119, 119L, 135; Environmental Horticulture 102, 105, 107, 120, 125, 130, 133; Environmental Toxicology 101; Hydrologic Science 124; International Agricultural Development 101; Nematology 100, 110; Plant Biology 121, 142, 143, 146, 151, 152, 153, 154, 157, 158, 160, 171, 172, 172L, 173, 174, 175, 176, 177, 178, 188, 196; Plant Pathology 120, 125, Pomology 103; Range Science 100, 105, 133, 134; Soil Science 100, 105, 109, 111; Viticulture and Enology 101A, 101B, 101C, 110, 115, 116, 118.

Ecology
Agricultural Systems and Environment 112; Environmental Studies 121, 123, 124, 128, 128L, 150C, 151, 151L, 155, 155L; Evolution and Ecology 121, 138; Hydrologic Science 122, 122L, 124; Plant Biology 117, 121, 142, 146; Range Science 133, 134.

Evolution and Diversity
Evolution and Ecology 100, 102, 140, 144, 149; Plant Biology 102, 108, 116, 118, 143, 148.

Plant Genetics and Breeding
Agricultural Systems and Environment 118, 150; Entomology 110; Evolution and Ecology 100, 144; Molecular and Cellular Biology 161, 164; Plant Biology 116, 117, 142, 151, 153, 157, 175; Plant Pathology 120, 125.

Plant Physiology, Development, and Molecular Biology
Molecular and Cellular Biology 126; Plant Biology 113, 125, 153, 157, 158, 160; Plant Pathology 130.

Master Adviser. A. Stemler, Plant Biology Section Office, 2220 Life Sciences Addition.

Minor Program Requirements:

UNITS

Plant Biology 23
Biological Sciences 1C (or equivalent introductory plant biology course) 5
Upper division units, including at least one course from each of the following four groups 18
(a) Anatomy and morphology:
Evolution and Ecology 140, Plant Biology 105, 116, 118.
(b) Physiology and development:
Plant Biology 111, 112, 125, Plant Pathology 130.
(*c) Evolution and ecology:*
Evolution and Ecology 100, Plant Biology 102, 117, 143.
(d) Applied plant biology:
Agronomy 100, Plant Biology 154, 160, 171, 172, 175.

Minor Adviser. Same as for major above.

Honors and Honors Programs. Students on the honors list may elect to substitute a maximum of 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

Teaching Credential Subject Representative. R.M. Thornton *(Section of Plant Biology),* 278 Robbins Hall. See also the Teacher Education Program.

Graduate Study. Consult the Plant Biology Graduate Group listing.

Divisionwide Programs and Courses

Bodega Marine Laboratory Program

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory (BML) located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology of marine invertebrates, physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses 120, 120P, 122, 122P, 123; Neurobiology, Physiology and Behavior 141, 141P).

The program is residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. An application is required. Obtain forms from the Division of Biological Sciences. Applications are due before *RSVP* Pass 1 registration

begins for spring quarter. Additional information on the Bodega Marine Laboratory Program is available from the Undergraduate Programs Office, 202 Life Sciences Addition, or from BML directly, 707-875-2211, P.O. Box 247, Bodega Bay, CA 94923.

Courses in Biological Sciences (BIS)

Lower Division Courses

1A. Introductory Biology (5) I, II. The Staff; III. Villarejo, Klionsky
Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 2B (may be taken concurrently). Introduction to biological molecules, bioenergetics, cell structure and function, elements of molecular biology and genetics, and viruses. Interdisciplinary course for majors in the biological sciences.

1B. Introductory Biology (5) I. Shaffer, Keen; II. The Staff; III. Keen and staff
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 1A. Topics covered include transmission genetics, systematics, evolution, survey of the animal kingdom, comparative anatomy, physiology, and adaptation in animals.

1C. Introductory Biology (5) I. Thornton; II. Stemler, Shackel/Labavitch; III. Thornton
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1A. Introduction to structure and function of plant tissues and organs; adaptive development and evolution of plants; survey of cyanobacteria, algae, fungi, and plants; principles of population and community ecology; and ecosystem analysis. GE credit: SciEng, Wrt.

10. General Biology (4) I. Goldberg; II. Marr; III. Falk
Lecture—3 hours; discussion—1 hour. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology. Not open for credit to those who have had course 1A. GE credit: SciEng, Wrt.

11A-11B. Issues in the Life Sciences (2-2) I. Villarejo; II. The Staff
Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students; consent of instructor required. Designed to broaden the students' understanding of biology by demonstrating the range of subjects and approaches included in the field of biology. Both basic biological research topics and applied biology will be studied.

15. Biology of Aging (3) I. McDonald
Lecture—3 hours. Biological basis of the aging process. Topics include the normal aging process, developmental influence on the rate of aging, diseases of the aged, theories of aging, and mechanisms for modifying aging. Designed for students with limited biology backgrounds.

***19. Biology of Cancer** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 1A or 10, or Molecular and Cellular Biology 10 or Neurobiology, Physiology and Behavior 10. Interdisciplinary course offers an introduction to the biological, clinical and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background. Offered in alternate years.

92. Internship in Biological Sciences (1-12) I, II, III. The Staff (Associate Dean in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Genes and Gene Expression (4) I. Gottlieb (Evolution and Ecology), Quiros (Vegetable Crops); II. Bowman (Plant Biology), Sanders, Spearow (Neurobiology, Physiology and Behavior); III. Dvorak (Agronomy and Range Science), Rodriguez, Rose
Lecture—4 hours. Prerequisite: course 1B; Chemistry 8B or 118B or 128B (may be taken concurrently). Nucleic acid structure and function; gene expression and its regulation; replication; transcription and translation; transmission genetics; molecular evolution. Not open for credit to students who have completed Genetics 100. (Former course Genetics 100.)

102. Structure and Function of Biomolecules (3) I. Hilt, Morand, Sprechman; II. Gasser, Hilt, Hjelmeland; III. Hilt, Sprechman, Theg (Plant Biology)
Lecture—3 hours. Prerequisite: Chemistry 8B or 118B or 128B. Structure and function of macromolecules with emphasis on proteins; enzyme kinetics; supramolecular assemblies; membranes; cytoskeleton; cell motility and cell division. Not open for credit to students who have completed Biochemistry and Biophysics 101A. (Former course Biochemistry and Biophysics 101A.)

103. Bioenergetics and Metabolism (3) I. Doi, Mitchell; II. I.H. Segel, Callis; III. Carlson, L.D. Segel
Lecture—3 hours. Prerequisite: course 102. Fundamentals of metabolism including glycolysis and oxidative pathways; photosynthesis; biosynthesis of amino acids, nucleic acids and proteins. Not open for credit to students who have completed Biochemistry and Biophysics 101B. (Former course Biochemistry and Biophysics 101B.)

104. Regulation of Cell Function (3) I. Baskin, Crowe, Nuccitelli; II. Erikson, Myles, Wilson (Neurobiology, Physiology and Behavior); III. McNally, Privalsky (Microbiology)
Lecture—3 hours. Prerequisite: course 101 and 102; course 103 recommended. Membrane receptors and signal transduction; cell trafficking; cell cycle, cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system. Not open for credit to students who have completed Botany/Zoology 130, Physiology 100A or Zoology 121A. (Former courses Botany/Zoology 130, Physiology 100A, Zoology 121A.)

120. Developmental Biology of Marine Invertebrates (4) III. The Staff (Molecular and Cellular Biology)
Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Molecular and Cellular Biology 150-150L, Biological Sciences 102 and 103; course 123 concurrently. Phylogenetic patterns of reproduction and development among the marine invertebrates. Emphasis on both modern and classical approaches to understanding gametogenesis, gamete interaction and fertilization, cleavage, cell differentiation, morphogenesis, and larval development and metamorphosis. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

120P. Developmental Biology of Marine Invertebrates/Advanced Laboratory Topics (6) III. The Staff (Molecular and Cellular Biology)
Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 120 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 120 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

122. Population Biology and Ecology (4) III. Strong (Evolution and Ecology)
Lecture—30 hours total; laboratory—30 hours total. Prerequisite: lower division core in biological sciences; course 123 concurrently. Population and community processes. Emphasis on biological and physical processes affecting plant and animal populations in the array of habitats at the ecological reserve. Modelling as a basis for designing experiments. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

122P. Population Biology and Ecology/Advanced Laboratory Topics (6) III. Strong (Evolution and Ecology)
Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 122 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 122 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

123. Undergraduate Colloquium in Marine Science (1) III. The Staff
Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker. Course will be held at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)

192. Internship in Biological Sciences (1-12) I, II, III. The Staff (Associate Dean in charge)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

194H. Research Honors (2) I, II, III. The Staff (Associate Dean in charge)
Independent study—6 hours. Prerequisite: senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisers. (P/NP grading only.)

197T. Tutoring in Biological Sciences (1-3) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: upper division standing; appropriate background in biological sciences. Assisting in courses in Biological Sciences under the direction of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Biological Sciences (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

298. Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.

Professional Course

310. Effective Teaching of College Biology (2) II. Thornton (Plant Biology)
Informal lecture/discussion—2 hours. Teaching function of an academic career; objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussions; examinations and grading; evaluation; counseling; innovation. (S/U grading only.)

Sections of the Division of Biological Sciences

*Course not offered this academic year.

Biological Sciences: Evolution and Ecology

Thomas W. Schoener, Ph.D., Chairperson of the Section

Section Office, 2320 Storer Hall (916-752-1272)

Faculty

Primary Section Members
James A. Doyle, Ph.D., Professor
John H. Gillespie, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
Richard K. Grosberg, Ph.D., Professor
Charles H. Langley, Ph.D., Professor
Sergey V. Nuzhdin, Ph.D, Assistant Professor
Robert W. Pearcy, Ph.D., Professor
Marcel Rejmanek, Ph.D., Professor
Michael J. Sanderson, Ph.D., Assistant Professor
Thomas W. Schoener, Ph.D., Professor
H. Bradley Shaffer, Ph.D., Professor
Arthur M. Shapiro, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Judy A. Stamps, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Sharon Y. Strauss, Ph.D., Assistant Professor
Donald R. Strong, Ph.D., Professor
Catherine A. Toft, Ph.D., Professor
Michael Turelli, Ph.D., Professor

Emeriti Faculty

Daniel I. Axelrod, Ph.D., Professor Emeritus
Milton Hildebrand, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Everett W. Jameson, Ph.D., Professor Emeritus
Jack Major, Ph.D., Professor Emeritus
Peter R. Marler, Ph.D., Professor Emeritus
Milton A. Miller, Ph.D., Professor Emeritus
Timothy Prout, Ph.D., Professor Emeritus
Robert L. Rudd, Ph.D., Professor Emeritus
George W. Salt, Ph.D., Professor Emeritus
G. Ledyard Stebbins, Ph.D., Professor Emeritus
Kenneth E. F. Watt, Ph.D., LL.D, Professor Emeritus
Grady L. Webster, Ph.D., Professor Emeritus

Affliated Faculty

Susan L. Keen, Ph.D., Lecturer

Courses in Evolution and Ecology (EVE)

Lower Division Courses

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Section of Evolution and Ecology. Internships supervised by a member of the faculty. (Former course Zoology 92.) (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)
Former course Zoology 99. (P/NP grading only.)

Upper Division Courses

100. Introduction to Evolution (4) I. Grosberg; II. II. Stanton; III. Turelli
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, 101; Mathematics 16A, 16B, 16C or the equivalent; Statistics 13 or 100 (Statistics 100 recommended). A general survey of the origins of biological diversity and evolutionary mechanisms. Not open for credit to students who have completed Botany 100, Genetics 103, Zoology 148. (Former courses Botany 100, Genetics 103, Zoology 148.)

101. Introduction to Ecology (4) I. Strauss; II. Toft; III. The Staff
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C; Mathematics 16A, 16B, 16C or the equivalent. A general survey of the principles of ecology. Not open for credit to students who have completed Zoology 125. (Former course Zoology 125.)

102. Population and Quantitative Genetics (4) II. Gillespie
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101, and Statistics 100 or 102, and course 100. Evolution as caused by random mating, genetic drift, natural selection, inbreeding, migration, and mutation in theory and actuality. The resemblance between relatives and consequences of selection for quantitative traits. Application of these ideas to topics such as the evolution of sex.

103. Phylogeny and Macroevolution (3) II. Sanderson
Lecture—3 hours. Prerequisite: course 100. Patterns and processes of evolution above the species level. Homology, homoplasy, and character evolution. Adaptive radiation; modes of rates of diversification. Evolution of complexity, and macroevolution of the genome. Principles of phylogeny reconstruction and their application to macroevolutionary studies.

***105. Phylogenetic Analysis of Vertebrate Structure** (4) I. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B. The structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny. Not open for credit to students who have completed Zoology 105. (Former course Zoology 105.)

108. Systematics and Evolution of Angiosperms (5) III. Doyle
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B and 1C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Plant Biology 108.) GE credit: SciEng.

***112. Invertebrate Zoology** (4) II. The Staff
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; course 112L (concurrently); courses in systematics, ecology, and evolution recommended. Survey of the invertebrate phyla emphasizing aquatic forms and focusing on morphology, development, natural history, and phylogenetic relationships. Not open for credit to students who have completed Zoology 112. (Former course Zoology 112.)

***112L. Laboratory for Invertebrate Zoology** (3) II. The Staff
Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B; course 112 concurrently. Field and laboratory experience with representative members of the invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates. Not open for credit to students who have completed Zoology 112L. (Former course Zoology 112L.)

117. Plant Ecology (4) I. Schwartz
Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; Plant Biology 112; Plant Biology 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for Plant Biology 101. (Same course as Plant Biology 117.) Not open for credit to students who have completed Botany 117. (Former course Botany 117.)

121. Survey of Plant Communities of California (4) III. Barbour
Lecture—2 hours; fieldwork—1 hour; term paper. Prerequisite: Biological Sciences 1C recommended; consent of instructor required. Structure of selected plant communities and the relationship of their component species to the environment. Especially recommended for non-majors. Not open for credit to students who have completed Plant Biology 101 or Botany 101. (Former courses Plant Biology 101, Botany 101.) GE credit: SciEng, Wrt.

***134. Herpetology** (3) III. Shaffer
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B; Evolution and Ecology 100 recommended. The world-wide diversity of amphibians and reptiles with emphasis on behavior, ecology, functional morphology, and evolutionary history. Offered in alternate years. Not open for credit to students who have completed Zoology 134. (Former course Zoology 134.)

***134L. Herpetology Laboratory** (2) III. Shaffer
Laboratory—6 hours; two weekend field trips. Prerequisite: Biological Sciences 1A, 1B; course 134 concurrently. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographic and phylogenetic patterns. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural conditions. Offered in alternate years. Not open for credit to students who have completed Zoology 134L. (Former course Zoology 134L.)

***137. Ornithology** (2) II. The Staff
Lecture—2 hours. Prerequisite: course 101 or the equivalent course in ecology. Systematics, distribution, physiology, and population dynamics of birds. Students who have had Wildlife, Fish and Conservation Biology 111 may not receive credit for this course. Not open for credit to students who have completed Zoology 137. (Former course Zoology 137.)

***137L. Ornithology Laboratory** (3) II. The Staff
Laboratory—6 hours. Prerequisite: course 101 or 137 (may be taken concurrently) and consent of instructor. Individual study and field trips strongly emphasized. Systematics, behavior, population dynamics, and reproduction of California birds. Not open for credit to students who have completed Zoology 137L. (Former course Zoology 137L.)

***138. Ecology of Tropical Latitudes** (3) III. Shapiro
Lecture—3 hours. Prerequisite: any one of the following: Biological Sciences 1A, 1B, or 10, Plant Biology 10, Geography 2 or 2G, or Wildlife, Fish and Conservation Biology 10. Biological, physical, and human-related aspects of the ecology of low latitudes. Distribution, numbers, and relationships of tropical organisms. Problems of development and conservation in the context of ecological and evolutionary theory. Offered in alternate years. Not open for credit to students who have completed Zoology 138. (Former course Zoology 138.) GE credit: SciEng, Wrt.

140. Paleobotany (4) I. Doyle
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to plant fossil record, beginning with invasion of land in the Silurian, emphasizing origin and evolution of major groups and adaptations and changing composition and distribution of floras in relation to plate tectonics and climatic change. Not open for credit to students who have completed Botany 140. (Former course Botany 140.)

***141. Principles of Systematics** (3) II. Shapiro
Lecture—2 hours; biweekly research projects. Prerequisite: Biological Sciences 1B or 1C; course 100 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biosystematics, including International Code of Zoological Nomenclature. Offered in alternate years.

147. Biogeography (4) I. Shapiro
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial organisms. The role of geologic, climatic, and biologic changes in the geographic distribution of organisms. Offered in alternate years. Not open for credit to students who have completed Zoology 147. (Former course Zoology 147.)

***149. Evolution of Ecological Systems** (4) I. Shapiro
Lecture—3 hours; term paper. Prerequisite: course 101 or Environmental Studies 100 (or the equivalent), and course 100 (or the equivalent). Evolution as an

organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation. Offered in alternate years. Not open for credit to students who have completed Zoology 149. (Former course Zoology 149.)

***170. Comparative Biomechanics** (3) I. The Staff
Lecture—3 hours. Prerequisite: Physics 7A, 7B, Mathematics 16A, 16B, 16C, Biological Sciences 1B. Biomechanics and functional morphology of vertebrates and invertebrates. Emphasis on physical laws that provide design principles for a wide range of organisms. Principles from fluid and solid mechanics, acoustics and vibration. Locomotion, skeletal morphology, biological materials, and waves. Offered in alternate years. Not open for credit to students who have completed Zoology 170. (Former course Zoology 170.)

***170L. Comparative Biomechanics Laboratory** (3) I. The Staff
Laboratory—6 hours; term paper. Prerequisite: Physics 7A, 7B, Mathematics 16A, 16B, 16C, Biological Sciences 1B; course 170 recommended to be taken concurrently. Experimental techniques for measuring physical quantities relevant to organismal designs. Demonstration of principles in fluid, solid, and acoustical mechanics. Emphasis on use of electronic transducers and computerized data collection. Includes a student-designed research project. Offered in alternate years. Not open for credit to students who have completed Zoology 170L. (Former course Zoology 170L.)

189. Introduction to Biological Research (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: upper division standing in Evolution and Ecology or related biological science; consent of instructor. Introduction to research methods in biology. Presentation and discussion of research by faculty, graduate, and undergraduate students. May be repeated for credit up to a total of 3 units. (Former course Zoology 189.) (P/NP grading only.)

190. Undergraduate Seminar (2) I. Shapiro; II, III. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (Former course Zoology 190.) (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the Section of Evolution and Ecology. Internships supervised by a member of the faculty. (Former course Zoology 192.) (P/NP grading only.)

194HA-194HB-194HC. Research Honors (2-2-2) I, II, III. The Staff
Laboratory—6 hours. Prerequisite: Students who have completed 135 units and qualify for the honors program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. Not open for credit to students who have completed Zoology 194HA-194HB-194HC. (Former course Zoology 194HA-194HB-194HC.) (Deferred grading only, pending completion of sequence.)

197T. Tutoring (1-5) I, II, III. The Staff
Tutorial—1-5 hours. Prerequisite: upper division standing. Experience in teaching under guidance of the staff. (Former course Zoology 197T.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(Former course Zoology 198.) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(Former course Zoology 199.) (P/NP grading only.)

Graduate Courses

***221. Behavioral Ecology** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 101 or Neurobiology, Physiology and Behavior 102 or the equivalent, and graduate standing. Introduction to the main issues treated in modern behavioral ecology, the main experimental techniques used to treat these issues and the major theoretical methods used to develop predictive models. Offered in alternate years. Not open for credit to students who have completed Zoology 221. (Former course Zoology 221.)

***240. Paleobotany and Angiosperm Evolution** (4) II. Doyle
Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Biology 108, 116, or course 140. Critical analysis of the plant fossil record as a source of evidence on origin, evolution, and phylogeny of the angiosperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered in alternate years. Not open for credit to students who have completed Botany 240. (Former course Botany 240.)

***243. Palynology** (4) I. Doyle
Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 108, 116, or course 140. Morphology of spores and pollen grains and their use in stratigraphy, plant systematics and evolution, and paleoecology. Techniques for study of modern spores and pollen and extraction and identification of fossil palynomorphs from sediments of Paleozoic to Quaternary age. Offered in alternate years. Not open for credit to students who have completed Botany 243. (Former course Botany 243.)

287. Seminar in Animal Behavior (2) III. Stamps
Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior. Not open for credit to students who have completed Zoology 287. (Former course Zoology 287.)

290. Current Topics (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (Former course Zoology 290.) (S/U grading only.)

290C. Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (Former course Zoology 290C.) (S/U grading only.)

***294. Seminar in Animal Ecology** (3) III. The Staff
Seminar—3 hours. Prerequisite: course 101 and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals. Not open for credit to students who have completed Zoology 294. (Former course Zoology 294.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(Former course Zoology 298.) (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(Former course Zoology 299.) (S/U grading only.)

Professional Course

390. Methods of Teaching (2) I, II, III. The Staff
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching. Includes analyses of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (Former course Zoology 390.) (S/U grading only.)

Biological Sciences: Microbiology

Stephen C. Kowalczykowski, Ph.D., Chairperson of the Section

Section Office, 156 Hutchison Hall (916-752-0262)

Faculty

Primary Section Members
Stanley W. Artz, Ph.D., Professor
Paul Baumann, Ph.D., Professor
Michele M. Igo, Ph.D., Assistant Professor
Daniel J. Klionsky, Ph.D., Professor
Stephen C. Kowalczykowski, Ph.D., Professor
JaRue S. Manning, Ph.D., Professor
John C. Meeks, Ph.D., Professor
Douglas C. Nelson, Ph.D., Associate Professor
Martin L. Privalsky, Ph.D., Professor
Mitchell H. Singer, Ph.D., Assistant Professor
Merna R. Villarejo, Ph.D., Professor
Mark L. Wheelis, Ph.D., Senior Lecturer

Secondary Section Members
Jodi Nunnari, Ph.D., Assistant Professor
Irwin H. Segel, Ph.D., Professor

Emeriti Faculty

Robert E. Hungate, Ph.D., Professor Emeritus
John L. Ingraham, Ph.D., Professor Emeritus
Allen G. Marr, Ph.D., Professor Emeritus
Herman J. Phaff, Ph.D., Professor Emeritus
David Pratt, Ph.D., Professor Emeritus

Courses in Microbiology (MIC)

Lower Division Courses

10. Natural History of Infectious Diseases (4) II. Manning
Lecture—3 hours; discussion—1 hour. Topics in the natural history of infectious diseases principally affecting humans. Introduction to infectious microbial agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature. Designed for students not majoring in the biological sciences. GE credit: SciEng, Wrt.

***20. Biology of Microorganisms (4)** II. The Staff
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 10. Survey of the diversity of microorganisms (viruses, bacteria, protists), their metabolism, genetics, and habitats. Emphasis on importance to humans—role of microorganisms in global element cycles, in food production, and in disease. GE credit: SciEng, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

102. General Bacteriology (4) I. Wheelis; II. Artz; III. Wheelis
Lecture—4 hours. Prerequisite: Biological Sciences 1A and Chemistry 8B (may be taken concurrently). Survey of the biology of bacteria and viruses, including bacterial structure, metabolism, physiology, genetics, and evolution; viral structure and replication; the role of bacteria in global element cycles; and the role of microbes in infectious disease. Only two units of credit allowed to students who have previously passed course 2.

102L. General Bacteriology Laboratory (2) I. Wheelis; II. Artz; III. Wheelis
Laboratory—6 hours. Prerequisite: course 102 (may be taken concurrently) and consent of instructor. Introduction to principles and laboratory methods employed in working with microorganisms. For students planning to continue study of microbiology, or use microorganisms as tools for study of genetics and biochemistry.

105. Bacterial Diversity (5) II. Wheelis
Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 102, 102L, Biological Sciences 102 and consent of instructor; Biological Sciences 103 recommended. Survey of the major groups of bacteria emphasizing diversity of energy metabolism, morphology and natural history. Includes methods for determination of evolutionary relationships among groups. Isolation and characterization of bacterial strains from various habitats.

***110. Bacteriology of Insects** (3) II. Baumann
Lecture—3 hours. Prerequisite: course 102; Biological Sciences 102. Physiological basis of pathogenic and symbiotic associations between procaryotes and insects. Taxonomy, physiology, pathogenesis, and molecular biology of insect pathogens. Insect immunity. Nutritional associations between microorganisms and insects. Pertinent entomological background information will be included.

120. Microbial Ecology (3) III. Meeks
Lecture—3 hours. Prerequisite: course 105, Biological Sciences 102. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

120L. Microbial Ecology Laboratory (2) III. Meeks
Laboratory—6 hours; one optional overnight weekend field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experiments on ecologically important microbial activities. For remaining one-half, research projects will be done on student selected specific habitats of microorganisms. Limited enrollment.

140. Bacterial Physiology (3) I. Singer
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103 (may be taken concurrently); course 102 recommended (may be taken concurrently). Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis. Not open for credit to students who have completed course 130A.

150. Bacterial Genetics (3) II. Igo
Lecture—3 hours. Prerequisite: Biological Sciences 101 and 102; course 102 (may be taken concurrently) recommended. Fundamentals of bacterial and phage genetics. Topics will include generating mutations, phage genetics, classical bacterial genetics, molecular techniques to generate mutations and physical mapping techniques. Not open for credit to students who have completed course 130A.

155L. Bacteriology Physiology Laboratory (3) III. Artz
Laboratory—9 hours. Prerequisite: course 140 or 150; course 102L; consent of instructor. Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of control of enzyme synthesis by induction, repression, and catabolite repression. Former course 130L. Not open for credit to students who have taken course 130L.

***160. Bacterial Regulatory Mechanisms** (3) III. Kowalczykowski, Artz
Lecture—3 hours. Prerequisite: course 140 or 150 recommended. Fundamentals of bacterial regulatory mechanisms. Topics will include control of DNA, RNA, and protein synthesis, global regulatory mechanisms, recombination, DNA repair systems, and cell cycle control with emphasis on bacterial systems. Not open for credit to students who have taken course 130B. (Former course 130B.)

162. General Virology (4) II. Manning
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 102. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics.

***177. Metabolism of Anaerobic Bacteria** (3) II. The Staff
Lecture—3 hours. Prerequisite: course 102; Biological Sciences 103 (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria, a consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

***177L. Laboratory in Metabolism of Anaerobic Bacteria** (2) II. The Staff
Laboratory—6 hours. Prerequisite: course 102L; course 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experiments dealing with certain characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in alternate years.

190C. Undergraduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion/conference—1 hour. Prerequisite: upper division standing; consent of instructor. Presentation and critical discussion of staff research activities: designed for advanced undergraduate students. May be repeated for a maximum of 3 units of credit when subject matter differs. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/NP grading only.)

194H. Microbiology Honors Research (2) I, II, III. The Staff
Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six units of 199 in microbiology; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.)

197T. Tutoring in Microbiology (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: course 102L and 18 upper division units in Microbiology; consent of chairperson. Assist in undergraduate laboratory courses supervised by teaching assistants or faculty; in discussion sections supervised by faculty; and staffing "drop-in" offices for individual help. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A-*200B-*200C. Microbiology for First-Year Graduate Students (3-3-3) I-II-III. The Staff (Nelson in charge)
Lecture—3 hours. Prerequisite: first-year graduate standing with interest in microbiology. A survey of general microbiology at the graduate level.

201L. Advanced Microbiology Laboratory Rotations (5) I, II. The Staff
Laboratory—15 hours. Prerequisite: course 200A (may be taken concurrently). Two five-week assignments in microbiology research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit.

210. Molecular Mechanisms in Microbial Pathogenesis (3) II. Manning, Hirsh (Pathology, Microbiology and Immunology)
Lecture—3 hours. Prerequisite: course 105 or Veterinary Microbiology 127 and course 162 or Veterinary Microbiology 128 or the equivalent. Study of the molecular mechanisms involved in cytopathogenesis of higher eukaryotic organisms. Emphasis on the alteration or inhibition of cellular metabolism and function by bacteria and animal viruses.

215. Recombinant DNA (2) I. Privalsky
Lecture—2 hours. Prerequisite: courses 130A-130B or Biological Sciences 101, 102 and 103. Application of the recombinant DNA technology to modern problems in biology, biochemistry and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA and selection procedures.

***215L. Recombinant DNA Laboratory** (4) I. Privalsky
Laboratory/discussion—10 hours. Prerequisite: course 130L or Molecular and Cellular Biology 120L; Biological Sciences 101; consent of instructor. Application of the recombinant DNA technology to modern problems in biology, biochemistry and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA and selection procedures. (Submit application, available from Microbiology Section Office, two weeks prior to first day of class.)

***240. Biology of Autotrophic Prokaryotes** (3) I. Meeks, Wheelis
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 103. Biochemistry and ecology of photo- and chemoautrophic bacteria, and of methylotrophic bacteria, with special emphasis on the mechanisms of ATP and reductant generation. Offered in alternate years.

***250. Biology of Yeasts** (5) I. Bisson (Viticulture and Enology), C. Price (Food Science and Technology)
Lecture—3 hours; discussion—2 hours. Prerequisite: Biological Sciences 102, 103; course 102, 102L; course 215 recommended. Survey of the genetics, physiology, metabolism, regulatory mechanisms, structure, cell biology, ecology and diversity of yeasts and related organisms. Offered in alternate years.

***260. Bacterial Genetic Regulatory Mechanisms** (3) I. Artz
Lecture/discussion—3 hours. Prerequisite: general knowledge of nucleic acid biochemistry and bacterial genetics. Analysis at the molecular level of genetic regulation in selected bacterial systems. Specific systems discussed will include the following types of regulation: control of transcription initiation and termination; translational controls; tRNA modification effects; autoregulation; control circuits in bacterial viruses; supercontrols. Offered in alternate years.

262. Advanced General and Molecular Virology (3) III. Luciw (Medical Pathology), Bruening (Plant Pathology)
Lecture—3 hours. Prerequisite: graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms.

***263. Principles of Protein–Nucleic Acid Interactions** (3) III. Kowalczykowski
Lecture—3 hours. Prerequisite: advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein–nucleic acid interaction. Topics include nucleic acid recognition by proteins, thermodynamics of protein–nucleic acid stability, and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein–nucleic acid interactions. Offered in alternate years.

***270. Advanced Animal Virology** (3) III. Manning in charge
Lecture—3 hours. Prerequisite: consent of instructor. Selected advanced topics on biological and biochemical properties of animal viruses. May be repeated for credit. Offered in alternate years.

274. Seminar in Genetic Recombination (2) I, II, III. Kowalczykowski
Seminar—2 hours. Prerequisite: graduate standing; consent of instructor. Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination, and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand exchange, DNA helicase, and Holliday junction resolving proteins. (S/U grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (S/U grading only.)

291. Selected Topics in Microbiology (1) I, II, III. Kowalczykowski in charge
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. (S/U grading only.)

292. Seminar in Bacterial Physiology, Genetics and Virology (1) I. Manning; II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in bacterial physiology, genetics, and virology with presentations by individual students. (S/U grading only.)

***293. Seminar in Protein Sorting** (1) I, II. Klionsky
Seminar—1 hour. Prerequisite: consent of instructor. Current research papers on the topics of organelle biogenesis, protein sorting and secretion. May be repeated for credit. (S/U grading only.)

296. Seminar in Animal Virology (1) I. Manning
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (Same course as Pathology, Microbiology and Immunology 292A.) (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Biological Sciences: Molecular and Cellular Biology

Carl W. Schmid, Ph.D., Chairperson of the Section
Section Office, 149 Briggs Hall (916-752-3611)

Faculty

Primary Section Members

Peter B. Armstrong, Ph.D., Professor
Enoch Baldwin, Ph.D., Assistant Professor
Ronald J. Baskin, Ph.D., Professor
Kenneth C. Burtis, Ph.D., Associate Professor
Judy Callis, Ph.D., Associate Professor
Don M. Carlson, Ph.D., Professor
James S. Clegg, Ph.D., Professor
Richard S. Criddle, Ph.D., Professor
John H. Crowe, Ph.D., Professor
Michael E. Dahmus, Ph.D., Professor
Roy H. Doi, Ph.D., Professor
Carol A. Erickson, Ph.D., Professor
Marilynn E. Etzler, Ph.D., Professor
Charles S. Gasser, Ph.D., Professor
Robert D. Grey, Ph.D, Professor, *Academic Senate Distinguished Teaching Award*
R. Scott Hawley, Ph.D., Professor
Jerry L. Hedrick, Ph.D., Professor
Leonard M. Hjelmeland, Ph.D., Professor *(Biological Chemistry)*
John A. Kiger, Ph.D., Professor
J. Clark Lagarias, Ph.D., Professor
Francis J. McNally, Ph.D., Assistant Profesor
Mark G. McNamee, Ph.D., Professor
Diana G. Myles, Ph.D., Professor
Jeanette E. Natzle, Ph.D., Associate Professor
Richard L. Nuccitelli, Ph.D., Professor
Jodi Nunnari, Ph.D., Assistant Professor
Raymond L. Rodriguez, Ph.D., Professor
Lesilee S. Rose, Ph.D., Assistant Professor
Carl W. Schmid, Ph.D., Professor *(Chemistry)*
Jonathan M. Scholey, Ph.D., Professor
Irwin H. Segel, Ph.D., Professor
Che-Kun J. Shen, Ph.D., Professor
Larry R. Sprechman, Ph.D., Lecturer

Secondary Section Members

Ernest S. Chang, Ph.D., Professor *(Animal Science)*
Richard H. Falk, Ph.D., Professor
Andrew Fisher, Ph.D., Assistant Professor *(Chemistry)*
Leslie D. Gottlieb, Ph.D., Professor
John J. Harada, Ph.D., Professor
Daniel J. Klionsky, Ph.D., Associate Professor
Stephen C. Kowalczykowski, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Brian Mulloney, Ph.D., Professor
Sharman O'Neill, Ph.D., Associate Professor
Pamela A. Pappone, Ph.D., Professor
Martin L. Privalsky, Ph.D., Professor
Steven M. Theg, Ph.D., Associate Professor
Robert M. Thornton, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*
Larry N. Vanderhoef, Ph.D., Professor
Merna R. Villarejo, Ph.D., Professor
Martin Wilson, Ph.D., Professor

Emeriti Faculty

Paul A. Castelfranco, Ph.D., Professor Emeritus
Sterling Chaykin, Ph.D., Professor Emeritus
Eric E. Conn, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*
David W. Deamer, Ph.D., Professor Emeritus
Gordon J. Edlin, Ph.D., Professor Emeritus
Melvin M. Green, Ph.D., Professor Emeritus
Lloyd L. Ingraham, Ph.D, Professor Emeritus
Paul K. Stumpf, Ph.D., Professor Emeritus

Affiliated Faculty

Kenneth L. Hilt, Ph.D., Lecturer
Donna M. Lagarias, Ph.D., Lecturer
Leann L. Lindsay, Ph.D., Lecturer
Ryan D. Mitchell, Ph.D., Lecturer
Janice Morand, Ph.D., Lecturer
Mark F. Sanders, Ph.D., Lecturer
Leigh D. Segel, Ph.D., Lecturer
Jimmy L. Spearow, Ph.D., Lecturer

Courses in Molecular and Cellular Biology (MCB)

Lower Division Courses

10. Introduction to Human Heredity (4) I. Hawley
Lecture—3 hours; discussion—1 hour. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development and behavior. Not open for credit to students who have received credit for Genetics 10. (Former course Genetics 10.) GE credit: SciEng, Wrt.

99. Special Study (1-5) I, II, III. The Staff
Independent study—3-15 hours. Prerequisite: consent of instructor. (Former course Genetics 99.) (P/NP grading only.)

Upper Division Courses

120L. Biochemistry Laboratory (6) I. Fairclough (Neurology), Hilt, Lindsay, Morand, Sprechman; II. D. Lagarias, J. Lagarias, Morand, L. Segel, Sprechman; III. Hedrick, Hilt, Lindsay, McNamee, Morand, Nunnari
Laboratory—10 hours; lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: Biological Sciences 103 (may be taken concurrently). Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who need experience in the use of biochemical techniques as laboratory tools. Not open for credit to students who have received credit for Biochemistry and Biophysics 101L. (Former course Biochemistry and Biophysics 101L.)

121. Molecular Biology of Eukaryotic Cells (3) II. Dahmus; III. Gasser, Hjelmeland
Lecture—3 hours. Prerequisite: Biological Sciences 101, 103, course 120L. Structure, expression and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription and RNA processing; protein synthesis and translation control; development, immune system and oncogenes. Not open for credit to students who have received credit for Biochemistry and Biophysics 153, Genetics 102A, 102B, Zoology 121B, or course 141 or 161. (Former course Biochemistry and Biophysics 153.)

122. Structure and Function of Proteins (3) I. Criddle; II. Baldwin, Sprechman
Lecture—3 hours. Prerequisite: course 120L, Biological Sciences 103. Correlation of structure and biological function. Molecular models of enzymes that explain their physiological functioning. Physical and chemical methods used in determining protein structure. Function as measured by kinetic and binding models and as affected by physiological considerations. Not open for credit to students who have received credit for Biochemistry and Biophysics 143. (Former course Biochemistry and Biophysics 143.)

123. Behavior and Analysis of Enzyme and Receptor Systems (3) III. I.H. Segel
Lecture—3 hours. Prerequisite: Biological Sciences 103. Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, mulitreactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. Not open for credit to students who have received credit for Biochemistry and Biophysics 133. (Former course Biochemistry and Biophysics 133.)

126. Plant Biochemistry (3) III. Abel (Vegetable Crops), Callis
Lecture—3 hours. Prerequisite: Biological Sciences 103. The chemistry of important plant processes and constituents in photosynthesis and respiration; carbohydrate, fat and nitrogen metabolism. Not open for credit to students who have received credit for Biochemistry and Biophysics 122. (Former course Biochemistry and Biophysics 122.)

138. Undergraduate Seminar in Biochemistry (1) I. Carlson and staff; II. Criddle, Hilt; III. Scholey, Sprechman
Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. Not open for credit to students who have received credit for Biochemistry and Biophysics 190. (Former course Biochemistry and Biophysics 190.) May be repeated twice for credit when topic differs. (P/NP grading only.)

140L. Cell Biology Laboratory (3) II. Baskin, Myles
Lecture—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 103, 104; course 141 recommended. Exercises illustrating the principles of cell biology, emphasis on individual research employing one or more advanced techniques. Not open for credit to students who have received credit for Zoology 121L. (Former course Zoology 121L.)

***141. Cellular Regulation of Gene Expression** (4) III. Natzle
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101 and 102; Biological Sciences 104 recommended. Molecular and cellular mechanisms for regulating the flow of information from genome to the cytoplasm, and from one generation to the next in eukaryotes and prokaryotes. Various levels of regulation will be discussed from an experiment-based perspective. Not open for credit to students who have received credit for Biochemistry and Biophysics 153, Genetics 102A, 102B, Zoology 121B, or course 121 or 161. (Former course Zoology 121B.)

142. Advanced Cell Biology: Contractile and Motile Systems (4) III. Baskin
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 104; Mathematics 16B. Advanced cell biol-

*Course not offered this academic year.

ogy with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. Not open for credit to students who have received credit for Zoology 121C. (Former course Zoology 121C.)

***146. Histology** (4) II. The Staff
Lecture—3 hours; laboratory—2 hours. Prerequisite: Biological Sciences 104. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes. Not open for credit to students who have received credit for Zoology 122. (Former course Zoology 122.)

***148. Undergraduate Seminar in Cell Biology** (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.)

150. Embryology (4) I. Armstrong; III. Erickson
Lecture—4 hours. Prerequisite: Biological Sciences 1A-1B, and concurrent enrollment in course 150L. The events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates. Not open for credit to students who have received credit for Zoology 100. (Former course Zoology 100.)

150L. Laboratory in Vertebrate Embryology (1) I. Armstrong; III. Erickson
Laboratory—3 hours. Prerequisite: concurrent enrollment in course 150. The comparative analysis of the embryonic development of vertebrates. Not open for credit to students who have received credit for Zoology 100L. (Former course Zoology 100L.) (P/NP grading only.)

***151L. Advanced Developmental Biology** (4) II. Erickson, Natzle, Jeffery, Nuccitelli
Lecture—2 hours; laboratory—6 hours; written report required. Prerequisite: courses 150, 150L; Biological Sciences 103. Modern topics in developmental biology followed by sophisticated laboratory exercises that demonstrate lecture topics. Students conduct independent studies during last four weeks of quarter. Not open for credit to students who have received credit for Zoology 101.

***158. Undergraduate Seminar in Developmental Biology** (2) II. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.)

***159. Senior Colloquium in Developmental Biology** (3) II. Grey
Lecture—1 hour; seminar—2 hours. Prerequisite: course 150 with a grade of B or better; consent of instructor. Analysis of major topics in developmental biology, including fertilization and activation of development, morphogenesis, cell differentiation, and pattern formation. Limited enrollment. Not open for credit to students who have received credit for Zoology 102. (Former course Zoology 102.)

160L. Principles of Genetics Laboratory (4) I. Natzle, Sanders; II. Kiger; III. Sanders
Laboratory—6 hours; lecture—2 hours. Prerequisite: Biological Sciences 101. Laboratory work in basic and molecular genetics including gene mapping and isolation of mutants. Not open for credit to students who have received credit for Genetics 100L. (Former course Genetics 100L.)

161. Molecular Genetics (3) I. Dahmus, Shen
Lecture—3 hours. Prerequisite: Biological Sciences 101; Biological Sciences 103 (may be taken concurrently). Molecular genetics including DNA structure and replication, restriction analysis, sequencing, transcription, translation and gene regulation. Not open for credit to students who have received credit for Genetics 102A, 102B, Zoology 121B, Biochemistry and Biophysics 153, or course 121 or 141. (Former courses Genetics 102A and 102B.)

162. Human Genetics (3) II. Hawley
Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Human molecular genetic variation, molecular basis of metabolic disorders, chromosome aberrations and consequences, diseases associated with the immune system, and statistical techniques for estimating genetic and environmental effects. Not open for credit to students who have received credit for Genetics 107. (Former course Genetics 107.) GE credit: SciEng, Wrt.

163. Developmental Genetics (3) II. Natzle
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102; course 150 recommended. Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. Not open for credit to students who have received credit for Genetics 104. (Former course Genetics 104.)

164. Advanced Eukaryotic Genetics (3) III. Hawley
Lecture—3 hours. Prerequisite: Biological Sciences 101. Concentration on the five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Special emphasis will be placed on the theory and practice both of isolating new mutations and of analyzing existing mutations.

***166. Advanced Developmental Genetics** (3) III. Kiger
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 161, 163. Topics of current interest in the area of genetic control of development. Focus on the genetic dissection of development in *Drosophila* and *Caenorhabditis,* with emphasis on transgenic and other novel techniques for the description and manipulation of developmental processes. Not open for credit to students who have received credit for Genetics 144. (Former course Genetics 144.) (P/NP grading only.)

***170L. Advanced Molecular Genetics Laboratory** (6) II, III. The Staff
Laboratory—9 hours; lecture—1 hour; discussion—2 hours. Prerequisite: Biological Sciences 101; courses 120L or 160L; course 121, 141, or 161; and consent of instructor. Molecular analysis of gene structure and function. Isolation, manipulation, and characterization of DNA, RNA, and proteins using recombinant DNA technology. Limited enrollment. Not open for credit to students who have completed Genetics 102L. (Former course Genetics 102L.)

178. Undergraduate Seminar in Molecular Genetics (1) I. Rodriguez, Sanders; II. Hawley, Sanders; III. Hawley
Seminar—1 hour. Prerequisite: upper division standing, completion of Biological Sciences 101, course 160L, and completion or concurrent enrollment in course 161. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated for credit. (Former course Genetics 191.) (P/NP grading only.)

190C. Undergraduate Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing and consent of instructor; concurrent enrollment in course 193 or 199. Presentation and discussion of current research by faculty and students. May be repeated for credit. (Former course Genetics 190C.) (P/NP grading only.)

191. Introduction to Research (1) I, II. L. Segel
Seminar—1 hour. Prerequisite: Biological Sciences 102 (may be taken concurrently) or consent of instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (Former courses Biochemistry and Biophysics 192, Genetics 192.) (P/NP grading only.)

193. Advanced Research (3) I, II, III. The Staff
Laboratory—6 hours; discussion—1 hour. Prerequisite: upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course and consent of instructor. Research project carried out under the supervision of a faculty sponsor. Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group. May be repeated for credit. (Former course Genetics 193.) (P/NP grading only.)

194H. Research Honors (3) I, II, III. The Staff
Independent study—9 hours. Prerequisite: 6 units of course 193 and/or 199 with faculty director; senior standing; GPA of at least 3.25; consent of Section. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (Former course Biochemistry and Biophysics 194H.) (P/NP grading only.)

197T. Tutoring (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: upper division standing, completion of course to be tutored, and consent of instructor. To assist the instructor by tutoring students in one of the Section's regular courses. (Former courses Biochemistry and Biophysics 197T, Genetics 197T.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Variable—1-5 hours. Prerequisite: consent of instructor. (Former courses Biochemistry and Biophysics 198, Genetics 198.) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Independent study—3-15 hours. Prerequisite: consent of instructor. (Former courses Biochemistry and Biophysics 199, Genetics 199.) (P/NP grading only.)

Graduate Courses

200A. Current Techniques in Cell Biology (2) I. Nuccitelli
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 104 and course 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with an emphasis on pitfalls to avoid when using the technique. (Same course as Cell and Developmental Biology 200.) Not open for credit to students who have received credit for Zoology 200. (Former course Zoology 200.) (S/U grading only.)

200B. Current Techniques in Biochemistry (2) II. Hedrick
Lecture—2 hours. Prerequisite: Biological Sciences 103 and course 120L or the equivalent courses. Current techniques used in biochemical research including protein and carbohydrate analyses, immunochemistry, recombinant DNA methods, electrophoretic and chromatographic methods. Not open for credit to students who have received credit for Biochemistry and Biophysics 200. (Former course Biochemistry and Biophysics 200.)

200C. Current Techniques in Biophysics (2) III. Jue (Biological Chemistry)
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Biophysics Graduate Group 200.) (S/U grading only.)

220L. Advanced Biochemistry Laboratory Rotations (5) I, II, III. McNally, Nunnari
Laboratory—15 hours. Prerequisite: course 221A (may be taken concurrently) and 120L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit. (Former course Biochemistry and Biophysics 202L.)

221A. Physical Biochemistry (4) I. Schmid
Lecture—4 hours. Prerequisite: Biological Sciences 103; Chemistry 107B-108 and 128C, 129C or 118C or the equivalents. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules. Not open for credit to students who have received credit for Biochemistry and Biophysics 201A. (Former course Biochemistry and Biophysics 201A.)

***221B. Integration of Metabolism and Regulatory Phenomena** (3) I. The Staff
Lecture—3 hours. Prerequisite: course 221A or consent of instructor. Regulatory phenomena that occur in control of metabolism; e.g., regulation at enzyme level; integration of metabolic pathways including homeostasis, hormonal influences, turnover of enzymes, comparative aspects of metabolism, regulation of amino acids and lipid metabolism in living systems. Not open for credit to students who have received credit for Biochemistry and Biophysics 201B. (Former course Biochemistry and Biophysics 201B.)

221C. Molecular Biology (4) III. Dahmus
Lecture—4 hours. Prerequisite: course 221A. Structure and organization of DNA and chromatin; DNA replication, repair and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells, and viruses. Not open for credit to students who have received credit for Biochemistry and Biophysics 201C. (Former course Biochemistry and Biophysics 201C.)

221D. Cellular Biochemistry (4) II. Etzler, Fairclough (Neurology), Hanley (Biological Chemistry), McNamee, Scholey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 221A. Molecular structure and biochemical function of cell membranes, cytoplasmic organization, organelle trafficking, signaling, mechanisms of intracellular transport, chromosome segregation and cell division with emphasis on biochemical principles. Not open for credit to students who have received credit for Biochemistry and Biophysics 201D. (Former course Biochemistry and Biophysics 201D.)

***231. Membrane Biochemistry** (2) III. NcNamee
Lecture—2 hours. Prerequisite: course 221D. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Offered in alternate years. Not open for credit to students who have received credit for Biochemistry and Biophysics 208. (Former course Biochemistry and Biophysics 208.)

***232. Chemical Modifications of Proteins** (3) III. Benisek (Biological Chemistry)
Lecture—3 hours. Prerequisite: Biological Sciences 103; Chemistry 128C or 118C or the equivalent courses. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions. Offered in alternate years. Not open for credit to students who have received credit for Biochemistry and Biophysics 212. (Former course Biochemistry and Biophysics 212.)

***241. Membrane Biology** (3) I. Crowe
Lecture—3 hours. Prerequisite: Biological Sciences 102 and 103, or Biological Sciences 104 and course 141, or consent of instructor. This course will emphasize biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of membranous components of cells. Offered in alternate years. Not open for credit to students who have received credit for Zoology 241. (Former course Zoology 241.)

***242. Muscle Biophysics** (4) I. Baskin
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: Biological Sciences 102, 103 and Mathematics 16B or 21B; or consent of instructor. The physical and chemical aspects of muscle function. Not open for credit to students who have received credit for Zoology 236. (Former course Zoology 236.)

***248. Seminar in Cell Biology** (2) II. Scholey
Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit. (Former course Zoology 266.)

***249. Literature in Cell Biology** (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of recent journal articles in cell biology. General topic area will change each quarter. May be repeated for credit. (Former course Zoology 242.) (S/U grading only.)

***250. Special Topics in Cell Biology** (3) I. Deamer
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in cell biology. May be repeated for credit. (Former course Zoology 240.)

251. Biology of Fertilization (3) I. Hedrick, Myles, Nuccitelli
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 104 or the equivalent, and consent of instructor. The morphology, physiology, and biochemistry of gametes, and the mechanism and consequences of their union. Offered in alternate years. Not open for credit to students who have received credit for Zoology 225. (Former course Zoology 225.)

***252. Cellular Basis of Morphogenesis** (4) III. Armstrong
Lecture/discussion—3 hours; term paper. Prerequisite: course 150. Development of form and structure; morphogenetic movement, mechanisms of cellular motility, cell adhesion, intercellular invasion, interaction of cells and tissues in development. Offered in alternate years. Not open for credit to students who have received credit for Zoology 204. (Former course Zoology 204.)

***253. Pattern Formation** (4) II. Nuccitelli
Lecture—3 hours; term paper. Prerequisite: course 150, Biological Sciences 104 or the equivalent, and consent of instructor. Morphology and mechanism of pattern formation beginning with ooplasmic segregation. Emphasis will be on cell polarity, but some multicellular systems will also be covered. Offered in alternate years. Not open for credit to students who have received credit for Zoology 205. (Former course Zoology 205.)

***254. Mechanisms of Organogenesis** (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 150. This course will demonstrate the various means by which several cell types become organized and differentiate to form a functional unit, using five selected organ systems. Offered in alternate years. Not open for credit to students who have received credit for Zoology 206. (Former course Zoology 206.)

***255. Molecular Mechanisms in Animal Development** (3) I. Natzle, Jeffery
Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: graduate standing or consent of instructor; introductory background in developmental biology and molecular genetics recommended. Analysis of the molecular mechanisms that control animal development, with a special focus on multiple levels of gene regulation. Experimental systems including *Drosophila*, amphibians, *C. elegans*, and mice will be discussed. Readings will be taken from current literature. Offered in alternate years. Not open for credit to students who have received credit for Zoology 208. (Former course Zoology 208.)

256. Cell and Molecular Biology of Cancer (1) I. Armstrong
Lecture—1 hour. Prerequisite: course 150 or 141 or Biological Sciences 104 or Biological Sciences 102 and 103. Analysis at the cellular and molecular levels of the regulation of normal and neoplastic growth, tumor dissemination, identification and characterization of oncogenic agents, characterization of oncogenes and anti-oncogenes. Not open for credit to students who have received credit for Zoology 226. (Former course Zoology 226.)

258. Seminar in Development (2) II. Armstrong, Erickson
Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. (Former course Zoology 292.)

259. Literature in Developmental Biology (1) I, II, III. Armstrong, Erickson
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. (Former course Zoology 269.) (S/U grading only.)

262. Recombinant DNA and Genetic Engineering (3) II. Rodriguez
Lecture—3 hours. Prerequisite: course 161 or Microbiology 130A-130B or consent of instructor. This course will explore the biology of necessary elements such as plasmids, transposons insertion sequences, prophages, etc. Both prokaryotic and eukaryotic moveable genetic elements will be discussed. The molecular biology of plasmid replication, illegitimate recombination, etc., will be considered. Offered in alternate years. Not open for credit to students who have received credit for Genetics 202. (Former course Genetics 202.) (S/U grading only.)

263. Biotechnology Fundamentals and Application (2) II. Doi, Ryu, Privalsky
Lecture—2 hours. Prerequisite: Biological Sciences 101, 102, Microbiology 102, graduate student in good standing. To train graduate students interested in a biotechnology career track; to learn recombinant DNA, rate processes of biological systesm, optimization of bioreactor performance, practical issues in biotechnology, and some case studies of the development of biotechnology products and processes. Offered in alternate years.

282. Biotechnology Internship (1-12) I, II, III. Doi, Ryu
Internship/laboratory—3-36 hours. Prerequisite: graduate student in good academic standing or consent of instructor. Research at a biotechnology company for a minimum of three months as part of the Designated Emphasis in Biotechnology.

290C. Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry, genetics, and cell biology. May be repeated for credit. (Former courses Biochemistry and Biophysics 250, Genetics 290C.) (S/U grading only.)

291. Current Progress in Molecular and Cellular Biology (1) I, II, III. Dahmus
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. (Former course Biochemistry and Biophysics 291.) (S/U grading only.)

294. Current Progress in Biotechnology (1) I, II, III. Doi, Ryu
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Chemical Engineering 294.) (S/U grading only.)

295. Literature in Molecular and Cellular Biology (1) I. Privalsky (Microbiology); II. Radke (Avian Sciences); III. Oberbauer (Animal Science) Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. (S/U grading only.)

***296. Research Seminar** (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: course 221C or consent of instructor. Presentation and critical discussions of research activities of various members of the local molecular and cellular biology community; primarily designed for graduate students. May be repeated for credit. (Former course Biochemistry and Biophysics 270.) (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff Variable—1-5 hours. Prerequisite: consent of instructor. (Former courses Biochemistry and Biophysics 298, Genetics 298.) (S/U grading only.)

299. Research (1-12) I, II, III. The Staff Independent study—3-36 hours. (Former courses Biochemistry and Biophysics 299, Genetics 299.) (S/U grading only.)

Professional Course

390. Methods of Teaching (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion and laboratory sections, formulating examinations under supervision of instructor. Participating in the teaching program required for Ph.D. May be repeated for credit. (Former courses Biochemistry and Biophysics 390, Genetics 300.) (S/U grading only.)

Biological Sciences: Neurobiology, Physiology and Behavior

Barbara A. Horwitz, Ph.D., Chairperson of the Section

Section Office, 196 Briggs Hall (916-752-0203)
World Wide Web: http://www.npb.ucdavis.edu

Faculty

Primary Section Members
Thomas P. Adamson, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Marylynn S. Barkley, Ph.D., Associate Professor
Kenneth H. Britten, Ph.D., Assistant Professor
Earl E. Carstens, Ph.D., Professor
Leo M. Chalupa, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor *(Animal Science)*
Barbara Chapman, Ph.D., Assistant Professor
Nicola S. Clayton, Ph.D., Assistant Professor
Charles A. Fuller, Ph.D., Professor
Jack M. Goldberg, Ph.D., Lecturer
Charles M. Gray, Ph.D., Assistant Professor
Barbara A. Horwitz, Ph.D., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*
Andrew T. Ishida, Ph.D., Associate Professor
Joel E. Keizer, Ph.D., Professor
Gary P. Moberg, Ph.D., Professor *(Animal Science)*
Brian Mulloney, Ph.D., Professor
Gabrielle A. Nevitt, Ph.D., Assistant Professor
Pamela A. Pappone, Ph.D., Professor
Gregg H. Recanzone, Ph.D., Assistant Professor
Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor
Arnold J. Sillman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Mitchell L. Sutter, Ph.D., Assistant Professor
W. Jeff Weidner, Ph.D., Professor
Martin Wilson, Ph.D., Professor
Charles M. Winget, Ph.D., Lecturer
Dorothy E. Woolley, Ph.D., Professor

Secondary Section Members
Ronald J. Baskin, Ph.D., Professor
John H. Crowe, Ph.D., Professor
Mark G. McNamee, Ph.D., Professor
Judy A. Stamps, Ph.D., Professor

Emeriti Faculty

James M. Boda, Ph.D., Professor Emeritus
Harry W. Colvin, Ph.D., Professor Emeritus
John M. Horowitz, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Frederick W. Lorenz, Ph.D., Professor Emeritus
Peter R. Marler, Ph.D., Professor Emeritus
Verne E. Mendel, Ph.D., Professor Emeritus
Arthur H. Smith, Ph.D., Professor Emeritus

Courses in Neurobiology, Physiology and Behavior (NPB)

Lower Division Courses

10. Elementary Human Physiology (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed course 101. GE credit: SciEng.

12. Human Nervous System (3) III. Recanzone
Lecture—3 hours. Organization and function of the human nervous system for non-science majors. Brain function discussed in relation to cognition, learning and memory, and neurological diseases. Not open for credit to students who have completed courses 100, 112 or Psychology 108. GE credit: SciEng.

12G. Understanding the Human Nervous System (1) III. Recanzone
Discussion—1 hour. Prerequisite: concurrent enrollment in course 12. For non-science majors. Scientific studies of brain function will be discussed in relation to ethical considerations, social, economic, and political implications and current and future research. GE credit with concurrent enrollment in course 12: Wrt.

Upper Division Courses

100. Neurobiology (4) I. Chapman, Sutter; III. Mulloney
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B; Physics 5C or 7C recommended. Brains and nervous systems, neurons and neural circuits. Vision, hearing, and feature extraction by the central nervous system. Development of nervous systems. Coordination of movement. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed course 112, 160, 161 or 162, or Neuroscience 221 or 222.

101. Systemic Physiology (5) I, II, III. Barkley, Fuller, Ishida, Goldberg, Sillman, Weidner
Lecture—5 hours. Prerequisite: Biological Sciences 1B; Physics 1B or 7C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed Physiology 110 or course 110. (Former course 110, Physiology 110.)

101L. Systemic Physiology Laboratory (2) I. Adamson; III. Goldberg
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 101 prior to taking 101L recommended, but 101 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Not open for credit to students who have completed Physiology 110L or course 110L. (Former course 110L, Physiology 110L.)

102. Animal Behavior (3) II. Clayton; III. Nevitt
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed course 155 or Zoology 155. (Former course 155, Zoology 155.)

103. Cellular Physiology/Neurobiology (3) II. Pappone
Lecture—3 hours. Prerequisite: Biological Sciences 103 and 104; Physics 7C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to cytoplasmic homeostasis, communication between cells, and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed course 100B or Physiology 100B. (Former courses Neurobiology, Physiology and Behavior 100B, Physiology 100B.)

104L. Cellular Physiology/Neurobiology Laboratory (3) II. Horwitz
Lecture—1 hour; laboratory—3 hours and discussion—1 hour alternate weekly. Prerequisite: Biological Sciences 103 and 104, or the equivalent. Experiments in the physical and chemical processes of cells and tissues. Not open for credit to students who have completed course 100L or Physiology 100L. (Former course 100L, Physiology 100L.) GE credit: Wrt.

105. Introduction to Computer Models (4) III. Keizer
Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: Mathematics 16C or the equivalent, Physics 7C, Chemistry 2C, and course 100 or 101. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca^{2+} oscillations, respiration, and muscle contraction. Offered in alternate years.

106. Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3) I, II, III. The Staff
Laboratory—7.5 hours; discussion—0.5 hours. Prerequisite: Course 100, 101, or 102 and consent of instructor. Experiments in current physiological, neurobiological, or animal behavior problems. Discussion of experimental design. Students choose a project and, independently or in groups of 2-3, design a protocol, do the project and report their findings. May be repeated once for credit with consent of instructor. (P/NP grading only.)

111C. Advanced Systemic Physiology Laboratory (3) II. Sutter
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 101, 101L, Statistics 13; course 112, 113, or 114 recommended. Interfacing physiological recording equipment with microcomputers; data acquisition and analysis using the microcomputer; data interpretation within the framework of physiological concepts. Not open for credit to students who have completed Physiology 111C. (Former course Physiology 111C.)

111L. Advanced Systemic Physiology Laboratory (3) I, III. Adamson
Lecture—1 hour; laboratory—6 hours; discussion—2 hours (laboratory and discussion alternate weekly). Prerequisite: courses 101, 101L. Selected comprehensive experiments in the autonomic nervous system, the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems. Not open for credit to students who have completed courses 111A or 111B. (Former courses 111A, 111B.) GE credit: Wrt.

112. Neuroscience (3) I. Carstens; III. Gray
Lecture—3 hours. Prerequisite: course 100 or 101. Presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration. Emphasis on mammalian nervous system.

Not open for credit to students who have completed Physiology 112. (Former course Physiology 112.)

113. Cardiovascular, Respiratory, and Renal Physiology (4) II. Goldberg
Lecture—4 hours. Prerequisite: course 101; Chemistry 8B, Physics 7B and 7C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Not open for credit to students who have completed Physiology 113. (Former course Physiology 113.)

114. Gastrointestinal Physiology (3) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 101; Biological Sciences 103 recommended. Advanced gastrointestinal physiology covering absorption, secretion, motility, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the gastrointestinal tract; some pathology and nutritional items will be covered. Not open for credit to students who have completed Physiology 114. (Former course Physiology 114.) GE credit: Wrt.

117. Avian Physiology (3) III. Millam
Lecture—3 hours. Prerequisite: course 101 or Biological Sciences 1B. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems. Not open for credit to students who have completed Physiology 117. (Former course Physiology 117.)

***119. Invertebrate Physiology** (4) II. Crowe
Lecture—3 hours; term paper; individual conferences. Prerequisite: Evolution and Ecology 112, Chemistry 2A, 2B, Physics 7C; Biological Sciences 102 and 103 recommended. Comparative physiology of invertebrate organ systems. Not open for credit to students who have completed course 142 or Zoology 142. (Former course 142, Zoology 142.)

***119L. Invertebrate Physiology Laboratory** (3) II. Crowe
Laboratory—6 hours (includes research project). Prerequisite: course 119 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Design and execution of a research project. Not open for credit to students who have completed course 142L or Zoology 142L. (Former course 142L, Zoology 142L.)

121. Physiology of Reproduction (3) II. Anderson
Lecture—3 hours. Prerequisite: course 101. Physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals. Not open for credit to students who have completed Physiology 121. (Former course Physiology 121.)

121L. Physiology of Reproduction Laboratory (1) II. Anderson
Laboratory—3 hours. Prerequisite: course 121 recommended (may be taken concurrently). Experiments on the reproductive systems of domestic animals including male and female gametes. Not open for credit to students who have completed Physiology 121L. (Former course Physiology 121L.) (P/NP grading only.)

125. Comparative Physiology: Neurointegrative Mechanisms (3) III. Woolley
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels. Not open for credit to students who have completed course 120A or Physiology 120A. (Former course 120A, Physiology 120A.)

126. Comparative Physiology: Sensory Systems (3) II. Sillman
Lecture—3 hours. Prerequisite: course 100 or 101. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechano-sensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Not open for credit to students who have completed course 120F or Physiology 120F. (Former course 120F, Physiology 120F.)

127. Comparative Physiology: Circulation (3) II. Weidner
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates. Not open for credit to students who have completed course 120B or Physiology 120B. (Former course 120B, Physiology 120B.)

128. Comparative Physiology: Endocrinology (3) II. Moberg, Chang
Lecture—3 hours. Prerequisite: course 101. Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Not open for credit to students who have completed course 120D or Physiology 120D. (Former course 120D, Physiology 120D.)

***129. Comparative Physiology: Respiration** (3) II. Cech
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: respiration. Offered in alternate years. Not open for credit to students who have completed course 120E or Physiology 120E. (Former course 120E, Physiology 120E.)

130. Physiology of the Endocrine Glands (4) I. Adams
Lecture—4 hours. Prerequisite: course 101. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. Not open for credit to students who have completed Physiology 130. (Former course Physiology 130.)

140. Principles of Environmental Physiology (3) II. Fuller
Lecture—3 hours. Prerequisite: course 101; Biological Sciences 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/ mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148 or Physiology 148. (Former course148, Physiology 148.)

141. Physiological Adaptation of Marine Organisms (4) III. Clegg (Molecular and Cellular Biology), Chang
Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Biological Sciences 102 and 103; Biological Sciences 123 (concurrently); Physics 7A-7B-7C. Physiological adaptation to the environment among organisms in marine and estuarine habitats. Course offered at Bodega Marine Laboratory. (See "Division-wide Programs" for Bodega Marine Laboratory Program.) Not open for credit to students who have completed Biological Sciences 121. (Former course Biological Sciences 121.)

141P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (6) III. Clegg (Molecular and Cellular Biology), Chang
Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 141 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 141 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See "Division-wide Programs" for Bodega Marine Laboratory Program.) Not open for credit to students who have completed Biological Sciences 121P. (Former course Biological Sciences 121P.)

152. Hormones and Behavior (3) III. Barkley, Mendoza
Lecture—3 hours. Prerequisite: course 101 and 102 or Psychology 108. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Same course as Psychology 152.)

***160. Advanced Cellular Neurobiology** (4) II. Mulloney and Wilson
Lecture—3 hours; independent study—1 hour. Prerequisite: Biological Sciences 101, 102, 104, course 100, or consent of instructor; Physics 7C recommended. Neuronal structure; ion channels; synapses, transmitters and transmitter pharmacology; receptors; neuronal modulation and circuit dynamics. Not open for credit to students who have completed course 143 or Zoology 143. (Former course 143, Zoology 143.)

***160L. Advanced Cellular Neurobiology Laboratory** (4) II. Mulloney
Laboratory—12 hours. Prerequisite: course 160, Physics 7C recommended. Students will learn to record neural activity, to interpret their recordings, and to label neurons with antibodies against neurotransmitters. Not open for credit to students who have completed course 143L or Zoology 143L. (Former course 143L and Zoology 143L.)

161. Developmental Neurobiology (3) III. Chalupa
Lecture—3 hours. Prerequisite: course 100 or 101. Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives.

162. Neural Mechanisms of Behavior (3) III. Britten
Lecture—3 hours. Prerequisite: course 100 or 101. The relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation.

***163. Modeling in Systems Neuroscience** (4) III. Sutter
Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: Physics 7C and Mathematics 16C; course 100 or Psychology 108; Biological Sciences 1A, 1B. Modeling as an approach to understanding communcation signals and behavior. Mathematical tools will be developed to explore echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms and modeling assumptions. Offered in alternate years.

***190. Proseminar in Physiology** (3) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours. Prerequisite: course 101 and Biological Sciences 104, one additional upper division course in physiology or a related course in science, and consent of instructor. Student presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

190C. Introduction to Physiological Research (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: upper division standing in physiology or related biological science; consent of instructor. Introduction to research findings and methods in physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (Former course Physiology 190C.) (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in physiology. (Former course Physiology 192.) (P/NP grading only.)

194HA-194HB-194HC. Neurobiology, Physiology and Behavior–Honors (1, 1-4, 2) I-II-III. The Staff
Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.5 GPA in courses counted toward major; approval by the Master Adviser. Honors project in Neurobiology, Physiology and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honosr Thesis Committee. Honors thesis to be submitted upon completion of the project. Course 194HB may be repeated for credit for

a total of 8 units. Not open for credit to students who have completed Physiology 194HA-194HB-194HC. (Former course Physiology 194HA-194HB-194HC.) (P/NP grading only.)

***196A. Voluntary Control of Physiological Processes** (2) I, II, III. Lorenz
Seminar—1 hour; laboratory—3 hours. Prerequisite: adequate upper division preparation in at least one of the following: physiology, behavioral science, computer science, physics or electrical engineering; consent of instructor. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. (Former course Physiology 196A.) (P/NP grading only.)

***196B. Voluntary Control of Physiological Processes** (1-4) I, II, III. Lorenz
Laboratory—3-12 hours. Prerequisite: course 196A. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit with a maximum of 6 units for 196A-196B course sequence. (Former course Physiology 196B.) (P/NP grading only.)

197T. Tutoring in Neurobiology, Physiology and Behavior (1-5) I, II, III. The Staff
Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting in courses in neurobiology, physiology and behavior under the direction of the faculty. (Former course Physiology 197T.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
(Former course Physiology 198.) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(Former course Physiology 199.) (P/NP grading only.)

Graduate Courses

221. Cellular and Molecular Neuroscience (4) I. Wilson
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced course dealing with the cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning will be covered. (Same course as Neuroscience 221.)

222. Systems Neuroscience (4) II. Britten
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced course covering the integrative and information-processing aspects of nervous system organization. Specific topics to be covered include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neuroscience 222.)

245. Computational Models of Cellular Signaling (3) II. Keizer
Lecture—3 hours. Prerequisite: consent of instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits.

263. Modeling in Systems Neuroscience (4) II. Sutter
Lecture—3 hours; lecture/laboratory— 1 hour. Prerequisite: consent of instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Offered in alternate years.

Biological Sciences: Plant Biology

Deborah P. Delmer, Ph.D., Chairperson of the Section

Section Office, 1002 Life Sciences Addition (916-752-0617)

Committee in Charge of the Major

Deborah Canington, Ph.D. *(Plant Biology)*
John J. Harada, Ph.D. *(Plant Biology),* Chairperson
Judy Jernstedt, Ph.D. *(Agronomy and Range Science)*
John Labavitch, Ph.D. *(Pomology)*
Alan Stemler, Ph.D. *(Plant Biology)*

Faculty

Faculty includes members of the Departments of Agronomy and Range Science; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Sections of the Division of Biological Sciences.

Primary Section Members
John L. Bowman, Ph.D., Assistant Professor
Anne Britt, Ph.D., Assistant Professor
Deborah P. Delmer, Ph.D., Professor
Richard H. Falk, Ph.D., Professor
John J. Harada, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Terence M. Murphy, Ph.D., Professor
Sharman O'Neill, Ph.D., Associate Professor
Thomas L. Rost, Ph.D., Professor
Nelima Sinha, Ph.D., Assistant Professor
Alan J. Stemler, Ph.D., Professor
Steven M. Theg, Ph.D., Associate Professor
Robert M. Thornton, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*
Larry N. Vanderhoef, Ph.D., Professor

Secondary Section Members
Judy Callis, Ph.D., Associate Professor
Richard S. Criddle, Ph.D., Professor
James A. Doyle, Ph.D., Professor *(Geology)*
Marilynn E. Etzler, Ph.D., Professor
Charles S. Gasser, Ph.D., Professor
R. Marc Learned, Ph.D., Assistant Professor
Marcel Rejmanek, Ph.D., Associate Professor
Raymond L. Rodriguez, Ph.D., Professor
Irwin H. Segel, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Donald R. Strong, Ph.D., Professor

Emeriti Faculty

Fredrick T. Addicott, Ph.D., Professor Emeritus
Floyd M. Ashton, Ph.D., Professor Emeritus
Bruce A. Bonner, Ph.D., Professor Emeritus
Herbert B. Currier, Ph.D., Professor Emeritus
Emanuel Epstein, Ph.D., Professor Emeritus
Ernst M. Gifford, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Hendrick J. Ketellapper, Ph.D., Professor Emeritus
Donald W. Kyhos, Ph.D., Professor Emeritus
Norma J. Lang, Ph.D., Professor Emeritus
C. Ralph Stocking, Ph.D., Professor Emeritus
John M. Tucker, Ph.D., Professor Emeritus
Grady Webster, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor Emeritus

Affiliated Faculty

Deborah Canington, Ph.D., Academic Coordinator/Lecturer
Ellen Dean, Ph.D., Academic Coordinator/Lecturer

Concordance

The following courses in Plant Biology have been renumbered.

Former Course Number	Equivalent new course and number
10	Plant Biology 11 (Plants, People and the Biosphere)
119	Plant Biology 148 (Introductory Mycology)
120	Plant Biology 176 (Introduction to Weed Science)
122	Plant Biology 177 (Action of Herbicides)
135	Plant Biology 158 (Mineral Nutrition of Plants)
150	Plant Biology 178 (Biology and Management of Freshwater Macrophytes)

Courses in Plant Biology (PLB)

Lower Division Courses

1. Plants for Garden, Orchard and Landscape (2) I, III. Marrush (Vegetable Crops)
Lecture—1 hour; laboratory—3 hours. For nonmajors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagating trees and vines, growing flowers and ornamental plants, and the role of plants in human health and well-being. Not open for credit to students who have completed Agricultural Systems and Environment 2 or Plant Science 1. (Former course Plant Science 1.) (P/NP grading.)

11. Plants and the Biosphere (3) I. Falk
Lecture—3 hours; one weekend field trip (half-day); term paper. Ethnobotanical and ecological themes are emphasized in examining our dependence on plants, the ecological roles of plants, and the development of botany as a contemporary science. Intended primarily for non-science majors. Not open for credit to students who have completed former course 10 or Botany 10. (Former course 10, Botany 10.) GE credit: SciEng, Wrt.

12. Plants and People (3) I. Bradford; II. Bennett, Michelmore; III. Nevins (Vegetable Crops)
Lecture—3 hours. Prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect their utility. Not open for credit to students who have completed Plant Science 10. (Former course Plant Science 10.) GE credit: SciEng, Div, Wrt.

90X. Plant Science Seminar (1-4) I, II, III.
The Staff
Prerequisite: consent of instructor. Examination of a special topic in a small group setting. Not open for credit to students who have completed course Plant Science 90X. (Former course Plant Science 90X.)

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. (Former course Botany 92.) (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (Former course Botany 98.) (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge.)
Prerequisite: consent of instructor. (Former course Botany 99.) (P/NP grading only.)

Upper Division Courses

For questions about courses numbered 102 through 125, see the Plant Biology Section Office, 143 Robbins Hall. For questions concerning courses numbered 142 through 188, see the Plant Science

Advising Center, 152 Hunt Hall.

102. California Floristics (5) III. Dean
Lecture—2 hours; lecture/discussion—1 hour; laboratory—6 hours (includes three one-day, weekend field trips). Prerequisite: Biological Sciences 1A, 1B, 1C or the equivalent in plant science. Survey of the flora of California, with emphasis on field recognition and identification of important vascular plant families and genera characterizing the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographical patterns of California flora. Not open for credit to students who have completed Botany 102. (Former course Botany 102.)

105. Developmental Plant Anatomy (5) I. Rost
Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (for example, Biological Sciences 1C). Survey of vascular plant structure and development. Current ideas and experimental evidence for developmental concepts. Not open for credit to students who have completed Botany 105. (Former course Botany 105.)

108. Systematics and Evolution of Angiosperms (5) III. Doyle
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B and 1C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Evolution and Ecology 108.) GE credit: SciEng.

111. Plant Physiology (3) I. Stemler, Lucas
Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B (may be taken concurrently; Physics 7A, 7B, 7C recommended. Fundamental activities of plants; the plant cell as a functioning unit. Processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration. Not open for credit to students who have completed Botany 111. (Former course Botany 111.)

111D. Problems in Plant Physiology (1) I. Stemler, Lucas
Discussion—1 hour. Prerequisite: course 111 concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. Not open for credit to students who have completed Botany 111D. (Former course Botany 111D.) (P/NP grading only.)

111L. Introductory Plant Physiology Laboratory (5) III. Murphy
Lecture/discussion—1 hour; laboratory—9 hours; extensive writing. Prerequisite: course 111 (may be taken concurrently) or 112 or consent of instructor (both recommended). Introduction to basic experimental techniques and instruments used in the investigation of plant physiological processes, such as photosynthesis, water and solute transport, tissue cultures, and detection of hormones. Not open for credit to students who have completed Botany 111L. (Former course Botany 111L.)

112. Plant Growth and Development (3) II. Thornton
Lecture—3 hours. Prerequisite: Biological Sciences 1C, Chemistry 8B. Introduction to the mechanisms and control systems that govern plant growth and development and the responses of plants to the environment. Strong emphasis on vegetative development of flowering plants. Not open for credit to students who have completed Botany 112. (Former course Botany 112.) GE credit: SciEng.

112D. Problems in Plant Growth and Development (1) II. Thornton
Discussion—1 hour. Prerequisite: course 112 concurrently. Discussion of problems and applications relating to principles presented in course 112. Students will be assigned problems each week showing novel applications of the principles described in course 112 and will prepare answers to be delivered orally during class period. Not open for credit to students who have completed Botany 112D. (Former course Botany 112D.) (P/NP grading only.)

113. Molecular and Cellular Biology of Plants (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Biological Sciences 102 recommended. Molecular and cellular aspects of the growth and development of plants and their response to biological and environmental stresses. Primary focus on processes unique to plants. Experimental approaches will be emphasized.

113D. Problems in Molecular and Cellular Biology of Plants (1) III. The Staff
Discussion—1 hour. Prerequisite: course 113 concurrently. Discussion of topics and applications related to principles presented in course 113. Assigned topics each week show novel applications of the principles described in course 113; discussion of topics during class period. (P/NP grading only.)

116. Plant Morphology and Evolution (5) II. Jernstedt
Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 1C); plant anatomy recommended (e.g., course 105). Introduction to the form, development and evolution of vascular plants. Emphasis given to the form and development of reproductive structure in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed Botany 116. (Former course Botany 116.) GE credit: SciEng.

117. Plant Ecology (4) I. Schwartz
Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; course 112; course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for Evolution and Ecology 121. (Same course as Evolution and Ecology 117.) Not open for credit to students who have completed Botany 117. (Former course Botany 117.)

118. Introductory Phycology and Bryology (4) II. Canington
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1C. Comparative morphology, physiology, development and reproduction of cyanobacteria, the major algal groups, and the bryophytes. Focus on structure-function and evolutionary relationships. Ecological factors and commercial uses considered. Laboratory includes study of living organisms and identification exercises. Not open for credit to students who have completed Botany 118. (Former course Botany 118.)

121. Biology of Weeds (3) III. Rejmanek
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Origin and evolution, beneficial and harmful aspects, reproduction and dispersal, seed germination and dormancy, growth and development, ecology, interaction of weeds and crops, natural succession, and herbicide-induced succession. Laboratories will emphasize taxonomy of weeds and demonstrate principles discussed in lectures. Not open for credit to students who have completed Botany 121. (Former course Botany 121.)

123. Plant-Virus-Vector Interaction (3) I. Lucas, Gilbertson, Ullman
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; course 105, Plant Pathology 120, and Entomology 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Entomology 123/Plant Pathology 123.)

***125. Molecular Biology of Plant Development** (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Biological Sciences 103; Molecular and Cellular Biology 161 or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues. Not open for credit to students who have completed Botany 125. (Former course Botany 125.)

142. Ecology of Crop Systems (4) II. Denison (Agronomy and Range Science)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C; Mathematics 16A or Physics 1A, or consent of instructor. Ecological processes governing the structure and behavior of managed ecosystems. Emphasis on mechanistic and systems views of the physical environment, photosynthetic productivity, competition, adaptation, nutrient cycling, energy relations and contemporary issues such as climate change. Not open for credit to students who have completed Plant Science 101. (Former course Plant Science 101.) GE credit: SciEng.

143. Evolution of Crop Plants (3) III. Gepts (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Origins of crops and agriculture, including methodological approaches, center of origin and diversity, crop dissemination pathways, and differences between wild and cultivated plants. Group studies of individual crops are published on the Internet. Not open for credit to students who have completed Plant Science 103 (Former course Plant Science 103.) GE credit: SciEng, Wrt.

144. Trees and Forests (3) I. Barbour, Berry (Environmental Horticulture), Bledsoe (Land, Air and Water Resources), DeJong (Pomology)
Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology; photosynthesis, respiration soil processes, life histories, dormancy, forest biodiversity, and agroforestry. (Same course as Environmental and Resource Sciences 144/Environmental Horticulture 144.) Not open for credit to students who have completed Plant Science 106. (Former course Plant Science 106.)

146. Rhizosphere Ecology (2) III. Phillips (Agronomy and Range Science)
Lecture—2 hours. Prerequisite: Agricultural Sysems and Environment 2 or Biological Sciences 1A-1B-1C. Plant-microbe interactions affect plant growth, soil formation, and agricultural sustainability. Course addresses physical, chemical and biological processes which occur at the surface of plant roots. Evolution and modification of the biochemical and genetic bases of rhizosphere ecology are discussed. Not open for credit to students who have completed Plant Science 110. (Former course Plant Science 110.)

148. Introductory Mycology (5) I. MacDonald, Rizzo (Plant Pathology)
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to morphology, ontogeny, taxonomy and biology of the fungi. Not open for credit to students who have completed former course 119, Botany/Plant Pathology 119. (Former course 119, Botany/Plant Pathology 119.) (Same course as Plant Pathology 148.)

151. Plant Genetic Resources for Global Crop Production (3) I. Bliss
Lecture—3 hours. Prerequisite: Biological Sciences 1B or 10. Biological and social factors that influence availability of plant genetic resources for discovery of useful new substances and improvement of cultivated plants. Effects of ethical issues, property rights and biological systems on conservation strategies in local and global contexts. GE credit: SciEng, Wrt.

152. Plant Genetics (4) I. Wilkins (Agronomy and Range Science)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A or consent of instructor. Basic principles of transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open for credit to students who have completed Plant Science 105. (Former course Plant Science 105.)

153. Plant, Cell, Tissue and Organ Culture (4) II.

Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryogenesis, anther culture, protoplast culture and transformation. Offered in alternate years. Not open for credit to students who have completed Plant Science 107. (Former course Plant Science 107.)

154. Introduction to Plant Breeding (4) II. St. Clair (Vegetable Crops)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152, Biological Sciences 101 or consent of instructor. The principles, methods and applications of plant breeding and genetics to the improvement of crop plants. Illustration of how plant breeding is a dynamic, multidisciplinary, constantly-evolving science. Laboratory emphasizes hands-on experience in the basics of breeding through experiments. (Former course Plant Science 113.)

157. Physiology of Environmental Stresses in Plants (3) II. Richards, Läuchli, Silk (Land, Air and Water Resources)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses. Not open for credit to students who have completed Plant Science 126. (Former course Plant Science 126.)

158. Mineral Nutrition of Plants (4) III. Richards (Land, Air, and Water Resources), Brown (Pomology)
Lecture—3 hours: laboratory—3 hours. Prerequisite: course 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. Not open for credit to students who have completed Plant Biology/Plant Science 135 or Botany 135. (Former course Plant Biology/Plant Science 135, Botany 135.)

160. Principles of Plant Biotechnology (3) II. Dandekar (Pomology)
Lecture—3 hours. Prerequisite: Biological Sciences 1A and 101. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement. Not open for credit to students who have completed Plant Science 140. (Former course Plant Science 140.)

161A. Plant Genetics and Biotechnology Laboratory (4) I. Wilkins, Dubcovsky (Agronomy and Range Science), Quiros (Vegetable Crops)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. Techniques of genetic analysis at the molecular and organismal levels, including segregation and linkage analysis, cytogenetics and recombinant DNA. Not open for credit to students who have completed Plant Science 141A. (Former course Plant Science 141A.)

***161B. Plant Genetics and Biotechnology Laboratory** (4) II. Wilkins, Gepts (Agronony and Range Science), Dandekar (Pomology)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. Advanced techniques of genetic analysis at the molecular and organismal levels, including transformation, gene expression, analysis of transgenic plants and QTL analysis. Not open for credit to students who have completed Plant Science 141B. (Former course Plant Science 141B.)

171. Plant Propagation (4) III. Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed Plant Science 109. (Former course Plant Science 109.)

172. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology), Reid (Environmental Horticulture), Saltveit (Vegetable Crops)
Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., Agricultural Sysems and Environment 2, course 12 or Food Science and Technology 2); concurrent enrollment in course 172L recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres. Not open for credit to students who have completed Plant Science 112. (Former course Plant Science 112.)

172L. Postharvest Physiology and Handling Laboratory (2) I. Kader (Pomology), Saltveit (Vegetable Crops)
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 172 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 172. Not open for credit to students who have completed Plant Science 112L. (Former course Plant Science 112L.)

173. Biological Applications in Fruit Tree Management (2) II. DeJong (Pomology)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2 or the equivalents. Physiology, growth, development and environmental requirements of fruit trees and cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students who have completed Plant Science 115. (Former course Plant Science 115.)

174. Biological Applications in Fruit Production (2) III. De Young, Polito (Pomology)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2; course 173 recommended. Reproductive biology of tree-crop species. Biological principles of fruit production, tree nutrition and orchard management. Laboratories emphasize hands-on work with orchard tree systems.

175. Applied Plant Biology (4) II. Brown, Labavitch, Bliss (Pomology)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111, and Biological Sciences 101 or course 152. Advanced concepts of plant biology with reference to the uses of plants for food, fiber, and environmental enhancement. Current research, applications, and issues in crop improvement, production and biotechnology will be presented and discussed. Not open for credit to students who have completed Plant Science 145. (Former course Plant Science 145.)

176. Introduction to Weed Science (3) II. Bayer
Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8A, 8B. Principles of weed science including mechanical, biological, and chemical control methods. Weed control in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Sight identification of common weeds and demonstrations to illustrate the principles. Not open for credit to students who have completed former course 120, Botany 120. (Former course 120, Botany 120.)

177. Action of Herbicides (3) III. Bayer/Falk
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 176; Soil Science 100; courses 111, 111D recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils. Not open for credit to students who have completed former course 122, Botany 122. (Former course 122, Botany 122.)

178. Biology and Management of Freshwater Macrophytes (3) I. Anderson
Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 8B; course 111 or Hydrologic Science 122 recommended. Brief survey of common fresh water macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology and management. Offered in alternate years. Not open for credit to students who have completed former course 150, Botany 150. (Former course 150, Botany 150.)

188. Undergraduate Research: Proposal (3) III. Bloom, Yoder (Vegetable Crops)
Lecture/discussion—3 hours. Prerequisite: upper division standing and consent of instructor. Through lectures, class discussion and individual mentoring, students will define a problem, identify objectives, conduct a literature survey, generate testable hypotheses, design experiments, plan data analysis, prepare an outline, and write a scientific proposal. (Same course as Agricultural Systems and Environment 188.) Not open for credit to students who have completed Plant Science 191, Vegetable Crops 191. (Former course Plant Science 191.) (P/NP grading only.)

189. Experiments in Plant Biology: Design and Execution (3) I, II, III. The Staff.
Laboratory/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C or the equivalent courses in plant sciences, and consent of the instructor. Provides an opportunity for undergraduate students to formulate experimental approaches to current questions in plant biology and to carry out their proposed experiments. May be repeated for credit for a total of 12 units. (Former course Botany 189.)

190C. Research Conference in Botany (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in botany or related discipline; consent of instructor. Introduction to research methods in botany. Design of field or laboratory research projects, survey of appropriate literature, and discussion of research by faculty and students. May be repeated for credit. (Former course Botany 190C.) (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Section faculty. (Former course Botany 192.) (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. Not open for credit to students who have completed Botany 194H. (Former course Botany 194H.) (P/NP grading only.)

196. Postharvest Technology of Horticultural Crops (3) III. Kader (Pomology) in charge
Lecture/discussion/demonstration—5 days; field trip—5 days. Prerequisite: upper division or graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Considered a spring course for preenrollment. Not open for credit to students who have completed Plant Science 196. (Former course Plant Science 196.) (P/NP grading only.)

197T. Tutoring in Botany (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student contact will be primarily in laboratory or discussion sections. (Former course Botany 197T.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Former course Botany 198.) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge.)
Prerequisite: consent of instructor. (Former course Botany 199.) (P/NP grading only.)

Biomedical Engineering (A Graduate Group)

Maury L. Hull, Ph.D., Chairperson of the Group (916-752-6656 or 752-2611)

Group Office, 1050 Engineering II (Engineering Dean's Office, 916-752-2611)

Faculty. Includes faculty members from the three colleges, and the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study prepare students for professional work in the effective integration of engineering with biology and medical sciences, including modeling of biological systems and the design of devices and procedures useful for human and veterinary medicine. This broad interdepartmental program is best suited for students who are capable and comfortable with considerable independence. Each student, together with an adviser, defines a specific course of study suited to individual goals.

Preparation. The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some such training can be acquired after admission to the Group, but it generally necessitates one or more additional years of study.

Faculty Advisers. M.L. Hull (*Mechanical Engineering*); R. Smith *(Electrical and Computer Engineering).*

Courses in Biomedical Engineering (BIM)

Graduate Courses

210. Introduction to Biomaterials (4) II. Shackelford
Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood coagulation; properties of bones, joints, and blood vessels; biocompatibility of orthopaedic and cardiovascular materials. Offered in alternate years.

215. Biomedical Fluid Mechanics and Transport Phenomena (4) I. Barakat
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B or Chemical Engineering 150B or Civil Engineering 141. Application of fluid mechanics and transport to biomedical systems. Flow in normal physiological function and pathological conditions. Topics include circulatory and respiratory flows, affect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Mechanical Engineering 215.)

220. Research Topics in Biomechanics (3) III. Williams
Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing and consent of instructor; Exercise Science 115 recommended. Survey of current research into diverse areas of the biomechanics of human movement. Topics will include locomotion, sport biomechanics, electromyography, musculoskeletal and tissue mechanics, advances in measurement technology, clinical biomechanics. (Same course as Exercise Science 220.)

223A. Multibody Dynamics I (3) II. Eke, Hubbard
Lecture—3 hours. Prerequisite: Engineering 102 or the equivalent, and graduate standing. Dynamics of coupled rigid bodies. Reference frames. Differentiation of vector functions. Multibody kinematics; configuration and motion constraints; holonomicity; non-holonomicity; generalized speeds; partial velocities. Mass and inertia properties, inertia tensor, inertia theorems. Angular momentum; angular momentum theorems. Force systems; generalized forces. (Same course as Mechanical Engineering 223A.)

223B. Multibody Dynamics II (3) III. Eke, Hubbard
Lecture—3 hours. Prerequisite: course 223A. Kinematics and dynamics of coupled rigid bodies. Comparison of various methods for obtaining rigid multibody dynamical equations. Newton/Euler formalism. Energy functions; Lagrange's Equations; Kane's method. Computer-aided dynamics of multibody systems. Rigid body orientation; Euler angles; Euler parameters; Rodriques parameters. (Same course as Mechanical Engineering 223B.)

225. Spatial Kinematics and Robotics (3) II. Cheng
Lecture—3 hours. Prerequisite: Mechanical Engineering 222. Spatial kinematics: Point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: Solving for kinematics equations; differential relationships, motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years. (Same course as Mechanical Engineering 225.)

227. Research Techniques in Biomechanics (4) II. Williams, Hawkins
Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hour. Prerequisite: consent of instructor, Mathematics 22B; Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Mechanical Engineering 227/Exercise Science 227.)

228. Skeletal Muscle Mechanics: Form, Function, Adaptability (3) I. Hawkins
Lecture—3 hours. Prerequisite: graduate standing, consent of instructor, and basic background in biology, physiology, and engineering; Engineering 3 and 45, Mathematics 22B, and Neurobiology, Physiology and Behavior 110 recommended. Basic structure and function of skeletal muscle is examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Special emphasis on the relation between muscle structure and muscle mechanics (e.g., force, work, power). (Same course as Exercise Science 228.)

231. Musculo-Skeletal System Biomechanics (3) III. Hull
Lecture—3 hours. Prerequisite: Engineering 102, Mechanical Engineering 176. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years. (Same course as Mechanical Engineering 231.)

232. Skeletal Tissue Mechanics (3) III. Martin
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disuse. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Mechanical Engineering 232.)

241. Introduction to Magnetic Resonance Imaging (2) III. Buonocore
Lecture—2 hours. Prerequisite: Physics 9D, Mathematics 22B. Introduction to equipment, methods, medical applications of magnetic resonance imaging (MRI). Lectures review basic, advanced pulse sequences, image reconstruction, display and technology and how these are applied clinically. Format: 35 mm slide presentation. Lecture complements more technical course 246, which may be taken concurrently.

***242. Survey of Medical Imaging Technology** (2) II. Boone, Seibert
Lecture—2 hours; term paper. Prerequisite: graduate student in scientific field or consent of instructor. The various imaging technologies used in medical diagnosis will be studied. These include x-ray radiography, fluoroscopy, computed tomography, mammography, ultrasound imaging, nuclear magnetic resonance imaging, and nuclear medicine imaging. Offered in alternate years.

246. Magnetic Resonance Technology (3) III. Buonocore
Lecture—3 hours. Prerequisite: Physics 9D, Mathematics 22B. Course covers MRI technology at an advanced level with emphasis on mathematical descriptions and problem solving. Topics include spin dynamics, signal generation, image reconstruction, pulse sequences, biophysical basis of T1, T2, RF, gradient coil design, signal to noise, image artifacts.

290. Seminar (1) I, II, III. Hull
Seminar—1 hour. Seminar in biomedical engineering. (S/U grading only.)

290C. Graduate Research Conference (1) I, II, III. The Staff (Hull in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in biomedical engineering research. May be repeated for credit. (S/U grading only.)

299. Research (1-12) I, II, III, IV. The Staff (S/U grading only.)

Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9092)

Faculty. Includes faculty members from the Departments of Molecular and Cellular Biology, Chemistry, Physics, and others, and the School of Medicine.

Graduate Study. The Graduate Group in Biophysics offers programs of study leading to the Ph.D. degree. Biophysics is a broad interdepartmental program that is ideal for students who are comfortable with considerable independence. The emphasis is on molecular biophysics. The curriculum consists of certain core courses in biology, chemistry, and physics, followed by specialty courses related to research interests. Specific program requirements are decided upon by a curriculum committee consisting of a research supervisor, the graduate adviser, and a group member. The Committee meets to consider individual educational needs with the student.

Graduate Adviser. R.J. Baskin (Molecular and Cellular Biology).

Courses in Biophysics (BPH)

Graduate Courses

200. Current Techniques in Biophysics (2) III. The Staff
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Molecular and Cellular Biology 200C.) (S/U grading only.)

*Course not offered this academic year.

200LA. Biophysics Laboratory (3) I, II, III. The Staff (Chairperson in charge)
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit four times.

200LB. Biophysics Laboratory (6) I, II, III. The Staff (Chairperson in charge)
Laboratory—two 18-hour rotations. Prerequisite: course 200 (may be taken concurrently). Two five-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit two times.

231. Biological Nuclear Magnetic Resonance (3) I. Jue
Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (Same course as Biological Chemistry 231.) Offered in alternate years.

290C. Research Conference in Biophysics (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Biophysics and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Biotechnology

(College of Agricultural and Environmental Sciences)

Faculty. Faculty includes members of the Departments of Agronomy and Range Science; Environmental Horticulture; Food Science and Technology; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Division of Biological Sciences.

The Major Program

Every living organism, from the most primitive bacteria to every plant, insect, animal or human being, contains DNA as the primary genetic material. DNA directs all cellular processes, creating the incredible variety and diversity of living organisms in the biosphere. Biotechnology focuses on the mechanics of life processes and their application. Biotechnology means "life technology" and represents an integrated, multidisciplinary field, with a profound impact today on almost every aspect of human endeavor.

The Program. In the first two years students develop a strong and general background in biological science with an emphasis on fundamental concepts and basic principles of genetics, molecular biology and cell biology. Three options, *Animal Biotechnology, Plant Biotechnology* and *Fermentation/Microbial Biotechnology,* provide in-depth training and specialized knowledge in an aspect of biotechnology. Each option has a strong laboratory component to reinforce the theoretical concepts. Students also do an internship in biotechnology company or university or government laboratory.

Internships and Career Opportunities. In the last decade, more industries are turning to biotechnology to solve problems and improve products, creating a growing job market for individuals trained in biotechnology in the agricultural, food and beverage, health care, chemical, pharmaceutical and biochemical, and environmental and bioremediation industries. Graduates trained in the technologies designed for biotechnology will find their training applicable to advanced research in molecular biology, genetics, biochemistry, and the plant and animal sciences.

B.S. Major Requirements

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 54-60
Mathematics 16A-16B 6
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C or 128A-128B-128C-129A.....6-12
Biological Sciences 1A-1B-1C 15
Statistics 13, 100, or Agricultural Systems and Environment 120 4
Physics 7A-7B 8

Breadth/General Education.....6-24

Depth Subject Matter 25-28
Biological Sciences 101, 102, 103, 104 13
Microbiology 102.....4
Molecular Genetics, Molecular and Cellular Biology 161 3
Genetics 202 or Plant Pathology 140.....2-4
Internship or independent research, 192 or 199 3
Plant Biology 188 (optional) 1

Areas of Specialization (choose one)

Fermentation/Microbiology Biotechnology Option 30-33
Microbiology 140, 150; Microbiology 102L or Food Science and Technology 104L; Molecular and Cellular Biology 160L; Viticulture and Enology 124 or 186.....15-18
Restricted Electives.....15
Select from: Microbiology 105, 155L, Viticulture and Enology 124, 126, 128, 135, Molecular and Cellular Biology 170L, Viticulture and Enology 140, Food Science and Technology 104, 104L, 110A, 110B, Chemical Engineering 161A, 161B, 161L.

Plant Biotechnology Option.....28
Molecular and Cellular Biology 126, Plant Biology 152, 160, 161A, 161B 18
Restricted Electives 10
Select at least one course from each of the areas:
(a) Pests, Pathogens and Production
Agricultural Systems and Environment 118, Plant Pathology 120, Entomology 110, Nematology 100 or 110, Plant Biology 143, 146, 153, 154, 172
(b) Growth and Development
Molecular and Cellular Biology 170L, Plant Biology 105, 111, 112, 157, 158

Animal Biotechnology Option 25
Animal Genetics 111, Neurobiology, Physiology and Behavior 101, Molecular and Cellular Biology 150, 150L 14
Restricted Electives.....11
Select at least one class from each of the areas:
(a) Animal microbiology
Molecular and Cellular Biology 160L, Microbiology 177, 177L, Pathology, Microbiology and Immunology 126, 126L, 128, Medical Microbiology 107
(b) Animal reproduction and breeding
Animal Genetics 107, Animal Science 131, 140, Avian Sciences 121, Neurobiology, Physiology and Behavior 121, 121L, Physiology Graduate Group 200L

Unrestricted Electives 27-68
Total Units for the Major 120-150

Major Adviser: A.M. Dandekar (Pomology).

Advising Center for the major is located at 152 Hunt Hall.

Botany

See Biological Sciences—Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)

Cantonese

See Asian American Studies

Cell and Developmental Biology (A Graduate Group)

Carol A. Erickson, Ph.D., Chairperson of the Group (916-752-8318)

Group Office, 188 Briggs Hall (916-752-9091)

World Wide Web: http://www-ggc.ucdavis.edu/ggc/cdb

Faculty. The group includes 40 faculty members from 17 departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Cell and Developmental Biology offers programs of study leading to the Ph.D. degree. Cell and Developmental Biology is a broad interdepartmental program. The curriculum consists of core courses in cell biology or developmental biology. Specific programs of study are decided upon by an advisory committee chaired by the student's research adviser, and the choice of major core courses will reflect the student's primary research interest.

Preparation. Appropriate preparation is an undergraduate degree in a biological or physical science. Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and introductory courses in statistics, biochemistry, genetics and biology.

Graduate Advisers. J. Natzle *(Molecular and Cellular Biology),* S. Meizel *(Cell Biology and Human Anatomy).*

Courses in Cell and Developmental Biology (CDB)

Graduate Courses

200. Current Techniques in Cell Biology (2) I. Nuccitelli
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 104 and Molecular and Cellular Biology 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with an emphasis on pitfalls to avoid when using the technique. (Same course as Molecular and Cellular Biology 200A.) (S/U grading only.)

200LA. Cell and Developmental Biology Laboratory (3) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week assignment in the research laboratory of a Cell and Developmental Biology Graduate Group member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit four times.

200LB. Cell and Developmental Biology Laboratory (6) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). Two five-week assignments in research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit.

205. Cell Biology of the Cytoskeleton (2) I. McNally
Lecture—1 hour and discussion 1/2 hour (course hours entered to run sequentially); student presents critical analysis of current journal article and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduction to cytoskeletal proteins: actin, tubulin, intermediate filaments, myosin, and other associated proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (S/U grading only.)

290. Current Topics in Cell and Developmental Biology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (S/U grading only.)

290C. Research Conference in Cell and Developmental Biology
(1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Cell and Developmental Biology and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in cell and developmental biology. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Cell Biology and Human Anatomy

See Medicine, School of

Chemistry

(College of Letters and Science)

Alan Balch, Ph.D., Chairperson of the Department

Dino S. Tinti, Ph.D., Vice-Chairperson of the Department

Department Office, 108 Chemistry Building (916-752-0503/0953; Fax: 916-752-8995)

Faculty

Matthew P. Augustine, Ph.D., Assistant Professor
Alan L. Balch, Ph.D., Professor
R. David Britt, Ph.D., Associate Professor
Timothy C. Donnelly, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
W. Ronald Fawcett, Ph.D., Professor
William H. Fink, Ph.D., Professor
Andrew J. Fisher, Ph.D., Assistant Professor
Constantine Issidorides, Ph.D., Lecturer
William M. Jackson, Ph.D., Professor
Philip G. Jessop, Ph.D., Assistant Professor
Susan M. Kauzlarich, Ph.D., Professor
Joel E. Keizer, Ph.D., Professor
Peter B. Kelly, Ph.D., Associate Professor
Mark J. Kurth, Ph.D., Professor
Gerd N. LaMar, Ph.D., Professor
Donald P. Land, Ph.D., Assistant Professor
Carlito B. Lebrilla, Ph.D., Professor
Claude F. Meares, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor
Tadeusz F. Molinski, Ph.D., Associate Professor
W. Kenneth Musker, Ph.D., Professor
Krishnan P. Nambiar, Ph.D., Associate Professor
Michael H. Nantz, Ph.D., Associate Professor
C. Tayhas R. Palmore, Ph.D., Assistant Professor
Timothy E. Patton, Ph.D., Assistant Professor
Philip P. Power, Ph.D., Professor
Peter A. Rock, Ph.D., Professor
Carl W. Schmid, Ph.D., Professor
Neil E. Schore, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Ben Shen, Ph.D., Assistant Professor
Kevin M. Smith, Ph.D., Professor
Alexei P. Stuchebrukhov, Ph.D., Assistant Professor
Dino S. Tinti, Ph.D., Professor
Nancy S. True, Ph.D., Professor
Susan C. Tucker, Ph.D., Associate Professor
Fred E. Wood, Ph.D., Lecturer

Emeriti Faculty

Thomas L. Allen, Ph.D., Professor Emeritus
Lawrence J. Andrews, Ph.D., Professor Emeritus
Albert T. Bottini, Ph.D., Professor Emeritus
Hakon Hope, Cand. real., Professor Emeritus
Edwin C. Friedrich, Ph.D., Professor Emeritus
Sevgi S. Friedrich, Ph.D., Lecturer Emerita
Raymond M. Keefer, Ph.D., Professor Emeritus
Richard E. Kepner, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
August H. Maki, Ph.D., Professor Emeritus
Donald A. McQuarrie, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Charles P. Nash, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Edgar P. Painter, Ph.D., Professor Emeritus
Joyce Takahashi, Ph.D., Adjunct Professor Emerita
Leo H. Sommer, Professor Emeritus
James H. Swinehart, Ph.D., Professor Emeritus
David H. Volman, Ph.D., Professor Emeritus
George S. Zweifel, Sc.D., Professor Emeritus

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program. Two programs in chemistry are available, one leading to the Bachelor of Arts and the other to the Bachelor of Science. Students who are interested in chemistry as a profession normally elect the program leading to the B.S. degree, which is accredited by the American Chemical Society. The curriculum leading to an A.B. degree offers a less intensive program in chemistry and is appropriate for a student with a strong interest in chemistry, but who also has another goal such as professional school preparation or secondary school teaching.

Career Alternatives. Chemistry graduates with bachelor's degrees are employed extensively throughout industry in production supervision, quality control, technical marketing, and other areas of applied chemistry. Some of the firms employing these graduates are in the food and beverage processing industries, the petroleum industry, paper and textile production and processing, the chemical industry, pharmaceuticals, and the photographic industry. The bachelor programs also provide chemistry graduates with the rigorous preparation needed for the advanced degrees required for careers in research and education.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**36-39**
Chemistry 2A-2B-2C or 2AH-2BH-2CH	15
Physics 5A-5B-5C or 7A-7B-7C	12
Mathematics 21A-21B-21C or 16A-16B-16C	9-12
Depth Subject Matter	**39**
Chemistry 110A, 110B, 110C, 124A, 128A, 128B, 128C, 129A, 129B	25
At least 14 additional upper division units in chemistry (except Chemistry 107A or 107B), biochemistry, or physics	14
Total Units for the Major	**75-78**

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**53**
Chemistry 2A-2B-2C or 2AH-2BH-2CH	15
Physics 9A, 9B, 9C, 9D.	16
Mathematics 21A, 21B, 21C, 21D, 22A, 22B	22
Depth Subject Matter	**50**
Chemistry 110A, 110B, 110C, 111, 115, 124A, 124B or 124C, 128A, 128B, 128C, 129A, 129B, 129C	38
At least 12 additional upper division units in chemistry (except Chemistry 107A, 107B), including one course with laboratory work	12
Total Units for the Major	**103**

Major Advisers. W.H. Fink, R.E. Kepner, M. Nantz, N. True, K.P. Nambiar, N.E. Schore, S. Tucker, F.E. Wood.

Honors and Honors Program. The student must take courses 194HA, 194HB, and 194HC.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry. See also the Graduate Studies section in this catalog.

Courses in Chemistry (CHE)

Diagnostic Examinations. Students who wish to enroll in Chemistry 2A or 2AH must pass both the *Chemistry Diagnostic Test* and the *Precalculus Qualifying Examination* with satisfactory scores. All students, including those who have Advanced Placement (AP) examination credit or transfer units for any courses in chemistry or mathematics, must pass both exams. Both exams are administered during Summer Advising and Orientation and during the orientation week of any quarter in which Chemistry 2A or 2AH is offered. Students who have not passed both exams will be administratively dropped from Chemistry 2A and 2AH.

If you do not acheive a satisfactory score on the Chemistry Diagnostic Test, you may retake the test. Materials are available for self-directed study so that you may improve your score. The Learning Skills Center will provide you with the results of your test and details regarding self-study materials. You may also be eligible for enrollment in Sacramento City College's Chemistry 41C (listed in the *Class Schedule and Room Directory* as WLD 041C before the Chemistry courses). This course is given at UC Davis during fall quarter specifically for UC Davis students who require extra preparation for Chemistry 2A. WLD 41C provides 3 units of credit toward minimum progress and verification of full-time status, but provides no units toward graduation or grade point average.

Lower Division Courses

2A. General Chemistry (5) I. Donnelly, ———; II. La Mar, Donnelly, Fisher, Stuchebrukhov
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics strongly recommended; satisfactory score on diagnostic examinations. Periodic table, stoichiometry, chemical equations, physical properties and kinetic

*Course not offered this academic year.

theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. GE credit: SciEng.

2AH. Honors General Chemistry (5) I. Tinti
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics; satisfactory score on diagnostic examinations; Mathematics 21A (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B.

2B. General Chemistry (5) II. Donnelly, Jessop; II. ———; III. Lebrilla, True
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A or 2AH. Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. GE credit: SciEng.

2BH. Honors General Chemistry (5) II. True
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A with consent of instructor or course 2AH with a grade of C or better; and Mathematics 21B (maybe taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C.

2C. General Chemistry (5) I. Fink, Tucker; III. Jackson, ———
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B or 2BH. Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in kinetics, electrochemistry, quantitative analysis using instrumental methods, qualitative analysis, and inorganic and organic synthesis. GE credit: SciEng.

2CH. Honors General Chemistry (5) III. Britt
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B with consent of instructor or course 2BH with a grade of C or better; and Mathematics 21C (maybe taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2C.

8A. Organic Chemistry: Brief Course (2) I. Musker; II. ———
Lecture—2 hours. Prerequisite: course 2B with a grade of C– or higher. With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than organic chemistry.

8B. Organic Chemistry: Brief Course (4) II. Takahashi; III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 8A or 118A. Continuation of course 8A. Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds.

***9. Introduction to General Chemistry** (2) I. The Staff
Lecture/discussion—3 hours. Prerequisite: chemistry diagnostic examination; not open for credit to students who have passed the exam or completed course 2A or 2AH. Introduction to chemistry. Students who complete course 9 will receive only 3 units credit for course 2A. Course 9 must be taken for a letter grade and may not be repeated

10. Concepts of Chemistry (4) II. Wood
Lecture—4 hours. A survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Course Not open for credit to students who have had Chemistry 2A; but students with credit for course 10 may take Chemistry 2A for full credit. GE credit: SciEng, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3) I. Meares
Lecture—3 hours. Prerequisite: course 2C or consent of instructor. Mathematics 16C or 21C; one year of college level physics. A basic course in physical chemistry intended for majors in the life science areas. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of nonelectrolytes. Kinetic theory of gases and liquids. Transport processes in liquids and solutions.

107B. Physical Chemistry for the Life Sciences (3) II. Fink
Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Electrochemistry and the thermodynamics of simple electrolyte solutions. Chemical rate processes. Introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and collodial systems. Considerations on bioirreversible processes.

108. Physical Chemistry of Macromolecules (3) III. Meares, Schmid
Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural thermodynamic, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

110A. Physical Chemistry: Thermodynamics (3) I. Lebrilla; III. Kelly
Lecture—3 hours. Prerequisite: course 2C, Mathematics 16C or 21C; one year of college physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry: Quantum Mechanics (3) I. True; II. Tucker
Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

110C. Physical Chemistry: Kinetics (3) II. Jackson; III. Fawcett
Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

111. Physical Chemistry: Methods and Applications (4) I. Land; III. Tinti
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 110C (may be taken concurrently) and 115. Introduction to the chemical literature, methods of data analysis, techniques of physical measurements, vacuum systems. Laboratory experiments from the areas of thermodynamics, spectroscopy, and kinetics. GE credit: SciEng, Wrt.

115. Instrumental Analysis (4) II. Lebrilla
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Theory and practice of modern instrumental techniques of chemical analysis with emphasis on electroanalytical and spectroscopic methods and separation science. Introduction to instrumentation electronics. Laboratory focuses on trace analyses of samples having practical significance. GE credit: SciEng, Wrt.

118A. Organic Chemistry for Health and Life Sciences (4) I. Issidorides, ———; II. Palmore
Lecture—3 hours; laboratory/discussion—1.5 hours. Prerequisite: course 2C with a grade of C– or higher. The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers.

118B. Organic Chemistry for Health and Life Sciences (4) II. Kurth, Patton; III. Shen
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118A. Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic compounds, aldehydes and ketones.

118C. Organic Chemistry for Health and Life Sciences (4) I. ———; III. Nambiar, ———
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118B. Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl amines, ß-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds.

120. Physical Chemistry Laboratory: Advanced Methods (3) II. Kelly
Lecture—1 hour; laboratory—6 hours. Prerequisite; courses 110C and 111. Design of experiments; experimental control and data acquisition using microcomputers. Laboratory emphasizes the use of microcomputers in advanced physical-chemical experiments.

121. Introduction to Molecular Structure and Spectra (4) III. La Mar
Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.

124A. Inorganic Chemistry: Fundamentals (3) I. The Staff
Lecture—3 hours. Prerequisite: course 2C. Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds.

124B. Inorganic Chemistry: Main Group Elements (3) II. Power
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and heteroorganic molecules containing the main group elements.

124C. Inorganic Chemistry: d and f Block Elements (3) III. Power
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

128A. Organic Chemistry (3) I. ———; II. Schore
Lecture—3 hours. Prerequisite: course 2C with a grade of C or higher; chemistry majors should enroll in course 129A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry.

128B. Organic Chemistry (3) II. Molinski; III. Nantz
Lecture—3 hours. Prerequisite: course 128A or consent of instructor, course 129A strongly recommended; chemistry majors should enroll in course 129B concurrently. Continuation of course 128A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.

128C. Organic Chemistry (3) I. Nambiar; III. Nantz
Lecture—3 hours. Prerequisite: course 128B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds.

129A. Organic Chemistry Laboratory (2) I. Issidorides; II. Miller
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2C with a grade of C or higher; course 128A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds.

129B. Organic Chemistry Laboratory (2) II.

Nambiar; III. Molinski
Laboratory—6 hours. Prerequisite: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.

129C. Organic Chemistry Laboratory (2) I. Miller; III. Schore
Laboratory—6 hours. Prerequisite: courses 128C (may be taken concurrently) and 129B. Continuation of course 129B.

130. Qualitative Organic Chemistry (4) III. Miller
Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 128C, 129C. Application of physical and chemical techniques to the qualitative identification of organic compounds.

131. Modern Methods of Organic Synthesis (3) II. Zweifel
Lecture—3 hours. Prerequisite: course 128C. Introduction to modern synthetic methodology in organic chemistry with emphasis on stereoselective reactions and application to multistep syntheses of organic molecules containing multifunctionality.

140. Synthetic Methods (4) III. The Staff
Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 124A, 128C, 129C. Integrated inorganic-organic course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using a wide range of methods.

150. Chemistry of Natural Products (3) I. Molinski
Lecture—3 hours. Prerequisite; course 128C. Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SciEng, Wrt.

192. Internship in Chemistry (1-6) I, II, III. The Staff (Chairperson in charge)
Internship—3-18 hours. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated for credit for a total of 6 units. (P/NP grading only.)

194HA-194HB-194HC. Undergraduate Honors Research (2-2-2) I-II-III. The Staff (Chairperson in charge)
Independent study—2 hours. Prerequisite: open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty adviser, culminating in the writing of an extensive report. (Deferred grading only, pending completion of sequence.)

195. Industrial Chemistry (1) I. Kurth
Seminar—2 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (P/NP grading only.)

197. Projects in Chemical Education (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

Graduate Courses

201. Chemical Uses of Symmetry and Group Theory (3) I. Kelly
Lecture—3 hours. Prerequisite: course 124A and 110B, or consent of instructor. Symmetry elements and operations, point groups, representations of groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry.

205. Symmetry, Spectroscopy, and Structure (3) II. Land
Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

210A. Quantum Chemistry: Introduction and Stationary-State Properties (3) II. Tinti
Lecture—3 hours. Prerequisite: course 110B and 110C or consent of instructor. Stationary-state quantum chemistry: postulates of quantum mechanics, simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules.

210B. Quantum Chemistry: Time-Dependent Systems (3) III. Stuchebrukhov
Lecture—3 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties.

210C. Quantum Chemistry: Molecular Spectroscopy (3) I. The Staff
Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics.

211A. Advanced Physical Chemistry: Statistical Thermodynamics (3) I. Britt
Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium.

211B. Statistical Mechanics (3) III. Tucker
Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Offered in alternate years.

212. Chemical Dynamics (3) II. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Offered in alternate years.

215. Theoretical and Computational Chemistry (3) III. Fink
Lecture—3 hours. Prerequisite: courses 211A and 210B or consent of instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit when topic differs. Offered in alternate years.

216. Magnetic Resonance Spectroscopy (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 210A, 210B (may be taken concurrently). Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of g-tensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Offered in alternate years.

217. X-Ray Structure Determination (3) III. Fisher
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics, crystallographic literature.

218. Physical Principles of Macromolecular Structure (3) III. Meares
Lecture—3 hours. Prerequisite: course 211A or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical-chemical determination of macromolecular structure. Offered in alternate years.

***219. Spectroscopy of Organic Compounds** (3) I. Patton
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods—principally NMR, IR, and MS. Offered in alternate years.

***221A-H. Special Topics in Organic Chemistry** (3) I. The Staff
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course.

226. Principles of Transition Metal Chemistry (3) I. Jessop
Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.

228A. Bio-inorganic Chemistry (3) III. The Staff
Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year.

***228B. Main Group Chemistry** (3) III.
Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency, and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year (next offering Spring 1999).

228C. Solid-State Chemistry (3) III. Power
Lecture—3 hours. Prerequisite: courses 124A, 110B, 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year (next offering Spring 1998).

231. Organic Synthesis: Methods and Strategies (3) III. Kurth
Lecture—3 hours. Prerequisite: course 131 or the equivalent. Provides a broadly based discussion of current strategies in synthetic organic chemistry. Focus on methods for constructing carbon frameworks, controlling relative stereochemistry, and controlling absolute stereochemistry. Retrosynthetic strategies will be discussed throughout the lectures.

233. Physical-Organic Chemistry (3) II. Palmore
Lecture—3 hours. Prerequisite: courses 128A-128B-128C and 110A-110B-110C or the equivalent. Introduction to elementary concepts in physical-organic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions.

235. Organometallic Chemistry in Organic Synthesis (3) III. The Staff
Lecture—3 hours. Prerequisite: course 128C. Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations

of organometallic reagents derived from transition and/or main group metals. Offered in alternate years.

236. Chemistry of Natural Products (3) II. Shen
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis, biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme.

***237. Bio-organic Chemistry** (3) I. Nambiar
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Offered in alternate years.

240. Advanced Analytical Chemistry (3) I. Fawcett
Lecture—3 hours. Prerequisite: courses 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and nonelectrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.

241A-D. Special Topics in Analytical Chemistry (3) III. Land
Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics will vary each time course is offered.

261. Current Topics in Chemical Research (2) I, II, III. The Staff
Lecture—2 hours. Prerequisite: graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ.

263. Introduction to Chemical Research Methodology (3) I, II, III. The Staff
Laboratory/discussion—9 hours. Prerequisite: course 293 and graduate student standing in Chemistry; consent of instructor. Introduction to identification, formulation, and solution of meaningful scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.)

264. Advanced Chemical Research Methodology (6) I, II, III. The Staff
Laboratory/discussion—18 hours. Prerequisite: course 263 or consent of instructor. Applications of the methodology developed in Chemistry 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit when topic differs. (S/U grading only.)

290. Seminar (2) I, II, III. Fisher
Seminar—2 hours. Prerequisite: consent of instructor. (S/U grading only.)

293. Introduction to Chemistry Research (1) I. The Staff (Balch in charge)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.)

295. Industrial Chemistry (1) I. Kurth
Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.)

Professional Courses

390. Methods of Teaching Chemistry (2) I, II, III. The Staff
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate student standing in Chemistry and consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.)

392. Advanced Methods of Teaching Chemistry (2) III. The Staff
Lecture—2 hours. Prerequisite: course 390. Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (P/NP grading only.)

Chicana/Chicano Studies

(College of Letters and Science)

Yvette Flores-Ortiz, Ph.D., Program Director

Program Office, Hart Hall, 2nd Floor (916-752-2421)

Griselda Castro, Program Coordinator/Student Affairs (916-752-2492)

Committee in Charge

Richard Berteaux, Ph.D. *(Environmental Design)*
Angie C. Chabram-Dernersesian, Ph.D. *(Chicana/o Studies)*
Yvette Flores-Ortiz, Ph.D. *(Chicana/o Studies)*
Rosa Linda Fregoso, Ph.D. *(Women's Studies)*
Malaquias Montoya, B.F.A. *(Chicana/o Studies)*
Lorena Oropeza, Ph.D. *(History)*
Beatriz Pesquera, Ph.D. *(Chicana/o Studies)*
Adaljiza Sosa-Riddell, Ph.D. *(Chicana/o Studies)*

Faculty

Angie C. Chabram-Dernersesian, Ph.D., Associate Professor
Yvette Flores-Ortiz, Ph.D., Associate Professor
Malaquias Montoya, Professor
Beatriz Pesquera, Ph.D., Associate Professor
Adaljiza Sosa-Riddell, Ph.D., Senior Lecturer

The Major Program

The Chicana/Chicano Studies Program offers an interdisciplinary curriculum focusing on the Chicana/Chicano experience through an analysis of class, race/ethnicity, gender and sexuality, and cultural expression. The program offers a major leading to the Bachelor of Arts degree and a minor that can satisfy breadth requirements for the College of Letters and Science. Both the major and minor frame an analysis within the historical and contemporary experiences of Chicanas/os in the Americas. The Chicana/Chicano (Mexican-American) Studies major gives students an opportunity to specialize within one of two emphases: a *Humanities/Arts emphasis* or a *Social Sciences emphasis*. Majors are expected to read, write, and speak Spanish at a level suitable for future study and work in Chicana/o and Latina/o settings. There are no language requirements for the minor. All Chicana/Chicano Studies courses are open to program minors and non-majors.

The Program. At the lower division level, the major curriculum provides an interdisciplinary overview of various topics. Students are advised to take lower division courses that serve as prerequisites for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary course work in both the humanities/arts and the social sciences. At this level, students will find courses in Chicana/Chicano history, theory, and method, and several courses taught from a variety of disciplinary perspectives. Majors may specialize in one of two emphases for the B.A. degree. The *Humanities* emphasis integrates literature, culture, and artistic expression and provides a choice of focus in one of two subject areas: *(1)* creative arts/artistic representation, and *(2)* literature/cultural studies. The *Social Science* emphasis incorporates social theory, research methods, and a specialization in one of two areas: *(1)* community/political economy, and *(2)* family and society/health issues.

Career Alternatives. The Humanities/Arts emphasis prepares students for professional work in cross-cultural education, cultural/art centers, artistic expression and communications. The Social Sciences emphasis orients students towards professional work in human service delivery, community development, legal services assistance, health services, social welfare, and education. Both emphases in the major prepare students for advanced graduate and/or professional studies in related fields.

Chicana/Chicano (Mexican-American) Studies

A.B. Major Requirements:

Humanities/Arts Emphasis:

	UNITS
Preparatory Subject Matter	**16-31**
Chicana/o Studies 10, 50	8
One course from Chicana/o Studies 21, 30, or 40	4
One course from Chicana/o Studies 60, 70, or 73	4
Spanish 1, 2, 3, or 31, 32 and 33 or the equivalent	0-15
Depth Subject Matter	**48**
Chicana/o Studies 100	4
Two courses from History 166B, 169A, 169B	8
Two courses from Chicana/o Studies 110, 120, 132, or 140	8
Comparative ethnicity/gender: two upper division courses selected from two of the following areas: African American Studies, Asian American Studies, Native American Studies, or Women's Studies.	8
Electives, a minimum of 20 units from the following areas, at least 12 of which must be selected from one area only. *Area 1—Creative arts/artistic representation:* Chicana/o Studies 156, 160, 171, 172 *Area 2—Literature/cultural studies:* Chicana/o Studies 150, 154, 155; Linguistics 115, 116; Education 151; Women's Studies 170. (Linguistics 1 is recommended for students selecting Linguistics courses.)	20
Total Units for the Major	**64-79**

Social Science Emphasis:

	UNITS
Preparatory Subject Matter	**16-31**
Chicana/o Studies 10, 50	8
One course from Chicana/o Studies 21, 30, or 40	4
One course from Chicana/o Studies 60, 70, or 73	4
Sociology 46A	4
Spanish 1, 2, 3, or 31, 32, and 33 or the equivalent	0-15

Depth Subject Matter 48
Chicana/o Studies 100 4
Two courses from History 166B, 169A, 169B 8
Two courses from Chicana/o Studies 154, 155, or 160 8
Comparative ethnicity/gender: two upper division courses selected from two of the following areas 8
African American and African Studies, Asian American Studies, Native American Studies, or Women's Studies
Electives, a minimum of 20 units from the following areas, at least 12 of which must be selected from one area only.....20
Area 1—Community/political economy: Chicana/o Studies 110, 111, 130, 132, 140.
Area 2—Family and society/health issues: Chicana/o Studies 120, 121, 122, 131.

Total Units for the Major 64-79

Master Adviser. Y. Flores-Ortiz.

Major Advisers. *Humanities/Arts emphasis:* A.C. Chabram-Dernersesian, M. Montoya. *Social Science emphasis:* A. Sosa-Riddell, B. Pesquera.

Minor Program Requirements:

This minor provides the student with a broad overview of the status and experience of Chicanas/os and Latinas/os in society, and of the historical, social, political, economic, ideological and cultural forces that shape the Chicana/o experience. The minor requires students to attain an interdisciplinary perspective by including courses from the two emphases. The minor is open to all students with or without course work in Spanish. Students must register for the minor at the Chicana/Chicano Studies Program Office.

UNITS

Chicana/o (Mexican-American) Studies 24
Chicana/o Studies 10 4
History 169A or 169B 4
Chicana/o Studies 110 or 120 4
Chicana/o Studies 130, 132, or 140 4
Chicana/o Studies 154, 155, or 171 4
Chicana/o Studies 111, 131, or Women's Studies 160 4

Minor Adviser. M. Montoya.

Courses in Chicana/o Studies (CHI)

Lower Division Courses

10. Introduction to Chicana/o Studies (4) I. Sosa-Riddell; III. Pesquera
Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas. GE credit: Div, Wrt.

21. Chicana/o and Latina/o Health Care Issues (4) I. Flores-Ortiz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education in limited access to health care. GE credit: Div.

30. United States Political Institutions and Chicanas/os (4) II. Sosa-Riddell
Lecture/discussion—3 hours; term paper. Overview of the major political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, effects from, and responses to them. Theory, method and critical analysis. GE credit: Div.

***40. Chicanas/os in the Economy** (4) II. The Staff
Lecture—4 hours. Introduction to Chicanas/os in the economy and related institutions. Topics include census counts, demographics, immigration, education, labor markets, local economies, and government roles and policies in employment and income generation.

50. Chicana and Chicano Culture (4) II. Chabram-Dernersesian; III. The Staff
Lecture—3 hours; discussion—1 hour. Interdisciplinary survey of Chicana/o cultural representation in the 20th century. Examines Chicana/o culture within a national and transnational context. Explores how Chicano cultural forms and practices intersect with social/material forces, intellectual formations and cultural discourses. (Former course 20.) GE credit: Div.

60. Chicana and Chicano Representation in Cinema (4) I, III. Fregoso
Lecture—8 hours. Introductory-level study of Chicana and Chicano representation. The depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanos, including independent filmmakers and the commercial industry. Offered in alternate years.

70. Survey of Chicana/o Art (4) I. Montoya
Lecture—4 hours. Survey of contemporary Chicana/o art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist. GE credit: Div.

73. Chicana/o Art Expression Through Silk Screen (4) I. Montoya
Studio—8 hours; laboratory—4 hours. Introductory level studio course using silk screen and basic printing techniques to explore and develop images of Chicana/o cultural themes and expressions. Students will experiment with images and symbols from their immediate environment/culture. Integrated approach to Chicana/o philosophy of art.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100. Chicana/Chicano Theoretical Perspective (4) II. Angie Chabram-Dernersesian (Director in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: courses 10 and 50. Critical examination of emerging Chicana/o Studies theoretical perspectives in light of contemporary intellectual frameworks in the social sciences, arts, and humanities. Includes analysis of practices of self-representation, and socio-cultural developments in the Chicana/o community.

110. Sociology of the Chicana/o Experience (4) III. Pesquera
Lecture/discussion—4 hours. Prerequisite: course 10 or Sociology 1. The Chicana/o experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicana/o labor into American class structure, education inequality, ethnicity, the family and Chicana/o politics. (Former course Sociology 110.) GE credit: SocSci, Div, Wrt.

111. Chicanas/Mexicanas in Contemporary Society (4) II. Pesquera
Lecture/discussion—4 hours. Prerequisite: course 10 or 50, Women's Studies 50 or History 169B. Analysis of the role and status of Chicanas/Mexicanas in contemporary society. Special emphasis on their historical role, the political, economic and social institutions that have affected their status, and their contributions to society and their community. (Former course 102.) GE credit: ArtHum.

***120. Chicana/o Psychology** (4) III. Flores-Ortiz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21; introductory psychology course recommended. Introduction to the field of Chicana/o psychology. Analysis of socio-cultural context of Chicanas/os and Latinas/os. Special attention to issues of ethnic identity development, bilingualism, and development of self esteem. Impact of minority experience, migration, acculturation are examined. GE credit: SocSci, Div.

121. Chicana/o Community Mental Health (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 10 or 20. Mental health needs, problems, and service utilization patterns of Chicanas/os and Latinas/os will be analyzed. An analysis of social service policy, and the economic context of mental health programs. GE credit: SocSci, Div, Wrt.

122. Psychology Perspectives Chicana/o and Latina/o Family (4) II. Flores-Ortiz
Lecture—4 hours. Prerequisite: course 10; introductory psychology course highly recommended, and/or consent of instructor. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies.

130. United States-Mexican Border Relations (4) I. Sosa-Riddell
Lecture—3 hours; term paper. Prerequisite: upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth analysis of immigration issues, border industrialization, women's organizations, economic crises, and legal issues. GE credit: Div.

***131. Chicanas in Politics and Public Policy** (4) I. Sosa-Riddell
Lecture/discussion—4 hours. Prerequisite: course 30 or Political Science 1. Historical and political analysis of Chicana/Latina political involvement and activities in the general political system, women's movement, Chicano movement, and Chicana movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered in alternate years. GE credit: SocSci, Div.

132. Political Economy of Chicana/o Communities (4) I. Sosa-Riddell
Lecture—3 hours; term paper. Prerequisite: upper division standing; lower division Chicana/o Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicana/o communities. Includes critiques of traditional and Marxian theories and concepts applicable to Chicana/o communities, case studies of Chicana/o communities, especially in California and Texas.

140. Chicana/o Ethnicity and Socio-Economic Inequalities (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: upper division standing. Cross-sectional comparisons of socioeconomic inequalities facing ethnic minorities and, in particular, Chicanas/os in the economy. Sub-topics include theories and concepts for studying ethnicity and inequalities correlated with factors of demographics, immigration, education, labor markets, employment, occupations, housing and health. GE credit: SocSci, Div.

154. The Chicana/o Novel (4) II. Chabram-Dernersesian
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicana/o novel with special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana/o novelists. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126A.) GE credit: ArtHum, Div.

155. Chicana/o Theater (4) I. Dernersesian
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicana/o theater in the contemporary period with special emphasis on El Teatro Campesino and Chicana Feminist Theater. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.)

156. Chicana/o Poetry (4) III. Chabram-Dernersesian
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Survey of Chicana/o poetry with special emphasis on its thematic and formal

dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126C.)

***165. Chicanas, Latinas and Mexicanas in Commercial Media** (4) I. Fregoso
Lecture/discussion—4 hours; laboratory—2 hours. Prerequisite: course 60 or other film or feminist theory course; conversational fluency in Spanish. The portrayal of Chicanas, Latinas and Mexicanas in commerical media. The relation between the representation of Chicana, Latina, and Mexicana women in commercial television and cinema and the role of women in Mexican and U.S. societies. Offered in alternate years.

171. Mexican and Chicano Mural Workshop (4) III. Montoya
Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated once for credit. (Same course as Art Studio 171.)

172. Chicana/o Voice/Poster Silk Screen Workshop (4) II. Montoya
Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or 73 and/or written consent of instructor. The poster as a voice art form used by Chicanas/os and other people of color to point to the defects of social and political existence and the possibility for change, from the Chicana/o artists' perspective. May be repeated once for credit.

192. Internship in Chicana/o and Latina/o Community (4) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; internship—11 hours. Prerequisite: one course from 10, 21, 50, Spanish 3, or the equivalent. Combines academic guidance with internship in community agencies serving Mexican/Latino/Chicano clients. Utilization of bilingual skills, knowledge of history, culture, economics, politics, social issues and work experience. Internship project required. May be repeated twice to a maximum of 12 units. (P/NP grading only.)

194HA-194HB-194HC. Senior Honors Research Project (2-5) I, II, III. The Staff
Independent study—6-15 hours. Prerequisite: senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

Graduate Courses

***230. Chicano/Latino Hispanic Politics** (4) III. Riddell
Seminar—3 hours; term paper. Prerequisite: two undergraduate courses in Chicana/o Studies or consent of instructor. Examination of Chicano/Latino political experiences. Evaluate theories, ideology, and practice of Chicano politics. Brief history of Chicano/Latino/Hispanic political activity, comparisons among political modes, gendered politics, and understanding relationships among Chicano, Mexican, American and world politics.

298. Group Study for Graduate Students (1-5) III. The Staff (Chairperson in charge)
Prerequisite: graduate standing, consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)

299. Special Study for Graduate Students (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Child Development (A Graduate Group)

Larry Harper, Ph.D., Chairperson of the Group

Group Office, 1303 Hart Hall (916-752-1926)

Faculty. Includes faculty members from the division of Human Development and the departments of Anthropology, Education, Psychology, and the Schools of Law and of Medicine.

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to an M.S. degree. The program provides students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Students may work with children and families in the community, as well as the University's Center for Child and Family Studies. Recipients of the degree gain sufficient background to engage in professions that directly (e.g., preschool, 4-H) or indirectly (e.g., social policy) involve children and families, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development, human development, clinical psychology, or related fields.

Admission applications must be in by *April 1.*

Graduate Adviser. Contact Group Office.

Chinese

See Chinese and Japanese (below); Asian American Studies; and East Asian Studies

Chinese and Japanese

(College of Letters and Science)

Michelle Yeh, Ph.D., Chairperson of the Department

Department Office, 522 Sproul Hall (916-752-4995)

Faculty

Robert Borgen, Ph.D., Professor *(Japanese, History)*
Chia-ning Chang, Ph.D., Associate Professor *(Japanese)*
Kyu Hyun Kim, Ph.D., Assistant Professor *(Japanese, History)*
Michelle Yeh, Ph.D., Professor *(Chinese)*

Emeriti Faculty

Donald A. Gibbs, Ph.D., Professor Emeritus
Key H. Kim, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus

Affiliated Faculty

Bei Dao, Visiting Professor *(Chinese)*
Kazue Chavez, Lecturer *(Japanese)*
David Fahy, Lecturer *(Japanese)*
Shun Guo, Lecturer *(Chinese)*
Haruko Sakakibara, Lecturer *(Japanese)*
Ritsuko Shigeyama, Lecturer *(Japanese)*
Miyo Uchida, Coordinator *(Japanese)*
Young Ming Wu, Lecturer *(Japanese)*
Tianwei Xie, Coordinator *(Chinese)*

The Major Program

The department serves the student in two ways: it offers a core language program in both Chinese and Japanese, and it offers courses in literature and culture. The core language program has two tracks: one for students who have no background whatsoever in Japanese or Chinese; and one for students with prior language background.

The Program. A student elects to major in either Japanese or Chinese. Practical language skills are taught using the most modern methods so that upon entering the upper division a student will have attained substantial fluency in the spoken language (hearing and speaking) and the written language (reading and writing). Upper division courses balance the need to further language skills with the need to understand and appreciate the cultural richness of either Chinese or Japanese civilization. All students are encouraged to combine their study of Japan's or China's language and literature with courses in related fields, and to study abroad through the UC International Summer Session programs, the Education Abroad Program, or through internships.

Career Opportunities. UC Davis graduates have learned that a major in Chinese or Japanese is a genuine, earned distinction that facilitates entrance to graduate programs and professional schools. In addition, job opportunities abound in virtually all career paths, especially for those who have completed study abroad.

Chinese

A.B. Major Requirements:

Preparatory Subject Matter 19/34
Chinese 1, 2, 3, 4, 5, 6; or 7, 17, 27; or 8, 18, 28; and one 4-unit lower division Chinese literature course.

Recommended:
Chinese 10, 11, 50, Comparative LIterature 14, Japanese 10, Linguistics 1, History 9A.

Depth Subject Matter 36
Chinese 106, 107, 111, 112, 113, 114 24
Three courses selected from Chinese 104, 105, 108, 109A-I, 110, 115, 116, 120, 130, 131, 132, 140, 160 12

Recommended:
Japanese 101, 102, 103, 104, 105, 106; Anthropology 148A-148B; Art History 163A-163B; East Asian Studies 113; History 190A-190B-190C, 191A-191B; Religious Studies 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser.

Total Units for the Chinese Major 55/70

Japanese

A.B. Major Requirements:

Preparatory Subject Matter 15/30
Japanese 1, 2, 3, 4, 5, 6; or 8, 18, 28.

Recommended:
Japanese 10, 15, 25, Chinese 10, 11, 50, Linguistics 1, History 9B.

Depth Subject Matter 40
Japanese 101, 102, 103, 111, 112, 113....24
Eight units selected from Japanese 104, 105, 106, 107, 108, 115, 131, 132, 133, 134, 135, 136, 201† 8
Eight units selected from Chinese 104, 105, 106, 107, 109A–I, 110, 132; Anthropology 149A-149B; Art History 164; Comparative Literature 153; History 194A-194B-194C; Religious Studies 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser 8

Total Units for the Japanese Major.....55/70

†See College procedures governing undergraduate enrollment in a graduate course.

Minor Program Requirements:

Minors are offered in Chinese and in Japanese for students wishing to follow a formally recognized program of study in those languages and their literatures.

UNITS

Chinese 20

Japanese.....20

All upper division courses, including both language courses and literature in translation courses, may be used to meet this requirement. One approved lower division course (Chinese 10, 11, 50; Japanese 10, 15, 25, 50) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of Chinese 111 or Japanese 111. Only four units from 192, 197T, 198, and 199 may be applied to the minor. For details, consult the undergraduate advisers.

Related Courses. See East Asian Studies course list.

Placement. Chinese 1 and Japanese 1 are intended for beginning students with no prior knowledge of those languages. Students who do have some knowledge but wish to improve their skills should meet with one of the advisers to discuss appropriate placement. Students must follow departmental guidelines for placement in all language courses and instructor approval is required for enrollment.

Education Abroad Program. The university maintains study abroad programs in China, Japan, Hong Kong, and Taiwan. They offer excellent opportunities for students to polish their language skills and experience Asian cultures firsthand. Students are encouraged to participate. Appropriate courses taken abroad can be applied toward the major or the minor. For details, see the department's undergraduate adviser and the Education Abroad Program office.

Student Advisers. R. Borgen (Japanese), C.N. Chang *(Japanese)*, M. Yeh *(Chinese).*

Prerequisite Credit. No student may repeat a course if that course is a prerequisite for a course that has already been completed with a grade of C– or better.

Courses in Chinese (CHN)

Lower Division Courses

1. Elementary Chinese (5) I. The Staff
Lecture/discussion—5 hours. Introduction to Chinese grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Chinese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

***1A. Intensive Elementary Modern Chinese** (10) II. The Staff
Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

1BL. Accelerated Written Chinese I (5) I. The Staff
Lecture—5 hours. Prerequisite: ability to speak and understand oral Chinese (Mandarin or dialect). Designed for students who already have some degree of fluency in spoken Chinese, but who cannot read Chinese characters. Concentrates on developing reading ability and accelerates progress to upper division. Not open for credit to students who have complete course 8. (Former course 8.)

1CN. Mandarin for Cantonese Speakers I (5) I. The Staff
Lecture—5 hours. Prerequisite: ability to read and write Chinese characters at the elementary school level. Accelerated training in spoken Mandarin, particularly in the phonetic transcription system known as pinyin, for students who already can read and write Chinese. Course assumes no knowledge of spoken Mandarin Chinese. Not open for credit to students who have completed course 7. (Former course 7.)

2. Elementary Chinese (5) II. The Staff
Lecture/discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

2BL. Accelerated Written Chinese II (5) II. The Staff
Lecture—5 hours. Prerequisite: course 1BL. Continuation of course 1BL. Designed to accelerate the progress of students who already know spoken Mandarin or a dialect but cannot read or write Chinese characters. Not open for credit to students who have completed course 18. (Former course 18.)

2CN. Mandarin for Cantonese Speakers II (5) II. The Staff
Lecture—5 hours. Prerequisite: course 1CN. Continuation of course 1CN. Training in spoken Mandarin for students who already can read and write Chinese. Not open for credit to students who have completed course 17. (Former course 17.)

3. Elementary Chinese (5) III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 2. Continuation of course 2. Completion of grammar sequence and continuing practice of all language skills.

***3A. Situational Chinese** (2) I, III. The Staff
Discussion—2 hours. Prerequisite: course 3 (may be taken concurrently). Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and substitution drills, students have greater opportunities to develop spoken skills than is possible in course 3.

3BL. Accelerated Written Chinese III (5) III. The Staff
Lecture—5 hours. Prerequisite: course 2BL. Advanced written styles and syntax in Chinese. Students completing this course proceed to course 111, which starts the third-year Chinese, or to some other appropriate upper-division course. Not open for credit to students who have completed course 28. (Former course 28.)

3CN. Mandarin for Cantonese Speakers III (5) III. The Staff
Lecture—5 hours. Prerequisite: course 2CN. Continuation of course 2CN. Prepares students for entering upper division courses in Chinese. Not open for credit to students who have completed course 27. (Former course 27.)

4. Intermediate Chinese (5) I. The Staff
Lecture/discussion—5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 3.

5. Intermediate Chinese (5) II. The Staff
Lecture/discussion—5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 4.

6. Intermediate Chinese (5) III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 5 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5.

***6A. Situational Chinese** (2) I, III. The Staff
Discussion—2 hours. Prerequisite: course 6 (may be taken concurrently.) Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and oral repetition, students develop spoken fluency and appropriateness of expression as skills requisite to internships and study in China.

7. Mandarin for Cantonese Speakers I (5) I. The Staff
Lecture—5 hours. Prerequisite: ability to read and write Chinese characters at the elementary school level. Accelerated training in spoken Mandarin, particularly in the phonetic transcription system known as *pinyin,* for students who already can read and write Chinese. Course assumes no knowledge of spoken Mandarin Chinese.

***10. Modern Chinese Literature (In English)** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century. GE credit: ArtHum, Div, Wrt.

11. Great Books of China (in English) (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Selected readings in English translation are supplemented with background information on periods, authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussions. GE credit: ArtHum, Div, Wrt.

***50. Introduction to the Literature of China and Japan** (3) II. Yeh
Lecture—3 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation), including film. East Asian cultural traditions will also be introduced. (Same course as Japanese 50.) GE credit: ArtHum, Div, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

***104. Twentieth-Century Chinese Fiction (in English)** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history recommended. English language survey of Chinese fiction as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres. GE credit: ArtHum, Div, Wrt.

***105. Western Influences on Twentieth-Century Chinese Literature (in English)** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or History 9A recommended. Introduction of Western literary thought into modern China, the experimentation with Western literary forms and techniques, and the development of Marxism in contemporary literary writing. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

106. Chinese Poetry (in English) (4) III. Yeh
Lecture—3 hours; discussion—1 hour. Prerequisite: History 9A or any course on traditional China recommended. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk songs down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English. GE credit: ArtHum, Div, Wrt.

107. Traditional Chinese Fiction (in English) (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history. English-language course studying the dawn of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as *The Story of the Stone* and famous Ming-Qing short stories. GE credit: ArtHum, Div, Wrt.

***108. Poetry of China and Japan (in English)** (4) II. Yeh
Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. Offered in alternate years. (Same course as Japanese 108.) GE credit: ArtHum, Div, Wrt.

***109A-I. Topics in Chinese Literature (in English)** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: depending on topic, course 10, 11, 104, 106, 107, or a course in Chinese history. Topics in Chinese literature may include: **(A)** crime and punishment; **(B)** love in poetry; **(C)** women writers; **(D)** the knight-errant; **(E)** the city in fiction; **(F)** the recluse; **(G)** the literature of twentieth-century Taiwan; **(H)** popular literature; **(I)** the scholar and the courtesan. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

110. Great Writers of China: Texts and Context (in English) (4) II. Yeh
Lecture—3 hours; discussion—1 hour. Prerequisite: any course from the General Education Literature Preparation List, or consent of instructor. Examination of major theoretical concepts and interpretive methods in the study of literature by using examples from the Chinese tradition; discussions of classical and modern works with an emphasis on the relations between literature, author, society, and culture. GE credit: ArtHum, Div, Wrt.

111. Modern Chinese: Reading and Discussion (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or the equivalent. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in courses 1 through 6.

112. Modern Chinese: Reading and Discussion (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in course 111.

113. Modern Chinese: Reading and Discussion (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in course 112.

114. Introduction to Classical Chinese: Confucius (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Texts from the Confucian canon are read with the assistance of prepared word glossaries so that while learning to read classical Chinese, the students also experience the most influential books in the history of China in their original texts.

115. Introduction to Classical Chinese: Mencius (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the text of the Mencius.

116. Introduction to Classical Chinese: Narrative Styles (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 115. Continues course 115 by reading selections from the Records of the Grand Historian and other early, influential works.

120. Advanced Chinese (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from all genres to develop advanced skills in reading, writing, aural comprehension, and translation. May be repeated once for credit.

***130. Readings in Traditional Chinese Fiction** (4) II. The Staff
Lecture—1 hour; discussion—3 hours. Prerequisite: course 112 or the equivalent; course 114 recommended. Close reading in Chinese of representative works from the Tang Dynasty (618-907) to modern times. May be repeated once for credit when content varies.

131. Readings in Traditional Chinese Poetry (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry.

132. Readings in Modern Chinese Poetry (4) II. Yeh
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture.

***140. Readings in Classical Chinese** (4) I, II, III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated twice for credit.

***160. The Chinese Language** (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 6 (may be taken concurrently); Linguistics 1 recommended. The Chinese language viewed in its linguistic context, synchronically and diachronically. Historical phonology, classical and literary language, rise of written vernacular, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors.

192. Chinese Internship (1-12) I, II, III. The Staff
Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

197T. Tutoring in Chinese (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

198. Directed Group Study
(1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
(Chairperson in charge)
(P/NP grading only.)

Graduate Course

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

Courses in Japanese (JPN)

Lower Division Courses

1. Elementary Japanese (5) I. The Staff
Lecture/discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. (Students who have successfully completed Japanese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

***1A. Intensive Elementary Japanese** (10) II. The Staff
Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

***1B. Accelerated Intensive Elementary Japanese** (15) Summer special session. The Staff
Lecture/discussion—15 hours. Combines the work of courses 1, 2, and 3, into a single 12-week summer session. Those who complete this course may go on to course 4 in the fall.

2. Elementary Japanese (5) II. The Staff
Lecture/discussion—5 hours. Prerequisite: course 1 or the equivalent. Continuation of training in basic spoken and written skills.

3. Elementary Japanese (5) III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 2 or the equivalent. Continuation of training in basic spoken and written skills.

4. Intermediate Japanese (5) I. The Staff
Lecture/discussion—5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 3.

5. Intermediate Japanese (5) II. The Staff
Lecture/discussion—5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4.

6. Intermediate Japanese (5) III. The Staff
Lecture/discussion—5 hours. Prerequisite: successful completion (C– or better) of course 5 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5.

8. Accelerated Japanese for Bilingual Students I (5) I. The Staff
Lecture—5 hours. Prerequisite: bilingual background in Japanese. A special course for students with some bilingual background in Japanese. Emphasis is on speaking at an educated level and learning to read and write Japanese. First of a three-course sequence accelerating advancement to upper division courses.

10. Masterworks of Japanese Literature (in English) (4) III. The Staff
Lecture—3 hours; discussion—1 hour. An introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present. GE credit: ArtHum, Div, Wrt.

***15. Introduction to Traditional Japanese Culture** (3) II. Borgen
Lecture—2 hours; discussion—1 hour. General introduction to Japanese culture from its beginnings through 1850, focusing on religion, thought, and the arts (visual and performing). Indigenous traditions and the assimilation of foreign influences will be discussed. Readings and discussions in English. GE credit: ArtHum, Div, Wrt.

18. Accelerated Japanese for Bilingual Students II (5) II. The Staff
Lecture—5 hours. Prerequisite: course 8. Continues course 8. A special course for students with some bilingual background in Japanese. Emphasis is on increasing knowledge of kanji and on reading and writing longer passages. Second of a three-course sequence accelerating advancement to upper division courses.

***25. Japanese Language and Culture (in English)** (4) I. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Linguistics 1 or Anthropology 4 recommended. Classification and communication of experience in Japanese culture; principles of language use in Japanese society. Speech levels and honorific language, language and gender, minority languages, literacy. Role of Japanese in artificial intelligence and computer science. Offered in alternate years.

28. Accelerated Japanese for Bilingual Students III (5) III. The Staff
Lecture—5 hours. Prerequisite: course 18. Continues course 18. A special course for students with some bilingual background in Japanese. Emphasis is on advanced training in formal and informal speech styles, discourses strategies in spoken and written Japanese, and on reading authentic works. Third of a three-course sequence accelerating advancement to upper division courses.

50. Introduction to the Literature of China and Japan (3) II. Borgen
Lecture—3 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation), including film. East Asian cultural traditions will also be introduced. (Same course as Chinese 50.) GE credit: ArtHum, Div, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff
(Chairperson in charge)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

101. Japanese Literature in Translation: The Early Period (4) I. Borgen
Lecture—3 hours; discussion—1 hour. Early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings. GE credit: ArtHum, Div, Wrt.

102. Japanese Literature in Translation: The Middle Period (4) II. The Staff
Lecture—3 hours; discussion—1 hour. The major literary genres from the twelfth century to the second half of the nineteenth century including poetry, *renga,* military chronicles, *no* drama, Buddhist literature, *haiku, haibun, kabuki, bunraku,* plays and Edo prose narratives. GE credit: ArtHum, Div, Wrt.

103. Japanese Literature in Translation: The Modern Period (4) III. Chang
Lecture—3 hours; discussion—1 hour. Modern Japanese literature from the 1870s to the 1970s. Surveys representative literary works and ideas against the social and intellectual background of the Meiji, Taisho, and Showa periods. GE credit: ArtHum, Div, Wrt.

***104. Modern Japanese Literature: War and Revolution** (3) I. Chang
Lecture/discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the traumatic and often poignant experiences of war and socio-political upheavals from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

105. Modern Japanese Literature: Hero and Anti-hero (3) II. Chang
Lecture/discussion—3 hours. The ways in which representative heroes and anti-heroes in modern Japanese literature perceive, confront, struggle with, and resolve a wide array of social, moral, and intellectual problems in their times. Lectures, discussions, and readings in English. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

106. Japanese Culture Through Film (4) II. Fahy
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Aspects of Japanese culture such as love, the family, position of women, growing up, death, and the supernatural as portrayed in films by Kurosawa, Mizoguchi, Ichikawa, Ozu, and Itami. Lectures, discussion, and readings in English. Films with English subtitles. GE credit: ArtHum, Div, Wrt.

***107. Modern Japanese Autobiographies (in English)** (4) I. Chang
Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: upper division standing. Exploring the modern and contemporary Japanese social and cultural landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***108. Poetry of China and Japan (in English)** (4) II. Borgen
Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. Offered in alternate years. (Same course as Chinese 108.) GE credit: ArtHum, Div, Wrt.

111. Modern Japanese: Reading and Discussion (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings.

112. Modern Japanese: Reading and Discussion (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Continuation of course 111.

113. Modern Japanese: Reading and Discussion (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Continuation of course 112.

***114A. Spoken Japanese** (2) I. The Staff
Discussion—2 hours. Prerequisite: course 6 or the equivalent. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

***114B. Spoken Japanese** (2) II. The Staff
Discussion—2 hours. Prerequisite: course 114A or consent of instructor. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

***114C. Spoken Japanese** (2) III. The Staff
Discussion—2 hours. Prerequisite: course 114B or consent of instructor. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

***115. Japanese Composition** (2) I. The Staff
Lecture—2 hours. Prerequisite: course 6 or consent of instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese.

131. Readings in Modern Japanese Literature: 1920-1945 (4) III. Chang
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945.

132. Readings in Modern Japanese Literature: 1945-1970 (4) II. Chang
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery.

***133. Readings in Modern Japanese Literature: 1970 to Present** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. Offered in alternate years.

134. Readings in the Humanities: Traditional Culture (4) II. Borgen
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 113. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture.

135. Readings in the Humanities: The Modern Period (4) III. Chang
Lecture—3 hours; term paper. Prerequisite: course 113. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars.

136. Readings in Newspapers and Magazines (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. Offered in alternate years.

141. Introduction to Classical Japanese (4) III. Borgen
Lecture/discussion—4 hours. Prerequisite: one advanced Japanese reading course such as Japanese 131, 132, or the equivalent reading knowledge of Japanese. The basic features of classical Japanese grammar through careful reading of selected literary texts such as *Hojoki* or *Tsurezuregusa.* Offered in alternate years.

192. Japanese Internship (1-12) I, II, III. The Staff
Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

197T. Tutoring in Japanese (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
(Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***291. Seminar in Modern Japanese Literature: Major Writers** (4) III. Chang
Seminar—4 hours. Prerequisite: any one of courses 131, 132, 133, 134, 135, or the equivalent. In-depth reading and critical analyses of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Offered in alternate years.

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

*Course not offered this academic year.

Classics

(College of Letters and Science)

David A. Traill, Ph.D., Program Director

Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0835)

Faculty

Don P. Abbott, Ph.D., Associate Professor *(English, Classics)*
Emily Albu, Ph.D., Assistant Professor
Marc E. Blanchard, Agrégé de Lettres, Professor *(French, Comparative Literature)*
Lincoln D. Hurst, Ph.D., Associate Professor *(Religious Studies)*
Naomi Janowitz, Ph.D., Associate Professor *(Religious Studies)*
Larry I. Peterman, Ph.D., Professor *(Political Science)*
Lynn E. Roller, Ph.D., Professor
Peter M. Schaeffer, Ph.D., Professor *(German)*
Seth L. Schein, Ph.D., Professor *(Comparative Literature)*
Stylianos Spyridakis, Ph.D., Professor *(History)*
David A. Traill, Ph.D., Professor
Michael Wedin, Ph.D., Professor *(Philosophy)*

Emeriti Faculty

Richard E. Grimm, Ph.D., Professor Emeritus
Wesley E. Thompson, Ph.D., Professor Emeritus

Affiliated Faculty

Charlayne Allan, M.A., Lecturer
Patricia Bulman, Ph.D., Lecturer *(Comparative Literature)*
Bruce Rosenstock, Ph.D., Lecturer

The Major Programs

Classical Civilization is an interdisciplinary major that examines the ancient Mediterranean cultures of Greece, Rome and the Near East. Courses are offered on the history, literature, religions, myths, art and archaeology of these societies, their achievements in rhetoric and philosophy, and their political and social institutions. The major has two tracks: *(1) Classical and Mediterranean Civilizations,* and *(2) Classical Languages and Literatures.*

The Program. The core of both major tracks consists of two years of Latin, Greek or Hebrew, the introductory sequence on the ancient Mediterranean world

(Classics 1, 2, 3), the advanced seminar (Classics 190), and a number of electives. The *Classical and Mediterranean Civilization* track allows students to choose their electives from a broadly balanced program in history, art and archaeology, literature, philosophy and rhetoric. The *Classical Languages and Literatures* track focuses more intensively on language and literature, requiring the study of two languages and allowing fewer electives. Students planning to go on to graduate work in Classics should take Track 2 and choose Latin and Greek as their languages. They are also advised to acquire a reading knowledge of French or German. There is a minor program in Classical Civilization. A wide array of General Education courses, certified to meet the topical breadth, diversity and writing requirements, is offered.

Career Opportunities. A degree in Classical Civilization represents a solid liberal arts education that provides an excellent foundation for a wide variety of careers. In the last twenty-five years, many majors have applied to Law or Medical School and practically all have been accepted. Additional career options include library and museum work, teaching, and graduate study in Classics, art, archaeology, history, philosophy and religion.

Classical Civilization

A. B. Major Requirements:

UNITS

Classical and Mediterranean Civilizations track

Preparatory Subject Matter 30-31
Latin 1-2-3, or Greek 1-2-3, or Hebrew 1-2-3 15
Two courses from Classics 1, 2, 3.....8
Two additional courses from: Art History 1A; Classics courses 1 through 50 (except 30 and 31); Comparative Literature 1; Philosophy 21; Religious Studies 21, 40 7-8

Depth Subject Matter 36
Upper division courses in Latin, Greek or Hebrew.....12
Five additional courses selected from at least three of the following groups.....20
(a) Literature:
Additional upper division courses in Latin, Greek and Hebrew; Classics 140, 141, 142, 143; Religious Studies 141A, 141B, 141C
(b) History:
History 102A, 111A, 111B, 111C; Religious Studies 102, 122
(c) Art, Archaeology and Drama:
Classics 171, 174, 175; Art History 154A, 154B, 155
(d) Rhetoric, Philosophy and Political Theory:
Classics 110, 150; Political Science 118A; Philosophy 143, 160, 161, 162

Total Units for the Major 66-67
(Classical and Mediterranean Civilizations track)

UNITS

Classical Languages and Literatures track

Preparatory Subject Matter 34
Two of the following sequences: Latin 1-2-3; Greek 1-2-3; Hebrew 1-2-3 30
Classics 1, 2, or 3.....4

Depth Subject Matter 36
Six upper division courses in the two chosen languages, with at least two courses in each language 24
Two additional courses selected from any of the following groups.....8
(a) Literature:
Additional upper division courses in Latin, Greek and Hebrew; Classics 140, 141, 142, 143; Religious Studies 141A, 141B, 141C
(b) History:
History 102A, 111A, 111B, 111C; Religious Studies 102, 122
(c) Art, Archaeology and Drama:
Classics 171, 174, 175; Art History 154A, 154B, 155
(d) Rhetoric, Philosophy and Political Theory:
Classics 110, 150; Political Science 118A; Philosophy 143, 160, 161, 162
Classics 190.....4

Total Units for the Major 70
(Classical Languages and Literatures track)

Major Advisers. D.A. Traill, L.E. Roller.

Greek

Admission to the undergraduate major in Greek has been suspended. Courses in Greek continue to be offered and may be applied toward majors such as Classical Civilization.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 0-15
Greek 1, 2, 3 (or the equivalent).....15

Depth Subject Matter 36
Upper division units in Greek (two courses may be chosen from department-approved courses in related fields).

Total Units for the Major 36-51

Recommended
Latin 1, 2, 3.

Latin

Admission to the undergraduate major in Latin has been suspended. Courses in Latin continue to be offered and may be applied toward majors such as Classical Civilization.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 15
Latin 1, 2, 3 (or the equivalent) 15

Depth Subject Matter 36
Latin 121.....5
At least 31 additional upper division units in Latin 31

Total Units for the Major 36-51

Minor Program Requirements:

The Department offers minors in Classical Civilization, Greek and Latin for those wishing to follow a shorter but still formally recognized program of study in classics.

UNITS

Classical Civilization.....20
Classics 1, 2, or 3.....4
One upper division course in Latin, Greek or Hebrew.....4
Three additional upper division courses selected from any of the groups *(a)* through *(d)* in the Classical Civilization major 12

UNITS

Greek 21
Greek 3.....5
Four upper division courses in Greek 16

UNITS

Latin.....21
Latin 3.....5
Four upper division courses in Latin 16

Prerequisite credit. Credit will not normally be given for a lower division course in Latin or Greek if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Program Director only.

Graduate Study. The Department offers a master's degree in Classics with emphasis on either Greek or Latin. The program is suitable for high school teachers seeking to improve their qualifications and for students wishing to prepare themselves for admission to one of the more competitive doctoral programs in Classics. *Admission into the graduate program has been suspended.*

Courses in Classics (CLA)

Lower Division Courses

***1. The Ancient Near East and Early Greece: 3000-500 B.C.E.** (4) I. Roller
Lecture—3 hours; term paper. Introduction to the literature, art, and social and political institutions of ancient Mesopotamia, Egypt, Palestine, and early Greece from 3000 to 500 B.C.E. GE credit: ArtHum, Wrt.

2. Ancient Greece and the Near East: 500 to 146 B.C.E. (4) II. Traill
Lecture—3 hours; term paper. Introduction to the literature, art and thought and the political and social institutions and values of Greece and its eastern Mediterranean neighbors—the Persians, Egyptians, and Judeans. GE credit: ArtHum, Wrt.

3. Rome and the Mediterranean: 1000 B.C.E. to 500 C.E. (4) I. Abbott
Lecture—3 hours; term paper. Introduction to the history, literature and art and the political and social institutions and values of Roman civilization, with emphasis on Rome's interactions with its Mediterranean neighbors—Etruscans, Carthaginians, Greeks, Egyptians, and Persians—and on the rise of Christianity. GE credit: ArtHum, Wrt.

10. Greek, Roman, and Near Eastern Mythology (3) I, III. Allan, Roller
Lecture—3 hours. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: ArtHum.

15. Women in Classical Antiquity (4) III. Allan
Lecture—3 hours; term paper. Lives and roles of women in ancient Greece and Rome. Readings from history, philosophy, medical and legal documents, literature and myth. GE credit: ArtHum, Div, Wrt.

***20. Pompeii AD 79** (4) III. Traill
Lecture—3 hours; term paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' *Satyricon* and other ancient authors. Offered in alternate years. GE credit: ArtHum, Wrt.

30. Greek and Latin Elements in English Vocabulary (3) III. P. Schaeffer
Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected.

***31. Greek and Latin Elements in Technical Vocabulary** (3) III. The Staff
Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms.

***50. The Rise of Science in Ancient Greece** (4) II. Rosenstock
Lecture/discussion—3 hours; term paper. Prerequisite: Mathematics 16A or the equivalent. Study of the emergence of scientific rationality in ancient Greece and its political and social context; concentration on four areas: mathematics, medicine, cosmology, and psychology. Reading from the Presocratics, Hippocrates, Plato, Aristotle, and Hellenistic philosophers. GE credit: ArtHum, Wrt.

Upper Division Courses

102. Film and the Classical World (4) II. Albu
Lecture—3 hours; film viewing—2.5 hours. Prerequisite: any Classics course except 30 or 31. The Classical World as portrayed in films. Viewings and discussions of modern versions of ancient dramas,

modern dramas set in the Ancient Mediterranean world, and films imbued with classical themes and allusions. Supplementary readings in ancient literature and mythology. GE credit: ArtHum, Wrt.

110. Origins of Rhetoric (4) II. Abbott
Lecture—3 hours; term paper. Prerequisite: one course in ancient history or consent of instructor. Issues in the development of rhetoric from its origins in ancient Greece to A.D. 430. Special attention to works of Plato, Aristotle, Cicero, and Quintilian. Role of grammar and rhetoric in schools of Roman Empire. The Christian rhetoric of Saint Augustine. Not open for credit to students who have completed Rhetoric and Communication 110. (Former course Rhetoric and Communication 110.) GE credit: ArtHum, Wrt.

140. Homer and Ancient Epic (4) I. Schein
Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of *Iliad, Odyssey,* and *Aeneid* in English. Discussion of Homer's and Vergil's techniques of composition, the beliefs and values of their respective societies and the influence of Homer on Vergil. Offered in alternate years. GE credit: ArtHum, Wrt.

141. Greek and Roman Comedy (4) III. The Staff
Lecture—3 hours; conference—1 hour. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in alternate years. GE credit: ArtHum, Wrt.

***142. Greek and Roman Novel** (4) III. Schein
Lecture—3 hours; term paper. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' *Satyricon,* and the religious mysticism of Apuleius' *The Golden Ass*. GE credit: ArtHum, Wrt.

143. Greek Tragedy (4) III. Traill
Lecture—3 hours; term paper. Prerequisite: course 4A or 10. Reading in English of selected plays of Aeschylus, Sophocles and Euripides. Lectures on the development and influence of Athenian tragedy. Offered in alternate years. GE credit: ArtHum, Wrt.

***150. Socrates and Classical Athens** (4) III. Rosenstock
Lecture/discussion—3 hours; term paper. Prerequisite: course 4A. Study of the major sources of our knowledge of Socrates to assess his role in the politics and culture of ancient Athens; his method of teaching and its place in Western thought. GE credit: ArtHum, Wrt.

171. Mediterranean Bronze Age Archaeology (4) I. Roller
Lecture—3 hours; term paper. Prerequisite: course 1, Anthropology 3. Archaeological monuments of the ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the problems of state formation and on the co-existence and collapse of Bronze Age societies. Not open for credit to students who have completed course 17A. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

174. Ancient Greek Sanctuaries (4) II. Roller
Lecture/discussion—4 hours. Prerequisite: course 17B or consent of instructor. The history, cults, and monuments of Olympia, Delphi, and other sanctuaries. Student reports on major monuments. Offered in alternate years. GE credit: ArtHum, Wrt.

***175. Topography and Monuments of Ancient Athens** (4) III. Roller
Lecture/discussion—4 hours. Prerequisite: course 17A-17B or consent of instructor. The history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis placed on restoration, chronology, and on the relating of documentary to excavational evidence. Offered in alternate years.

197TC. Community Tutoring in Classical Languages (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: consent of instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated for credit up to 5 units. (P/NP grading only.)

Graduate Courses

***201. Introduction to Classical Philology** (4) I. Traill
Seminar—3 hours; term paper. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism.

***202. Homer** (4) II. Roller
Seminar—3 hours; term paper. Readings in the *Iliad* and *Odyssey:* the origins and transmission of the poems.

***203. Vergil** (4) I. Traill
Seminar—3 hours; term paper. Reading of selected books of the *Bucolics, Georgics,* and *Aeneid*. Emphasis will be placed on the study of Vergilean poetic language.

***204. Greek and Roman Comedy** (4) II. The Staff
Seminar—3 hours; term paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit.

***205. Latin Lyric and Elegy** (4) III. Traill
Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

***206. Greek Historiography** (4) II.
Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

***207. Greek Drama** (4) II. The Staff
Seminar—3 hours; term paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

299. Research (1-12) I, II, III. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Courses in Greek (GRK)

Lower Division Courses

1. Elementary Greek (5) I. The Staff
Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. (Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Greek (5) II. Traill
Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

2NT. Elementary New Testament Greek (1) II. The Staff
Lecture—1 hour. Prerequisite: course 2 (concurrently). Supplementary study of New Testament Greek.

3. Intermediate Greek (5) III. Bulman
Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Greek authors.

3NT. Elementary New Testament Greek (1) III. The Staff
Lecture—1 hour. Prerequisite: course 3 (concurrently). Supplementary study of New Testament Greek.

98. Directed Group Study (1-5) I, II, III. The Staff (Program Director in Charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

***100. Attic Orators** (4) I. Traill
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

101. Plato (4) I. Bulman
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

***102. Euripides** (4) I. Roller
Lecture—3 hours; term paper. Prerequisite: course 101. GE credit: ArtHum, Wrt.

***103A. Homer: Iliad** (4) III. Schein
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

103B. Homer: Odyssey (4) III. Roller
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

***104. Menander** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

***105. Demosthenes** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

111. Sophocles (4) II. Schein
Lecture—3 hours; term paper. Prerequisite: course 103. GE credit: ArtHum, Wrt.

***112. Aristophanes** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 103. GE credit: ArtHum, Wrt.

***113. Thucydides** (4) III. Roller
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

***114. Lyric Poetry** (4) III.
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

***115. Aeschylus** (4) II. Schein
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

116. Herodotus (4) II. Roller
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

198. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
(P/NP grading only.)

Courses in Latin (LAT)

Lower Division Courses

1. Elementary Latin (5) I. The Staff
Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. (Students who have successfully completed Latin 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Latin (5) II, III. The Staff
Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

***2X. Intensive Latin** (10) III. The Staff
Lecture—10 hours. Prerequisite: course 1. Intensive course that covers the ground of courses 2 and 3 in a single quarter. Those who have completed course 2 may receive only 5 units for course 2X.

3. Intermediate Latin (5) III. The Staff
Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Latin authors.

98. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Ovid (4) III. Traill
Lecture—3 hours; paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid. GE credit: ArtHum, Wrt.

***101. Livy** (4) II. Traill
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***102. Roman Comedy** (5) I. The Staff
Lecture—4 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***103. Vergil: Aeneid** (4) III. Schaeffer
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

*Course not offered this academic year.

***104. Sallust** (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***105. Catullus** (4) I. Allan
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***106. Horace: Odes and Epodes** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***108. Horace: Satires and Epistles** (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***109. Roman Elegy** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

110. Caesar (4) I. Albu
Lecture—3 hours; substantial paper. Prerequisite: course 3. Translation and discussion of selected readings from Caesar. Grammar review and introduction to Latin prose composition. Offered in alternate years. GE credit: ArtHum, Wrt.

111. Silver Age Latin (4) I. Albu
Lecture—3 hours; term paper. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal, Martial, and other writers of the Silver Age. Offered in alternate years. GE credit: ArtHum, Wrt.

112. Cicero: Political Writings (4) II. Schaeffer
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

***114. Cicero: Philosophical Works** (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***115. Lucretius** (4) II. Schaeffer
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***116. Vergil: Eclogues and Georgics.** (4) II. Traill
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

***121. Prose Composition** (5) I. Traill
Lecture—4 hours; term paper.

***125. Medieval Latin** (4) III. Albu
Lecture—3 hours; term paper. Prerequisite: course 3 and two upper division courses in Latin. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin Language and literature from the fourth to the fifteenth centuries. Offered in alternate years. GE credit: ArtHum, Wrt.

198. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
(P/NP grading only.)

Clinical Nutrition and Metabolism

See Internal Medicine in Medicine, School of

Clinical Psychology

See Medicine, School of

Communication

See Rhetoric and Communication

Community and International Health

See Epidemiology and Preventive Medicine, under Medicine, School of

Community and Regional Development

(College of Agricultural and Environmental Sciences)

Faculty. See the Department of Human and Community Development.

The Major Program

The Community and Regional Development major (formerly Applied Behavioral Sciences) is concerned with the study of communities and the people in them. The program focuses on community and organizational development, the role of culture and ethnicity in shaping community life, and the ways that knowledge can be used to solve social problems and improve the quality of life.

The Program. Principal subjects of study within the major are community and organizational development, social change processes, the role of culture and ethnicity in shaping community life, community research methodologies, the impacts of innovation and technology on community development, and the effects of social, economic and political systems on communities. In addition, the major includes a student-designed field of concentration to complement the student's academic and career interests. Examples of recently approved areas of concentration are organizational planning and management, aging and community development, health care in ethnic communities, community design and planning, socio-environmental planning, and community education.

Internships and Career Alternatives. Community and Regional Development students are required to have an internship in their field before graduation. Internships have been arranged with such agencies as local, county, and state planning units, health departments, schools, housing offices, and community education programs. Community and Regional Development graduates are prepared for occupations in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and community health. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences.

B.S. Major Requirements:

UNITS

English Composition Requirement.....4-12
See College requirement 0-8
Additional English (English 101, 104A, 104B, 104C, 104D, or 104E) 4

Preparatory Subject Matter.....22-25
Community Development (Community and Regional Development 1) 4
Computer science (Agricultural Systems and Environment 21 or Engineering: Computer Science 15).....3-4
Economic theory (Economics 1A or 1B).....5
Ethnicity and American communities (Community and Regional Development 2)...4
Social science theory (Anthropology 2 or Sociology 1).....4-5
Statistics (Statistics 13 or 32 or Sociology 46B) 3-4

Breadth/General Education Requirement.....24
Satisfaction of General Education requirement to include:
Sciences and mathematics.....8
Humanities (Proficiency in a second language is specifically useful to an understanding of particular aspects of the community. Students planning to work in a minority community are encouraged to select an appropriate language.) 8
Social sciences 8

Depth Subject Matter 40
Community and Regional Development 151, 160, and 168 12
Community and Regional Development 142 or 154 4
Community and Regional Development 164 or Sociology 180A.....4
Community and Regional Development 157, 158, or 171 4
Community and Regional Development 118, 140, 141, or 162 4
Community and Regional Development 172 or 176 4
Choose one course from Community and Regional Development 152, 173, 175 or International Agricultural Development 103 4
Internship: Community and Regional Development 159 4

Areas of Specialization
Take 20 units from each of two options or 40 units from one option. Up to 4 units of variable-unit course work (e.g., Community and Regional Development 159, 192) may be counted toward this requirement.

Community Groups Option.....40
Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.
General (Community and Regional Development 176, American Studies 156, Human Development 103)
African Americans (African American and African Studies 100, 123, 130, 145A, Sociology 128, 129, 130, 134)
Asian Americans (Asian American Studies 100, 110, 111, 112, 155)
Chicana/os (Chicana/o Studies 100, 110, 111, 120, 121, 131, 132, 140, Political Science 168)
Native Americans (Native American Studies 115, 116, 117, 118, 122, 130A/B, 134, 156, 181B)
Youth (American Studies 152, Human Development 100A, 100B, 102, 103, 130, 140, 140L, 151, Sociology 122, 152)
Aging (Community and International Health 180, Human Development 100C, 143, 160, 162, 191, Sociology 154)
Gender (Anthropology 130, Political Science 166, Psychology 114, Sociology 132, 133, 145B, Women's Studies 103, 130, 140, 187)
Specially Challenged Individuals (Education 115, Exercise Science 131, Human Development 130, 131)
Class (Sociology 140, 185)

Organization and Management Option.....40
Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.
Administration (Community and Regional Development 157, 158, Agricultural Economics 100A, 171A, Economics 104, 105, 115A, Engineering Computer Science 167, Political Science 100, 105, 142, 155, 181, 182, 183)
Communication (Community and Regional Development 173, 175, Education 120, 163, Rhetoric and Communications 114, 130, 134, 136, 140, 152)

Human Resources (Community and Regional Development 172, 176, Economics 151B, Food Service Management 123, Psychology 143, 144, 145, 183, Sociology 120, 128, 129)

Management (Community and Regional Development 118, 140, 141, 154, 161, 162, 164, Agricultural Economics 112, 113, History 174A, Political Science 188, Sociology 139, 158, 159, 180A, 180B)

Policy and Planning Option 40

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

General (Community and Regional Development 118, 142, 154, 162, Environmental Studies 165, Political Science 100, 103, 105, 108, 109, 142, 173, 183)

Environmental Policy (Political Science 107, 175, Environmental Studies 110, 160, 161, 164, 166, 168A, 168B, 171, 172, 173, 179, Environmental and Resources Sciences 121)

Law and Policy (Sociology 120, 152, 155, Political Science 103, 105, 154, 155, 181, 182)

Urban and Regional Planning (Community and Regional Development 140, 141, 152, 157, 158, 159, 171, Economics 115A, Environmental Planning and Management 110, 134, Environmental Studies 171, 173, Geography 155, Political Science 100, 101, 102)

Social Services Option 40

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

Community Health (Community and Regional Development 164, Community Health 101, Environmental Studies 126, Psychology 160, Sociology 154)

Aging (Community Health 180, Human Development 100C, 143, 160, 162)

Counseling (Education 160, 163, Human Development 121, Psychology 143, 145, Rhetoric and Communications 134, 135)

Youth (American Studies 152, Human Development 100A, 100B, 102, 103, 130, 140, 151, Sociology 122, 152)

The Family (Human Development 110, 131, 135)

Education (Community and Regional Development 173, 175, Agricultural Education 100, 163, Education 100, 110, 114, 120)

Bilingual Education (Education 151, 152, 153)

Unrestricted Electives 39-50

Total Units for the Degree.....180

Major Adviser. M. Kenney

Advising Center for the major is located in 1303 Hart Hall (916) 752-2244.

Minor Program Requirements:

The Community and Regional Development faculty offers the following minor program:

UNITS

Community Development.....24

Community and Regional Development 1, 151, 152, 164 16

Two courses selected from the following: Community and Regional Development 140, 157, 158, 162, 168, 171, 172, 173, 175, 176 8

Minor Adviser. M.J. Wells.

Graduate Study. Refer to the Graduate Studies section in this catalog.

Related Courses. See Environmental Studies 10, 101, 133.

Courses in Community and Regional Development (CRD)

(Formerly courses in Applied Behavioral Sciences.)

Lower Division Courses

1. The Community (4) I. Tarallo; III. MacCannell
Lecture—4 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghetto, suburban mainline, and California farm workers. GE credit: SocSci, Div, Wrt.

2. Ethnicity and American Communities (4) II. Guarnizo; III. The Staff
Lecture—3 hours; discussion—1 hour. Historical and cultural survey of the role of various ethnic groups in the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. GE credit: SocSci, Div, Wrt.

***17. Population and Community** (2) I. The Staff
Lecture—2 hours. Dynamics and challenges offered by demographic changes in California and the world community. Implications for individuals and communities. Special emphasis on the possible contributions each individual can make towards resolving global problems related to human ecology through local community action. (P/NP grading only.)

47. Orientation to Community Resources (2) II. Fujimoto; III.The Staff
Field trip—4 days; seminar—three 2-hour sessions. (Course given between quarters). Prerequisite: consent of instructor. Intensive field course in San Francisco. Students interact with agencies and individuals who address the range of human service, educational and social needs in the city. Advance reservations required. (P/NP grading only.)

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only).

98. Directed Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

118. Technology and Society (4) I. Kenney
Lecture—3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Impact of technology on labor relations, employment, industrial development and international relations. The internal relations of technology development and deployment. GE credit: SocSci, Wrt.

140. Dynamics of Regional Development (4) II. Kenney
Lecture—4 hours. Prerequisite: one undergraduate social science course or consent of instructor. Political economy of domestic regional development. Technology, labor relations and interfirm linkages. California and other regions as case studies. GE credit: SocSci, Wrt.

141. Organization of Economic Space (4) II. Momsen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. The globalization of economic activity focusing on new spatial patterns of production and circulation and their implications for particular countries and regions.

142. Rural Change in the Industrialized World (4) III. Momsen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Geography of rural environment with special emphasis on rural restructuring. The regional focus is on the developed world and comparisons are drawn between Europe (Eastern and Western) and North America.

151. Community Field Research: Theory and Analysis (3) I. Smith; II. The Staff
Lecture—3 hours. Prerequisite: course 151L must be taken concurrently; course 1 and any upper division Community and Regional Development course are recommended. Design and analysis of research at the community level with a focus on the relationship between practice and theory. Focus will be on conducting community research using structural analysis, elite interviewing, ethnographic research, and other such research methods. GE credit: SocSci, Div, Wrt.

151L. Laboratory in Community Research and Analysis: Field Experience (1-3) I. Smith; II. The Staff
Fieldwork—3-9 hours. Prerequisite: course 151 concurrently. Field research focused on community or organizational issues and their resolution. Includes assignment with local agencies or community-based organizations. The focus will be conducting community research using such methods as structural analysis, elite interviewing, ethnographic research, and comparative community studies.

152. Community Development (4) III. Bradshaw
Lecture—4 hours. Prerequisite: course 151 or 1, Sociology 2, Anthropology 2, Asian American Studies 100, Chicano Studies 132, Geography 5, or African American Studies 101. Introduction to principles and strategies of community organizing and development. Examination of different citizen participation movements and the role of change agents in the development process. Students work in teams and conduct fieldwork in local communities. GE credit: SocSci, Wrt.

***153. International Community Development** (4) III. Fujimoto
Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of global forces on community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development.

154. Social Theory and Community Change (4) III. Hirtz
Lecture—4 hours. Prerequisite: course 1, Sociology 1, or Anthropology 2. A comparative overview of the dominant social science paradigms for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory/Marxism, structuralism, and methodological individualism. GE credit: SocSci, Div, Wrt.

156. Community Economic Development (4) III. Bradshaw
Lecture—4 hours. Prerequisite: course 1 or a lower division course in Sociology, Political Science, or Economics; course 152 recommended. How government and community organizations help firms grow and create jobs through local economic development corporations, small business centers, revolving loan funds, incubators, and many other programs. Techniques to analyze community economic potential and identification of appropriate intervention tools.

***157. Politics and Community Development** (4) III. Smith
Lecture—4 hours. Prerequisite: prior course work in sociology or political science recommended. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Considers theories of the state, the community and social change and case studies of actual community development in comparative historical perspective. GE credit: SocSci, Div, Wrt.

158. Small Community Governance (4) II. Sokolow
Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 151 or 160 or Political Science 100. Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in select communities. Offered in alternate years.

*Course not offered this academic year.

159. Field Experience in Community Development (4) II, III. The Staff
Discussion—2 hours; field work—6 hours. Prerequisite: any one of courses 151, 152, 153, 154, or 157. Field involvment with community or organizational issues or problems and their resolution. May be repeated for credit for a total of 12 units with consent of instructor.

160. Research Design and Method in Community Studies (4) I. Goldman
Lecture—4 hours. Prerequisite: course 1; Statistics 13 or the equivalent. Application of behavioral science research methodology to multidisciplinary problems confronting communities and community organizations. Focuses on design, sampling, measurement and analysis.

***161. Ethnographic Research in America** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: completion of 8 units of course work in Anthropology, Sociology, or Community and Regional Development. Methodologies, ethics and goals of qualitative research. Emphasis on analyzing and conducting ethnographic research in American communities; problem formulation, analytic modes, data correction and interpretation. Offered in alternate years.

162. People, Work and Technology (4) I. Wells
Lecture—4 hours. Prerequisite: course work in the social sciences (e.g., Sociology 1, 3, Anthropology 137, Economics 1A, 1B) or labor history. Relationship between work, technology, and people's lives. Such topics as industrialization, bureaucratization, automation, the structure of work-linked communities, education and the labor market, work and the economic system and the future of work.

***163. Behavior of Community Organizations** (4) I. The Staff
Lecture—4 hours. Prerequisite: introductory social sciences course. How community organizations function and how members of organizations interact with each other, the organization, and those people who are clients of the organization. Effects of leadership, motivation, group dynamics, communications, and power.

164. Theories in Organizational Change (4) II. Hirtz
Lecture—4 hours. Prerequisite: course 1 or 2. Development of approaches to planned change including normative re-educative, applied systems, and developmental strategies.

168. Program Evaluation and the Management of Organizations (4) II. Goldman
Lecture—4 hours. Prerequisite: courses 160, 161. Role of program evaluation in organizational and program management. Impact of internal evaluation in program planning, improvement, and accountability.

171. Housing and Social Policy (4) III. The Staff
Lecture—4 hours. Social impact, economics, and politics of housing in the United States. Special attention given to alternative policy strategies at the national and local levels.

172. Social Inequality: Issues and Innovations (4) III. Wells
Lecture—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Study of the phenomenon of inequality in the U.S. Various approaches to inequality examined, including structural and historical explanations, prejudice and discrimination, the "culture of poverty," and arguments concerning race, sex, and genetic potential.

173. The Continuing Learner (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Designing of adult education programs.

***174. Communication for Community Change** (4) I. The Staff
Lecture—4 hours. Prerequisite: course 1. Communication as a mechanism and method for creating change in communities. Theories and practices; impact of message on attitudes and behavior; ethics of change induced through communication. Offered in alternate years.

175. Education in the Community (4) I. The Staff
Lecture—4 hours. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Function of education in the community. Relationships of community and non-formal education to formal education, schooling and to individual, community and national development. Planning process and role of education in social and community change. Offered in alternate years.

176. Comparative Ethnicity (4) I. Guarnizo
Lecture—4 hours. Prerequisite: upper division standing, 8 units of sociology or anthropology or combination. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies. GE credit: SocSci, Div, Wrt.

***190. Current Issues in Applied Behavioral Sciences** (1) I, II, III. The Staff
Seminar—1 hour. Current social, political, and economic issues affecting communities and individuals. One-hour presentations by guest speakers on research topics and contemporary issues in Community Development. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

197T. Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (P/NP grading only.)

197TC. Community Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Supervised tutoring in the community. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

240. Community Development Theory (4) I. Bradshaw
Lecture/discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects.

241. The Economics of Community Development (4) II. Kenney
Lecture—4 hours. Prerequisite: course 240. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy.

242. Community Development: Program Management (4) III. Hirtz
Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or city level.

***243. Professional Skills for Human Service and Community Development** (4) I. The Staff
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate student standing in a social science discipline. Theory of interpersonal communication and small group process as applied to development of professional skills as community developer, program administrator and/or consultant.

***244. The Political Economy of Domestic Development** (4) III. Kenney
Lecture—4 hours. Prerequisite: course 241. Examination of the politics and institutions affecting the economic growth of regions. Theories of development and change are examined with specific reference to case study material.

245. The Political Economy of Urban and Regional Development (4) II. Smith
Lecture—4 hours. Prerequisite: course 157, 244, or the equivalent. How global politics and economic restructuring and national and state policies are mediatd by community politics; social prediction of urban forces; role of the state in uneven development; dynamics of urban growth and decline; regional development in California.

246. The Political Economy of Transnational Migration (4) II. Guarnizo
Lecture—4 hours. Prerequisite: graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy.

247. Transformation of Work (4) I. Wells
Lecture/discussion—4 hours. Prerequisite: graduate standing in history or social science degree program or consent of instructor. Exploration of the ways that the experience, organization, and systems of work are being reconfigured in the late twentieth century. The impacts of economic restructuring on local communities and workers.

290. Seminar (1) I. Wright and staff; II, III. Wright
Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)

292. Graduate Internship (1-12) I, II, III. Staff
Internship—3-36 hours. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. (S/U grading only.)

298. Group Study (1-5) II. Guarnizo

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Community Development (A Graduate Group)

Michael P. Smith, Ph.D., Chairperson of the Group

Group Office, 1303 Hart Hall (Human and Community Development), (916-752-1926)

Faculty. The interdisciplinary faculty include those in Anthropology, Asian American Studies, African American and African Studies, the Graduate School of Management, Human and Community Development, Landscape Architecture, Environmental Design, Geography, Psychology, Sociology, and Women's Studies.

Graduate Study. The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program prepares students for professional roles as administrators, designers, planners, or researchers, with emphasis upon urban and rural communities and human service organizations. Graduate study in community development also prepares individuals to work within government or non-profit organizations in the realm of social and economic change. Students have the opportunity to specialize in *(1)* community design and planning, *(2)* ethnic and cultural diversity, *(3)* gender and community development, *(4)* community health and human services, *(5)* environmental issues, *(6)* urban and rural development, and *(7)* community economic development.

Preparation. Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, cultural geography, or political science, and courses in community studies.

Graduate Advisers. Contact the Group Office.

Community Nutrition

(College of Agricultural and Environmental Sciences)

The Major Program

Community nutrition teaches students the identification of nutrition-related health problems and the biological, behavioral, economic, and sociocultural factors that influence the nutrition of individuals and groups. The aim of community nutrition is to apply this knowledge to the development of programs that improve the nutritional status in the community.

The Program. The community nutrition major is for students who seek to combine a foundation in the biological and nutritional sciences with study in the social sciences. All students in the major are required to complete a common core of preparatory and depth subject matter courses. Students select one of three subject matter options emphasizing sociocultural, psychological, or economic aspects of food, diet, and nutrition, and an additional area of concentration in consultation with the adviser.

Career Alternatives. The community nutrition major prepares students for jobs in administrative, teaching, research, or public health/public service positions or for graduate or professional training in nutrition and other health sciences. Students who complete the academic requirements for an internship in dietetics are also qualified for careers in dietetics, following completion of an internship.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 49-51
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A, 2B, 8A, 8B) 16
Computer science (Agricultural Systems and Environment 21 or Computer Science Engineering 15) 3-4
Cultural food habits (Nutrition 20) 4
Cultural social science (Anthropology 2, Geography 2, or Sociology 3) 4
Social research methods (Sociology 46A or Psychology 41) 4
Statistics (Sociology 46B or Statistics 13) ...4

Breadth/General Education.....6-24
Satisfaction of General Education requirement 6-24
(Note that some of the Option Subject Matter may meet General Education requirements.)

Depth Subject Matter 53
Biological Sciences 102 and 103.....6
Food Science and Technology 100A, 100B, 101A, 101B 10
Nutrition 110, 111, 112, 113, 116A, 116B, 118, 120, 190 28
Nutrition 192 2
Neurobiology, Physiology and Behavior 101, 101L 7

Option Subject Matter.....28-32
Course work chosen from one of the three options below in consultation with adviser 18-20
Additional units in a related social or health science chosen in consultation with adviser 10-12
(May include a minor program in fields such as physical education, environmental toxicology, community development, statistics or the social sciences.)

Behavioral–Psychological Option
Psychology 1, Education 110 or Psychology 130
Psychology 112 or Human Development 100A or 100B
Psychology 115 or Human Development 100C
Psychology 108, 129, 145, 165, 168, 180A, 180B, 180C; Anthropology 129, 130; Community and Regional Development 173, 178; Consumer Science 100; Food Science and Technology 107, 117; Rhetoric and Communication 115; Sociology 154

Economics and International Development Option
Agricultural and Resource Economics 100A, 100B, 120, 130, 141; Anthropology 122, 126; Consumer Science 100; Economics 1A, 1B, 100, 101, 115A, 115B, 118, 123, 130, 151A, 162; Environmental Studies 1, 165; International Agricultural Development 10, 103, 110, 111, 195; Mathematics 16A; Rhetoric and Communication 115; Sociology 170

Sociocultural Option
Foreign language (10 units or the equivalent strongly recommended)
African American and African Studies 100; Anthropology 101, 126, 133, 135; Community and Regional Development 2; Geography 170, 175; Rhetoric and Communication 115
Regional courses, choose 8 units from one of the following four areas (alternative courses may be selected in consultation with the adviser)
North America:
Anthropology 141A, 176, History 169A, 169B, Sociology 143A, 143B
Central and South America:
Geography 122A, 122B, History 161A, 161B, 162, 163A, 163B, 165, 166A, 166B, 168
Africa:
Anthropology 140A, 140B, Geography 125A, 125B, History 115A, 115B, 115C
Asia:
Anthropology 142, 147, 148, 149, Geography 124, History 137A, 137B, 137C, 138, 190A, 190B, 190C, 191A, 191B, 193, 194A, 194B, 194C, 195

Additional Recommended Courses. Community and Regional Development 151, 152, Community Health 101, 160, 180, 194, Environmental Studies 126, Nutrition 114, 116AL, 116BL, 117, 129, 130, 199, 219A, 219B, Sociology 106.

Unrestricted Electives 12-43

Total Units for Degree 180

Major Adviser. R.B. McDonald *(Nutrition).*

Advising Center for the major is located in 1202E Meyer Hall (916-752-2512).

Dietetics Internship. To fulfill the academic requirements for an internship in Dietetics, the following courses must be included: Economics 1B, Agricultural and Resource Economics 112, Food Service Management 120, 120L, 121, 122, 123, Community and Regional Development 173 or Education 110, Psychology 1, Nutrition 116AL-116BL, and Rhetoric and Communication 1. Consult the Advising Center prior to the first quarter of the junior year for information on procedures.

Graduate Study. For information on graduate study, see the Graduate Studies section in this catalog.

Comparative Literature

(College of Letters and Science)

————, Ph.D., Program Director

Program Office, 522 Sproul Hall (916-752-9934)

Committee in Charge

Marc E. Blanchard, Agrégé de Lettres, Professor *(Comparative Literature, French)*
Gail Finney, Ph.D. *(Comparative Literature, German)*
Manfred Kusch, Ph.D. *(Comparative Literature, French)*
Kari Lokke, Ph.D. *(Comparative Literature, English)*
Harriet Murav, Ph.D. *(Comparative Literature, Russian)*
Seth L. Schein, Ph.D. *(Comparative Literature)*
Julianna Schiesari, Ph.D. *(Comparative Literature, Italian)*
Brenda Schildgen, Ph.D. *(Comparative Literature)*
Robert M. Torrance, Ph.D. *(Comparative Literature)*

Faculty

Salvatore Allosso, Ph.D., Lecturer
Marc Eli Blanchard, Agrégé de Lettres, Professor *(Comparative Literature, French)*
Patricia Bulman, Ph.D., Lecturer
Gail Finney, Ph.D., Professor *(Comparative Literature, German)*
Manfred Kusch, Ph.D., Senior Lecturer *(Comparative Literature, French)*
Kari Lokke, Ph.D., Associate Professor *(Comparative Literature, English)*
Scott McLean, Ph.D., Lecturer
Harriet Murav, Ph.D., Associate Professor *(Comparative Literature, Russian)*
Donna Reed, Ph.D., Lecturer
Seth L. Schein, Ph.D., Professor
Juliana Schiesari, Ph.D, Professor *(Italian, Comparative Literature)*
Brenda Schildgen, Ph.D., Lecturer
Robert M. Torrance, Ph.D., Professor

Emeriti Faculty

Ruby Cohn, Ph.D., Professor Emerita
Roland W. Hoermann, Ph.D., Professor Emeritus

The Major Program

Comparative literature encourages students to read, think about, and compare books from different national languages and from different parts of the world. Comparative literature enlarges students' horizons by bridging the divisions between national cultures instead of concentrating on a single tradition.

The Program. Both the major and minor comparative literature programs allow students to combine courses in one or more national literature departments with courses in comparative literature. The introductory course sequence, "Great Books of Western Culture" and "Major Books of the Contemporary World," provides both an overview of European literary culture from ancient times to the present and intensive practice in analytical thought and English composition. All readings in undergraduate comparative literature courses are in English, but majors take upper division courses in at least one foreign literature in the original language.

Career Alternatives. Careers directly related to comparative literature include teaching, journalism, publishing, and translating. Because many professional schools consider a literature major an excellent background for their graduate disciplines, comparative literature provides valuable preparation (supplemented with courses outside the major) for careers in business, government, medicine, or law.

*Course not offered this academic year.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 15-46
Comparative Literature 1, 2, 3.....12
One lower division course other than Comparative Literature 1, 2, 3, and 10A-N 3-4
Foreign language: sufficient preparation to insure satisfactory performance at the upper division level.....0-30

Depth Subject Matter 40
Five upper division courses (including at least three in a language other than English) distributed between the first and second literatures of concentration with the approval of the adviser 20
Comparative Literature 141.....4
Two additional upper division Comparative Literature courses, including at least one in a major literary period (such as 164A, 161B, 161C, 161D), genre (such as 160A-160B, 161A-161B, or 166A-161B), or movement (such as 168A-168B or 169).....8
Two additional upper division courses in one or both literatures of concentration or in Comparative Literature, selected with the approval of the adviser 8

Total Units for the Major 55-82

Recommended
Anthropology 2; Classics 10; English 171A, 171B; French 114; History 4A-4B-4C, 101; Linguistics 1, 4, 163; Philosophy 24, 123; Religious Studies 2.

Major Adviser. The Staff.

All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

Honors Program. Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. For this purpose, *in addition to* fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 194H during the first two quarters of the senior year. Only students who have attained a cumulative GPA of 3.5 in all courses satisfying the major (except elementary foreign language courses) at the end of the junior year will be eligible for the honors program.

Minor Program Requirements:

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no foreign language requirement for the minor.

UNITS

Comparative Literature 24
Comparative Literature 1, 2, 3, or 4.....4
At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended).....8
Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature.....12
Courses should form a coherent program and should be chosen in consultation with, and with the approval of, the adviser.

Minor Adviser. Same as Major Adviser.

All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

Teaching Credential Subject Representative. The Staff. See also the Teacher Education Program.

Graduate Study. Refer to Comparative Literature (A Graduate Group). See also the Graduate Studies section in this catalog.

Courses in Comparative Literature (COM)

Lower Division Courses

1. Great Books of Western Culture: The Ancient World (4) I, II, III. Director in Charge
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from *The Epic of Gilgamesh* to St. Augustine's *Confessions*. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

2. Great Books of Western Culture: From the Middle Ages to the Enlightenment (4) I, II, III. Director in charge
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Dante's *Inferno* to Swift's *Gulliver's Travels*. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

3. Great Books of Western Culture: The Modern Crisis (4) I, II, III. Director in charge
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Goethe's *Faust* to Beckett's *Waiting for Godot*. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

4. Major Books of the Contemporary World (4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Comparative study of selected major Western and non-Western texts composed in the period from 1945 to the present. Intensive focus on writing about these texts, with frequent papers written about these works. GE credit: ArtHum, Div, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

5. Fairy Tales, Fables, and Parables (4) I, II. Reed, Schildgen and staff
Lecture—3 hours; discussion—1 hour. An introduction to fairy tales, fables, and parables as recurrent forms in literature, with such readings as tales from Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges, Buddhist and Taoist parables, the Arabian Nights, and African American folklore. GE credit: ArtHum, Div, Wrt.

6. Myths and Legends (4) II, III. McLean, Schildgen
Lecture—3 hours; discussion—1 hour. Introduction to the comparative study of myths and legends, excluding those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, Japanese, Chinese, African and Central American literary sources. GE credit: ArtHum, Div, Wrt.

7. Literature of Fantasy and the Supernatural (4) I, III. Reed, Allosso
Lecture—3 hours; discussion—1 hour. The role of fantasy and the supernatural in literature: tales of magic, hallucination, ghosts, and metamorphosis, including diverse authors such as Shakespeare, P'u Sung-Ling, Kafka, Kawabata, Fuentes, and Morrison. GE credit: ArtHum, Div, Wrt.

8. Utopias and their Transformations (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: English A. A consideration, in literary works from different ages, of visionary and rational perceptions of a lost paradise, Golden Age, or Atlantis—and of the inhuman nightmares that can result from perversions of the utopian dream of perfection. GE credit: ArtHum, Wrt.

***9. The Short Story and Novella** (4) III. The Staff
Lecture/discussion—3 hours; term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with special emphasis on the modern period. GE credit: ArtHum, Div, Wrt.

10A-N. Master Authors in World Literature (2) I, II, III. The Staff (Director in charge)
Lecture/discussion—1 two-hour session. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: **(A)** *Gilgamesh, Ramayana, Beowulf, Nibelungenlied;* **(B)** *Metamorphoses, Decameron, Arabian Nights, Canterbury Tales;* **(C)** *Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur;* **(D)** *Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight;* **(E)** Swift, Rabelais, *La Celestina, Simplicissimus;* **(F)** Cervantes, Saikaku, Fielding, Voltaire; **(G)** Machiavelli, Shakespeare, Lope de Vega/ Calderón, Molière/Racine, Lessing/Schiller; **(H)** Goethe, Byron, Stendhal, Pushkin, Lermontov; **(I)** Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville; **(J)** Flaubert, Twain, Turgenev, Galdós, Ibsen; **(K)** Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg; **(L)** Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner; **(M)** Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/ Pirandello; **(N)** Camus/Sartre, García Márquez/Grass, Borges/Sarraute, Bellow/Nabokov, Beckett/Pinter, Genet/ Dürrenmatt. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only.)

12. Introduction to Women Writers (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. Survey of fiction, drama, and poetry by women writers from all continents. Concerns of women compared in light of their varied social and cultural traditions. Students will practice literary analysis of voice, imagery, narrative strategies and diction. GE credit: ArtHum, Div, Wrt.

***13. Dramatic Literature** (3) III. Finney
Lecture—3 hours. Prerequisite: Subject A or the equivalent. Introduction, through careful reading of selected plays, to some of the major forms of Western drama, from the earliest tragedies of ancient Greece to the contemporary American theater. Offered in alternate years. GE credit: ArtHum, Wrt.

14. Introduction to Poetry (3) III. Finney
Lecture/discussion—3 hours. Prerequisite: completion of Subject A requirement. Comparative study of poetry in a variety of lyric and other poetic forms from different historical periods and different linguistic, national, and cultural traditions. Offered in alternate years. GE credit: ArtHum, Wrt.

***15. The Spiritual Quest** (3) I. Torrance
Lecture/discussion—3 hours. An exploration of the unending search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in such works as the *Bhagavad Gita, The Quest of the Holy Grail,* Dante's *Purgatory,* and Melville's *Moby Dick*. GE credit: ArtHum, Wrt.

20. Man and the Natural World (4) I. McLean
Lecture/discussion—3 hours; term paper. Examination of the changing relationship between the individual human being and his "natural" environment, whether cultivated or wild, as reflected in literary works from ancient times to the present by such authors as Hesiod, Virgil, Rousseau, Wordsworth, and Thoreau. GE credit: ArtHum, Wrt.

***25. Ethnic Minority Writers in World Literature** (4) I, II. The Staff
Lecture—3 hours; term paper. Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. GE credit: ArtHum, Div, Wrt.

***53A. Literature of China and Japan** (3) II. The Staff
Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of East Asia with readings from such works as *The Story of the Stone, The Peach Blossom Fan,* T'ang and Sung poetry, classical

Japanese poetry, drama, and travel diaries, and *The Tale of Genji.* GE credit: ArtHum, Div, Wrt.

***53B. Literature of India and Southeast Asia** (3) I. Schildgen
Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of South Asia with readings from such works as the *Mahabharata* and *Ramayana, The Cloud Messenger, Shakuntala, The Little Clay Cart,* and the stories and poems of both ancient and modern India and Southeast Asia. GE credit: ArtHum, Div, Wrt.

90X. Lower Division Seminar (1-2) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge)
(P/NP grading only.)

Upper Division Courses

***120. Writing Nature: 1750 to the Present** (4) I. McLean
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of representations, descriptions, and discussions of humankind's problematical relationship with the non-human world in texts written in a variety of European and American traditions between 1750 and the present. Offered in alternate years. GE credit: ArtHum, Wrt.

135. Women Writers (4) III. Reed
Lecture/discussion—3 hours; term paper. An exploration of women's differing views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. GE credit: ArtHum, Div, Wrt.

***138. Gender and Interpretation** (4) I. Schiesari
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the representation of gender roles and gender hierarchy in literary texts from various periods, societies, and cultures in light of research and theory on gender, with attention to gender as a topic for literary interpretation. GE credit: ArtHum, Div, Wrt.

***140. Thematic and Structural Study of Literature** (4) II. Murav
Lecture/discussion—3 hours; term paper. Interpretation of selected works illustrating the historical evolution of themes, as well as of formal and structural elements. May be repeated for credit when substance of course varies. GE credit: ArtHum, Wrt.

141. Literary Theory and Criticism (4) II. Torrance
Lecture/discussion—3 hours; term paper. Exploration of literary theories with emphasis on specific objectives and possibilities of comparative literature. GE credit: ArtHum, Wrt.

***142. Critical Reading and Analysis** (4) III. The Staff (Director in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Close reading of selected texts; scrutiny of very limited amount of material, with attention to the problems of texts in translation.

***144. The Grotesque** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the "grotesque" in selected texts from the Renaissance to the 20th century, with attention to the "grotesque" as a means of social, cultural, and political commentary, as well as of aesthetic innovation. Offered in alternate years. GE credit: ArtHum, Wrt.

***145. Representations of the City** (4) I. The Staff
Lecture/discussion—3 hours; term paper. Examination of the portrayal of the modern city in 19th and 20th century western literature. Readings include works by Balzac, Dickens, Poe, Baudelaire, Dostoevsky, Whitman, Zola, T.S. Eliot, and William Carlos Williams. GE credit: ArtHum, Wrt.

***146. Myth in Literature** (4) II. Schaeffer, Lokke
Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions. GE credit: ArtHum, Wrt.

147. Modern Jewish Writers (4) II. Murav
Lecture/discussion—3 hours; term paper. Prerequisite: completion of the Subject A requirement and one lower division literature course. Problems of the modern Jewish experience from the perspective of the writer's construction of the self in relation to the future and to the non-Jew. Draws upon Russian, German, Yiddish, and American traditions. GE credit: ArtHum, Div, Wrt.

151. Colonial and Postcolonial Experience in Literature (4) III. Blanchard
Lecture—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. A literary introduction to the cultural issues of colonialism and postcolonialism through reading, discussing and writing on narratives which articulate diverse points of view. GE credit: ArtHum, Div, Wrt.

152. Literature of the Americas (4) I. Blanchard
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the various stylistic, historical, social and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***153. The Forms of Asian Literature** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Introduction to distinctive Asian literary forms, such as *haiku, noh,* the Chinese novel and tale, through reading of major works. Comparison with Western genres and study of native and Western critical traditions. GE credit: ArtHum, Div, Wrt.

154. African Literature (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Pre- and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature in the 19th and 20th centuries. GE credit: ArtHum, Div, Wrt.

157. War and Peace in Literature (4) II. Blanchard
Lecture/discussion—3 hours; term papers. Prerequisite: course 1, 2, or 3, or consent of instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. GE credit: ArtHum, Wrt.

***158. The Detective Story as Literature** (4) I. The Staff
Lecture—3 hours; term paper. Study of the origins, literary and social background, development and implications of the literature of detection in a comparative context. GE credit: ArtHum, Wrt.

159. Women in Literature (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 1, 2, 3, or 4 or the equivalent recommended. Portrayals of women in literature, comparing selected heroines who represent a particular theme, period, or genre. Texts range around the globe and from ancient to modern works, such as *Lysistrata, Emma, Hedda Gabler, The Makioka Sisters,* and *Top Girls.* GE credit: ArtHum, Div, Wrt.

160A. The Modern Novel (4) II. Finney
Lecture/discussion—3 hours; term paper. The changing image of man and his world as seen in novels by such writers as Joyce, Proust, and Mann. GE credit: ArtHum, Wrt.

***160B. The Modern Drama** (4) I. The Staff
Lecture/discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. GE credit: ArtHum, Wrt.

***161A. Tragedy** (4) III. Schein
Lecture/discussion—3 hours; term paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. GE credit: ArtHum, Wrt.

***161B. Comedy** (4) II. Finney
Lecture/discussion—3 hours; term paper. Comic attitudes towards life in literary works of different ages. GE credit: ArtHum, Wrt.

163. Biography and Autobiography (4) I. Murav
Lecture/discussion—3 hours; term paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. Offered in alternate years. GE credit: ArtHum, Wrt.

164A. The Middle Ages (4) I. Schildgen
Lecture/discussion—3 hours; term paper. Readings in heroic epics, chivalric romances, and such major authors as Dante and Chaucer, with emphasis on shared assumptions concerning man's place in the world. GE credit: ArtHum, Wrt.

164B. The Renaissance (4) II. Torrance
Lecture/discussion—3 hours; term paper. Readings in major authors such as Petrarch, Machiavelli, Erasmus, Montaigne, Rabelais, Cervantes, and Shakespeare, with particular emphasis on changing conceptions of the possibilities and limitations of man. GE credit: ArtHum, Wrt.

164C. Baroque and Neoclassicism (4) I. The Staff
Lecture/discussion—3 hours; term paper. Readings in major authors such as Calderón, Corneille, Pascal, Racine, Milton, and Grimmelshausen, with consideration of the tension between the expansive energies of the "baroque" and the restraints of dogma and reason. GE credit: ArtHum, Wrt.

164D. The Enlightenment (4) III. Kusch
Lecture/discussion—3 hours; term paper. Readings in major authors such as Swift, Voltaire, Rousseau, Sterne, and Kant, with emphasis on philosophical ideas and literary forms. GE credit: ArtHum, Wrt.

166A. The Epic (4) II. Schein
Lecture/discussion—3 hours; term paper. Study of various forms of epic poetry in both the oral and literary traditions. May be repeated for credit in different subject area. GE credit: ArtHum, Wrt.

166B. The Novel (4) I. The Staff
Lecture/discussion—3 hours; term paper. Readings in various forms of the novel such as the picaresque, the developmental, and the confessional, with emphasis on the evolution of the genre. May be repeated for credit in different subject area. GE credit: ArtHum, Wrt.

***167. Comparative Study of Major Authors** (4) I. Schein
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, Tolstoi, Proust, and Joyce. GE credit: ArtHum, Wrt.

***168A. Romanticism** (4) II. Lokke
Discussion—3 hours; term paper. Prerequisite: any introductory course in literature. Introduction to the Romantic movement with emphasis upon Romantic concepts of the self, irony, love, the imagination and artistic creativity, and the relationship of the individual to nature and society. GE credit: ArtHum, Wrt.

***168B. Realism and Naturalism** (4) I. Finney
Discussion—3 hours; term paper. Prerequisite: consent of instructor. Novels and plays by Dickens, Zola, Flaubert, Dreiser, Ibsen, and Strindberg investigate marriage and adultery, the city and its perils, the hardships of industrialization, the war between the sexes, the New Woman, and other 19th-century themes. Offered in alternate years. GE credit: ArtHum, Wrt.

***169. The Avant-Garde** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Studies in movements such as surrealism, expressionism and the absurd. GE credit: ArtHum, Wrt.

***170. The Contemporary Novel** (4) II. Torrance
Lecture—3 hours; term paper. Study of important novels from different parts of the world, including Asia, Africa, Latin America, Europe, and the United States, in the period from the Second World War to the present. GE credit: ArtHum, Wrt.

***180. Selected Topics in Comparative Literature** (4) III. Murav
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of a selected topic or topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated once for credit when the topic differs. GE credit: ArtHum, Wrt.

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Director in charge)
Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a comparative topic. May be repeated for credit. (P/NP grading only.)

195. Seminar in Comparative Literature (4) III. Murav
Seminar—3 hours; term paper. Prerequisite: junior standing and major in Comparative Literature, or consent of instructor. Advanced comparative study of selected topics and texts, with explicit emphasis on the theoretical and interpretive approaches that define Comparative Literature as a discipline and distinguish it from other literary disciplines. May be repeated once for credit when topic differs. Offered in alternate years.

197T. Tutoring in Comparative Literature (1-5) I, II, III. The Staff (Director in charge)
Discussion—2-4 hours. Prerequisite: upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
(P/NP grading only.)

Graduate Courses

***200. Introduction to the Graduate Study of Comparative Literature** (4) II. Finney
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language. Introduction to research tools, library resources, and critical concerns of Comparative Literature, with focus on the comparative study of a single work, culminating in a related research project.

201. Theories of Comparative Literature (4) III. Torrance
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language; course 141 or the equivalent recommended. An examination of international theories of literature with reference to language, genre, thematics, social and historical context.

202. History of Literary Theory (4) III. Schein
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Study of classical theoretical works from the Greeks to the late 19th century, with emphasis on these works' treatment of such topics as textuality, representation, genre, meaning, structure, style, allegory, and canonicity.

210. Topics and Themes in Comparative Literature (4) I, II. III. Lokke, Murav, Torrance
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative, interpretive study of the treatment of specific topics and themes in literary works from various periods, societies, and cultures, in light of these works' historical and sociocultural contexts. May be repeated for credit when topic differs.

***215. Forms of the Spiritual Quest** (4) III. Torrance
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor; knowledge of at least one foreign language. An exploration, culminating in a research paper, of changing forms of the quest for transcendence in different cultures, mainly in major works of Western literature, but also in other traditions and from the perspectives of other disciplines.

220. Literary Genres (4) II. Finney
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative literature of major works in a particular genre from various linguistic, national, and cultural traditions, with particular attention to historical developments within the genre and to genre theory. May be repeated for credit when topic differs.

250A. Research in Comparative Literature (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: course 200. Individually guided research, under the supervision of a faculty member, in a comparative topic culminating in a term paper. Required of M.A. and Ph.D. candidates.

250B. Research in Comparative Study of Author, Period, or Genre (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: courses 200 and 201. Individually guided research, under the supervision of a faculty member, in the specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of Ph.D. candidates.

250C. Basic Research for the Dissertation (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: courses 200 and 201. Individually guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.

255. Colloquium (2) I, II, III. The Staff
Lecture/discussion—2 hours. Prerequisite: graduate standing. Oral presentation and critique of research papers; discussion of current problems in teaching and research in Comparative Literature. May be repeated for credit. (S/U grading only.)

298. Directed Group Study (1-5) I, II, III
Prerequisite: graduate standing. (S/U grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Director in charge)
(S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12) I, II, III.
(S/U grading only.)

Professional Courses

390. Teaching Comparative Literature in College (3) I. Allosso
Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with specific application to the introductory courses 1, 2, and 3, in relation to major cultural and social developments. Discussion also of ways to teach analytical writing. (S/U grading only.)

392. Teaching Internship in Comparative Literature (1) I,II, III. Allosso
Discussion—1 hour. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (S/U grading only.)

Comparative Literature (A Graduate Group)

Manfred Kusch, Ph.D., Chairperson of the Group, (916-752-2239)

Group Office, 922 Sproul Hall (916-752-2239)

Faculty. The interdisciplinary faculty come from Comparative Literature, French, Italian, German, Russian, Spanish, and English.

Graduate Study. The Comparative Literature Program offers the M.A. and Ph.D. degrees with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the M.A. combine study of Comparative Literature with study of two literatures (one of which may be English or American) in the original languages. Ph.D. candidates, in addition to further research of a comparative nature, study three literatures (one of which may be English and/or American) in the original languages, acquiring an extensive knowledge of the overall development of one. Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as lyric poetry, epic, drama, or the novel; or any other special emphasis approved by the Graduate Adviser.

Preparation. For admission to the Program, M.A. candidates should have an undergraduate major in literature and reading ability in one foreign language. Ph.D. candidates should have an undergraduate major in literature and reading ability in two foreign languages. The Group requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

Graduate Adviser. K. Lokke *(Comparative Literature, English).*

Comparative Pathology (A Graduate Group)

Dennis W. Wilson, D.V.M., Ph.D., Chairperson of the Group

Group Office, 1042 Haring Hall (916-752-2657)

Graduate Study. The Graduate Group in Comparative Pathology offers the M.S. and Ph.D. degrees for graduate study in disciplines concerned with disease processes. The focus of the Group is on the study of the causes and nature of disease processes in animals and humans. Major emphasis is on the mechanisms responsible for the development of diseases at the organismal, cellular or subcellular level. To this study is brought a wide array of scientific knowledge so that students with divergent interests can be accommodated in programs designed for individual needs.

This program is primarily for students who have a professional medical degree, i.e., D.V.M., M.D., D.D.S. Students without a professional degree will not be considered unless they have an especially strong background in basic biomedical sciences.

Beyond core courses selected from disciplines such as anatomy, bacteriology, genetics, immunology, parasitology, pathology, physiology, and virology, course programs are intentionally flexible.

Graduate Adviser. J. G. Zinkl *(Pathology, Microbiology and Immunology),* D.H. Hinton *(Anatomy, Physiology and Cell Biology),* R.B. Le Febvre *(Pathology, Microbiology and Immunology),* K.M. Lam *(Population Health and Reproduction),* S.M. Stover *(Anatomy, Phsyiology, and Cell Biology).*

Computer Science

See Computer Science (below); Computer Science (A Graduate Group); Engineering: Computer Science; and Engineering: Electrical and Computer Engineering

Computer Science

(College of Letters and Science)

Charles U. Martel, Ph.D., Chairperson of the Department

Ronald A. Olsson, Ph.D., Vice Chairperson of the Department

Department Office, 2063 Engineering II (916-752-7004)
World Wide Web: http://www.cs.ucdavis.edu

Faculty. For complete faculty listing, please see Engineering: Computer Science.

The Major Program

The computer science major prepares students for careers involving the design of computer systems and their application to science, industry, and management.

The Program. Students taking this major receive solid grounding in fundamentals of computer languages, operating systems, and the formal mathematical tools required to use the computer in solving complex tasks. Emphasis in the major is on software, although introductory architecture is included. For students interested in the engineering aspects of computer science, see Engineering: Computer Science.

Career Alternatives. The computer science program prepares students for advanced work in computer science or in other disciplines requiring advanced knowledge of the use of computers.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 48-49
Computer Science Engineering 30 or 35, 40 8
Computer Science Engineering 50 4
Mathematics 21A-21B-21C, 22A-22B 18
Statistics 32 3
One series from the following four 15-16
(a) Chemistry 2A-2B-2C
(b) Chemistry 2A-2B and Biological Sciences 1A
(c) Chemistry 2AH-2BH-2CH
(d) Physics 9A-9B-9C and Mathematics 21D

Depth Subject Matter 53-55
Computer science, Computer Science Engineering 100, 110, 120, 122A, 140A; 150 or 151A (completion of only 150 or 151A will satisfy the core requirement, but not a computer science elective simultaneously); 154A-154B.....29
Computer science electives.....14
Minimum of 14 units from Computer Science Engineering 122B, 140B, 142, 150, 151A (completion of only 150 or 151A will satisfy the core requirement, but not a computer science elective simultaneously), 142, 151B, 152A, 152B, 153, 158, 160, 163, 165A, 165B, 168, 170, 172, 175, 177, 178, combined maximum of 3 units from approved 192 and 199 courses, Electrical and Computer Engineering 180A, 180B, Mathematics 160, 164 (completion of Mathematics 160 and/or 164 will satisfy either a computer science elective or a mathematics elective, but not both requirements simultaneously).
Mathematics 108; one course from Mathematics 115A, 115B, 115C, 125, 127A, 127B, 127C, 131 (or Statistics 131A), 141, 145, 147, 149A, 149B, 150A, 150B, 150C; one upper division Mathematics course numbered below 188 10-12

Total Units for the Major 101-103

Major Advisers. N. Matloff, R. Olsson, P. Rogaway, R.F. Walters.

Minor Program Requirements

UNITS

Computer Science.....24
Computer Science Engineering 50 4
Computer Science Engineering 110 4
Upper division Computer Science Engineering courses 16
Select from Computer Science Engineering 120, 122A, 122B, 140A, 140B, 142, 150, 151A, 151B, 152A, 152B, 153, 154A, 154B, 158, 160, 163, 165A, 165B, 168, 170, 172, 175, 177, 178, 189A-L, combined maximum of 3 units from approved 192 and 199 courses.

Graduate Study. See the Graduate Studies section in this catalog.

Computer Science (A Graduate Group)

Charles U. Martel, Ph.D., Chairperson of the Group

Group Office, 2063 Engineering II (Department of Computer Science)
(916-752-7004; gradinfo@cs.ucdavis.edu; http://www.cs.ucdavis.edu/graduate_info.html)

Faculty. Consists primarily of faculty members from the Departments of Computer Science, Electrical and Computer Engineering, Applied Science (Livermore), Mathematics, and the Graduate School of Management.

Graduate Study. The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. The varied nature of the faculty brings a wide variety of research interests to the program. Research strengths lie in algorithms, artificial intelligence, computer architecture, computer graphics, computer systems design, database systems, computer security, computer networks, fault tolerance, program specifications and verification, programming languages and compilers, parallel and distributed systems, operating systems, performance evaluation, robotics, scientific computation, and software engineering. Interdisciplinary research in computer science is encouraged.

Preparation. Normal preparation for the program is a bachelor's degree in either computer science or in a closely related field (such as electrical engineering or mathematics, with substantial course work in computer science). Applications are also considered from students with outstanding records in other disciplines. M.S. students may either complete a thesis or pass written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. candidates must pass preliminary written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. candidates must also pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

Graduate Advisers. N.S. Matloff, N. Max, B. Mukherjee.

Conservation Biology

See Ecology (A Graduate Group); Environmental Biology and Management; and Wildlife, Fish, and Conservation Biology

Consumer Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Division of Textiles and Clothing.

Major Programs and Graduate Study. The Consumer Food Science option under the Food Science major is a related program. For graduate study, see the Graduate Studies section in this catalog. See also Food Science and Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science (CNS)

Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising Office, 129 Everson Hall.

Lower Division Courses

92. Internship in Consumer Science (1-12) I, II, III. Rucker
Internship—3-36 hours. Prerequisite: consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

Upper Division Courses

100. Consumer Behavior (3) II. Rucker
Lecture—3 hours. Prerequisite: preparation in areas of psychology or sociology and economics recommended. Provides a set of behavioral concepts and theories useful in understanding consumer behavior on the part of the individual, business, and social organizations. Conceptual models to help guide and understand consumer research will be presented. GE credit: SocSci, Div, Wrt.

192. Internship in Consumer Science (1-12) I, II, III. Rucker
Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. Rucker (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Rucker (P/NP grading only.)

Graduate Course

299. Research (1-12) I, II, III. Rucker (S/U grading only.)

Critical Theory

————, Ph.D., Program Director (916-752-1038)

Program Office, 522 Sproul Hall, (916-752-5464)

Committee in Charge

Marc E. Blanchard, Agrégé de Lettres *(Comparative Literature, French)*
Elizabeth Constable, Ph.D. *(French)*
Joanne Diehl, Ph.D. *(English)*
Linda Egan, Ph.D., *(Spanish)*
M. Kay Flavell, Ph.D. *(Critical Theory)*
Smadar Lavie, Ph.D. *(Anthropology, Critical Theory)*

*Course not offered this academic year.

Janelle Reinelt, Ph.D. *(Dramatic Art)*
Irit Rogoff, Ph.D. *(Art, Critical Theory)*
Juliana Schiesari, Ph.D. *(Italian)*

Graduate Study. The program in Critical Theory offers study and research leading to the Ph.D. with a *designated emphasis* in Critical Theory. The program provides theoretical emphasis and interdisciplinary perspective to students already preparing for the Ph.D. in one of 13 participating departments (Anthropology, Comparative Literature, Dramatic Art, Education, English, French and Italian, German and Russian, History, Music, Philosophy, Psychology, Sociology, and Spanish). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consist of two core courses (200A, 200B) offered by the program in Critical Theory, two additional graduate courses (one of which may be Critical Theory 201), and a special examination.

Graduate Adviser. Consult Critical Theory Program Office.

Courses in Critical Theory (CRI)

Graduate Courses

200A. Approaches to Critical Theory (4) I, II, III. The Staff (Director in charge)
Seminar—3 hours; term paper. Prerequisite: graduate standing in a participating program. The problem of interpretation in 20th-century thought with a critical overview of various theoretical approaches (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis).

200B. Problems in Critical Theory (4) I, II, III. The Staff (Director in charge)
Seminar—3 hours; term paper. Prerequisite: course 200A with a grade of B+ or better. Focused study of a particular critical theoretical approach, school or perspective. Topics will vary. May be repeated for credit with consent of instructor when topic differs.

200C. Historical Studies in Critical Theory (4) I. The Staff
Seminar—3 hours; term paper. Critical analysis and discussion of pre-20th century theories of literary and cultural criticism. Topics will vary. May be repeated for credit with consent of instructor when topic differs.

201. Critical Theory Special Topics (4) I, II, III. The Staff (Director in charge)
Seminar—3 hours; term paper. Prerequisite: course 200A. Application of theoretical principles to one specific research topic. May be repeated for credit with consent of instructor when topic differs.

202. Visual Culture (4) II. Rogoff
Lecture/discussion—4 hours. Prerequisite: course 200A strongly recommended. Analysis of image production in the contemporary world (photography, film, television, advertising, etc.) and their effects on individual subjectivities and collective social identities.

298. Directed Group Study (1-5) I, II, III. The Staff
(Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff
(Chairperson in charge)
(S/U grading only.)

Crop Science and Management

(College of Agricultural and Environmental Sciences)

Faculty. See under Departments of Agronomy and Range Science; Agricultural and Resource Economics; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology.

Related Major Programs. The major relies on courses taught in conjunction with numerous other major programs, particularly Plant Biology, Agricultural Systems and Environment, and Agricultural and Resource Economics.

The Major Program

The Crop Science and Management major trains students in biological and natural sciences and economics as they apply to the production, protection, and maintenance of crop plants, and their quality following harvest.

The Program. Students majoring in crop science and management spend the first two years of study developing the scientific and general background necessary for upper division work. The science courses include chemistry, biology, botany, physics, and mathematics. Management courses include economics and accounting. General background is provided by courses in the social sciences/humanities (English, rhetoric, and the general education program).

At the upper division level, students take courses in areas supportive of crop science and farm management, such as entomology, weed science, water and soil science, plant pathology, nematology, plant physiology and agricultural economics. Students may specialize by electing courses pertinent to specific crop types (vegetables, fruits and nuts, small grains, or nursery crops).

Internships and Career Alternatives. This program prepares graduates for careers in farm management and various other technical and management positions in agricultural business and associated enterprises, such as banking and equipment and supply companies, as well as private, state and federal service in consulting and research. Graduates are also qualified to pursue graduate studies in sciences such as plant biology, horticulture, agronomy, agroecology, pest management, economics or business management. Internships are available in local companies involved in farm production and in extension work with farm advisers.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your adviser's approval. Course shown without a parentheses are required)

English Composition Requirement 7-8
See College Requirement

Preparatory Subject Matter 62-64
Biological Sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A, 2B, 8A, 8B) 16
Calculus (Mathematics 16A, 16B) 6
Physics (Physics 1A-1B, or 7A-7B) 6-8
Computer science (Agricultural Systems and Environment 21) 3
Economics (Economics 1A, 1B) 10
Statistics (Agricultural Systems and Environment 120, Statistics 13 or 102) 4
Field equipment operations (Applied Biological Technology 49) 2

Breadth/General Education 18-40
See General Education Requirement and consult your adviser

Depth Subject Matter 61
Crop and Soil Science Component 22
Plant Biology 111, 142, Soil Science 100, Hydrologic Science 110 or 124 14
In consultation with adviser select a minimum of 8 additional units from:
Agricultural Systems and Environment 110A, 110B, 110C, 110L, Environmental Horticulture 125, Plant Biology 173, 174, Viticulture and Enology 115, 116 8
Pest Management Component 16
Entomology 110, Nematology 100, Plant Biology 176, Plant Pathology 120
Economics and Business Management Component 23
Agricultural and Resource Economics 100A, 130, 140, Management 100 .. 16
In consultation with adviser select a minimum of 7 additional units from:
Agricultural and Resource Economics 100B, 112, 120, 131, 145, 147M, 150 or 157 7

Restricted Electives 12
In consultation with adviser select a minimum of 12 units from the following:
Agricultural Systems and Environment 101, 105, 107, 112, 118, 120, 121, 122, 150, 170A, 170B, 192, 194H, 195, Applied Biological Technology 52, 134, Entomology 119, 119L, 135, Environmental Horticulture 102, 105, 120, 125, 130, Plant Biology 111L, 112, 117, 121, 146, 152, 153, 154, 157, 158, 160, 171, 172, 172L, 175, 177, 196, Plant Pathology 125, Soil Science 109, Viticulture and Enology 101A, 101B, 101C, 110, 111, 118.

Unrestricted Electives 11-32
(Internship and Spanish Recommended)

Total units for the Major.....180

Major Adviser. T. DeJong.

Advising Center for the major is located in 152 Hunt Hall (916-752-1715).

Related Courses. See under Departments of Agronomy and Range Science, Agricultural and Resource Economics, Pomology, Plant Pathology, Vegetable Crops, and Viticulture and Enology.

Courses in Crop Science and Management (CSM)

Lower Division Courses

92. Internship in Crop Science and Management (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship in crop production, research or management. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

192. Internship in Crop Science and Management (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship off or on campus in crop production, research or management; or in a business, industry, or agency associated with these or other crop science enterprises. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Master Adviser in charge)
Independent study—3-15 hours. Prerequisite: senior standing, Crop Science and Management major, overall GPA of 3.25 or higher, and consent of Master Adviser. Two or three successive quarters of guided research on crop science and management related subject of special interest to the student. (P/NP grading only; deferred grading only, pending completion of thesis.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Dermatology

See Medicine, School of

Design

(College of Agricultural and Environmental Sciences)
JoAnn Stabb, M.A., Chairperson, Design Program
Department Office, 142 Walker Hall (916-752-6223)

Faculty

Richard Berteaux, B.Arch., M.S., Associate Professor
Dolph Gotelli, M.A., Professor
Patricia Harrison, M.Arch., Associate Professor
Janet Hethorn, Ph.D., Assistant Professor
Gyöngy Laky, M.A., Professor
Helge B. Olsen, Senior Lecturer
Susan Palmer, M.A., Lecturer
Kathleen L. Plummer, M.F.A., Lecturer
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor
Barbara Shawcroft, M.F.A., Professor
Kathryn Sylva, M.F.A., Assistant Professor
JoAnn C. Stabb, M.A., Senior Lecturer

Emeriti Faculty

Frances Butler, M.A., Professor Emerita
Katherine W. Rossbach, M.A., Professor Emerita

The Major Program

The design program offers a creative, challenging, and flexible approach to the study of design. The philosophy of the program encourages self-direction and independent thinking, not only in design work but also in planning the overall undergraduate education.

The Program. Fundamental courses, Design and Visual Culture, Fantasy Design, Design Drawing, Design Media, and Visual Use of Computers in Design, are required of all design majors. Beyond these, students take courses in their depth subject matter emphasizing their interests. Students select one of three areas of emphasis to focus undergraduate study: *Textile and Costume Design, Interior Architecture,* and *Visual Communication and Presentation.* These areas can also be combined into a fourth area of emphasis, *Comprehensive Design,* through an individualized study plan developed with a faculty adviser. The selected emphasis deteremines the required core of courses; all emphases are strongly complemented by classes in related design history. A more detailed explanation is available through the Design Advising Center, 152 Walker Hall.

Portfolio. Students will be required to keep a continuing portfolio of their creative work to be evaluated by faculty for the purposes of declaring the major, enrolling in overflow courses, and requesting independent study, internship, or other similar courses. Incoming first-year and transfer students with a strong background in art or design are encouraged to submit a portfolio to waive some of the preparatory studio courses.

Internships and Career Alternatives. As part of their preparation, design students are encouraged to supplement their education with internships in design firms, museums, art galleries, textile galleries, and in interior designers' and architects' offices. Design graduates go directly from this program into further graduate study, clothing and interior design and architectural firms, exhibit and display work in galleries and museums, and theatrical and textile companies. In addition, students have become entrepreneurs through freelance and commissioned work in many related areas.

B.S. Major Requirements:

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 20
Select one course from Art History 1A, 1B, 1C or 1D 4
Design 1, 14, 15, 16 16

Breadth/General Education 32
Sixteen units in natural science and 16 units in social sciences (to include satisfaction of General Education requirement) 32

Depth Subject Matter 56-57
Design 100 4
Design history, select from Design 140, 142A, 142B, 143, 144 12
Select one area of specialization (option) below 40-41

Interior Architecture option **.....41**
Architectural drawing, Design 21, 121 8
Materials and specifications, Design 138 ...2
Fundamentals of interior architecture, Design 134A-134B-134C 12
Advanced interior architecture, Design 180A-180B 8
Senior project, Design 180C 4
Senior project preparation and documenation, Design 193A-193B 3
One course from Design 135A, 135B, 136, 150 4

Textile and Costume Design option **.....40**
Lower division courses selected with adviser approval from Design 18, 23, 24, 77A, 77B 12
Upper division courses selected with adviser approval from Design 124, 125, 131, 132A, 132B, 132C, 160A, 160B, 170A, 170B, 177 28

Visual Communication and Presentation option **.....40**
Three courses from Design 13, 18, 21, 22 12
Visual presentation, Design 126A, 126B, 126C 12
Visual communication, Design 152A, 152B, 153 12
One course from Design 121, 132C, 160A, 160B, 170B 4

Comprehensive Design option **.....40**
Three-dimensional design, Design 18 4
Drafting and perspective, Design 21 4
Visual communication, Design 22 4
Soft product development, Design 77A 4
Choose two courses from each core set...24
(Must meet any required prerequisite)
Set 1: Design 134A, 134B, 134C, 135A, 135B, 136
Set 2: Design 124, 125, 132A, 132B, 160A, 160B, 170A, 170B
Set 3: Design 126A, 126B, 126C, 152A, 152B, 153

Restricted Electives 28
Two courses from American Studies 1A, Anthropology 2, Geology 1, Psychology 1, Sociology 1, 25, Rhetoric and Communication 1, 3 8-9
Courses selected from the list of Restricted Electives with approval of adviser...21-22

Unrestricted Electives 35-44

Total Units for the Degree.....180

Additional Requirement
Development of a course of study, in consultation with an adviser, upon completion of 90 units or prior to transferring into the major.

Major Adviser. R. Berteaux.

Graduate Study. The graduate program in Textile Arts and Costume Design leading to the Master of Fine Arts degree offers students opportunities for independent, creative, innovative interdisciplinary study combining design with anthropology, critical theory, consumer issues, art, engineering, the sciences and theater. Faculty work closely with students to build individual programs based upon a student's specialized goals and interests in textile and costume design. Study in new technologies and experimental approaches are encouraged. Areas of emphasis include constructed textiles (off loom and woven), surface design, computer-integrated textile design, and functional, ethnographic, and aesthetic costumes. The Textile and Costume Study Collection, which houses over 8,500 artifacts, is a valuable resource in enriching studies emphasizing multi-cultural experession. For information about specific requirements, please contact the Advising Center at 916-752-1165.

Graduate Adviser. Please contact department at 916-752-6223.

Courses in Design (DES)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 152 Walker Hall (916-752-1165).

Lower Division Courses

1. Design and Visual Culture (4) I. Hethorn
Lecture—4 hours. Introduction to design awareness; role of designer in contemporary culture; emphasis on visual literacy and perception, creative problem solving, and design vocabulary. GE credit: ArtHum, Wrt.

13. Photographic Media Studio (4) I, II, III. Sylva in charge
Studio—8 hours. Prerequisite: course 1; course 3 concurrently; priority enrollment to Design majors. Film and videotape for description, simulation, analytical research, and design development.

14. Design Drawing (4) I. Berteaux
Studio—8 hours. Priority given to Design majors. Students with a background in drawing or Advanced Placement Art Studio units are encouraged to submit a portfolio for review to waive this course. Develop freehand drawing skills to graphically communicate ideas and form. Basic skills in objective observation and representation. Color as a transition from value. Range of media used. Not open for credit to students who have taken course 11.

15. Design Media (4) II. The Staff (Chairperson in charge)
Lecture—2 hours; studio—4 hours. Priority given to Design majors. Understand color, composition and form as ways of communicating design concepts and content. Media and photography as tools for all design students: color theory and mixing, variety of materials and media, introduction to the camera. Not open for credit to students who have taken course 12.

16. Visual Use of Computers in Design (4) III. Sylva in charge
Lecture—2 hours; studio—6 hours. Prerequisite: courses 14, 15. Introduction to the computer as a visual design tool. Use of the Macintosh platform and exploration of specific software used in design. Practical instruction combined with theoretical perspective to investigate the impact of visual computing on the design process.

18. Three-Dimensional Design (4) I. Shawcroft
Studio—8 hours. Principles of three-dimensional design through creative experimentation in a variety of media. Exploration of structural, perceptual, and spatial properties of form.

21. Drafting and Perspective (4) I. Olsen in charge
Studio—8 hours. Prerequisite: course in drawing recommended. Creation of three-dimensional designs on two-dimensional surfaces.

22. Visual Communication: Image and Type (4) I, II. Sylva
Studio—8 hours. Prerequisite: courses 13, 14, 15, 16 or consent of instructor. Priority given to Design majors. Presentation of the fundamentals of design. Specific focus will be on gestalt principles of design, balance and visual hierarchy; integration of text and image on the two-dimensional page; and introduction to typographic exploration using Macintosh platform.

23. Personal Adornment (4) I. The Staff (Stabb in charge)
Studio—8 hours; field trip. Exploration of the human image altered through ornament and its relation to the human structure.

***24. Hand Constructed Textiles** (4) I. Shawcroft
Studio—8 hours; one or two field trips. Prerequisite: courses 14, 15. Contemporary approach to textile techniques of construction such as netting, plaiting, knotting and basketry.

*Course not offered this academic year.

77A. Soft Product Development (4) II. Hethorn
Studio—8 hours. Prerequisite: courses 14, 15 recommended. Basic theories and principles of soft product development from two-dimensional shapes to three-dimensional forms. Approaches include flat pattern, draping, as well as processes of joining and building. Structural development of clothing in relation to bodies is emphasized.

77B. Soft Product Development (4) III. Hethorn in charge
Studio—8 hours. Prerequisite: course 77A. Study and practice of designing clothing for the human body through pattern development and structural joining sequences. Problems emphasize advanced theories and principles of soft product development.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Stabb in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Design, Creativity, and Fantasy (4) III. Gotelli
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. To explore and develop personal creativity and imagination utilizing fantasy as a methodology for design. Examples of fantasy as found in the designed environment. Use of fantasy as problem solving tool in design. (Former course 3.) GE credit: ArtHum, Wrt.

121. Design Delineation (4) II. Olsen in charge
Studio—8 hours; field trip. Prerequisite: courses 14, 15, and 21. Exploration of the process of delineation, including principles of perspective drawing, rapid visualization techniques (the quick sketch), rendering, and graphic presentation methods.

124. Textile Structures (4) II. Shawcroft
Studio—8 hours; field trip. Prerequisite: course 24. Art and science of hand building structures in flexible materials. Studio projects in experimental two- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interiors.

125. Textiles in the Landscape (4) III. Shawcroft
Studio—8 hours. Prerequisite: courses 24 and 124 or consent of instructor. Structuring organic and mathematical forms in textiles, working with the symbiotic relationship of these textiles and their immediate placement in the outdoor landscape.

126A. Visual Presentation: Visual Merchandising (4) I. Gotelli
Studio—8 hours; field trips. Prerequisite: courses 14, 15 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on visual merchandising.

126B. Visual Presentation: Exhibition Design (4) II. Gotelli
Studio—8 hours; field trips. Prerequisite: course 14, 15 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on the museum and gallery environment.

126C. Visual Presentation: Installation and Design (4) III. Gotelli
Studio—8 hours; field trips. Prerequisite: course 126A and 126B or consent of instructor. Advanced principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on self-expression and alternative exhibition spaces.

131. Layered Textiles and Costumes (4) III. Stabb
Studio—8 hours; field trip required. Prerequisite: courses 14, 15, 23, and 24 recommended. Exploration of surface embellishments and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of handmade textiles/costumes and individual expression. Topics included mola and applique, piecing and quilting, beadwork, embroidery, and dimensional surfaces. Offered in alternate years.

132A. Loom-Constructed Textile Design (4) I. The Staff
Studio—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic drafting, basic weaves and their derivatives explored in context of original color effects and yarn combinations.

132B. Loom-Constructed Textile Design (4) II. The Staff
Studio—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

132C. Computer-Aided Textile Design (4) III. The Staff
Studio—8 hours. Prerequisite: course 132B. Microcomputer applications to the structure, design, and weaving of fabrics, emphasizing advanced compositions, drafting, and plotting of multi-dimensional, original weave structures.

134A. Introduction to Interior Architecture (4) I. Olsen
Studio—8 hours; required field trips. Prerequisite: courses 14, 15, 21 and upper division standing. The design process through simple space planning problems focused on residential and small commercial spaces.

134B. Introduction to Interior Architecture (4) II. Berteaux
Studio—8 hours; required field trips. Prerequisite: course 134A. Problems in interior architecture emphasizing environmentally conscious design concepts and issues. Includes thermal comfort, issues in sustainable design, reduction of waste, "green materials," and resource recycling.

134C. Introduction to Interior Architecture (4) III. Harrison
Studio—8 hours; required field trips. Prerequisite: course 134B. Focus on technical environments such as laboratories, medical facilities, child care facilities, school facilities, computer installations. Includes instruction in model making and presentations in the form of models or photographic presentations derived from computer modeling.

135A. Furniture Design (4) II. Olsen
Studio—8 hours; required field trip. Prerequisite: course 21; course 134A recommended. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, cultural and historic expression, and structural and aesthetic qualities. Process includes research, drawings, and construction of scale models.

135B. Furniture Design (4) III. Olsen in charge
Studio—8 hours; required field trip. Prerequisite: course 135A or consent of instructor. Design and construction of full size prototype furniture based on preliminary work completed in course 135A. Material technology, construction methods, and finishes discussed. Process includes development of shop drawings and furniture construction.

***136. Recording Historic Structures** (4) III. Berteaux
Studio—8 hours; field trip required. Prerequisite: courses 14, 15, and 21 or the equivalent. A studio course of individual and group projects that introduces students to historic preservation. A major component of the course is on-site study of a historic building and the production of measured drawings.

***138. Materials and Specifications for Interior Architecture** (2) II. Harrison
Lecture—2 hours; Field trips required. Prerequisite: course 21; course 134A recommended. Introduction to construction and finish materials used in interior architecture. Supplementary course for studio courses 134A, 134B, 134C and 180A, 180B, 180C.

140. History of Design (4) II. The Staff (Stabb in charge)
Lecture—4 hours. Prerequisite: Art History 1A or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological changes, development of design terminology, consumer goods, hand workmanship, and industrial design. GE credit: ArtHum, Wrt.

142A. World Textiles: Far East and Pacific (4) II. Rivers
Lecture—4 hours, field trip. Prerequisite: courses 132A, 132B, 160A, or 170A (concurrently) highly recommended: course 1, Art History 1A, 1B, or 1C also recommended. Textile arts of Japan, China, Africa, India, Oceania, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of textiles from these cultures. GE credit: ArtHum, Wrt.

142B. World Textiles: Middle East, Europe and the Americas (4) III. The Staff
Lecture—4 hours; two field trips. Prerequisite: course 1; a studio class highly recommended: course 24, 124, 131, 132A, 132B, 160A-160B-160C or 170A-170B-170C (concurrently). Study of concepts and methods significant in the historical, social, esthetic and stylistic development of the textile arts. GE credit: ArtHum, Wrt.

143. History of Costume Design (4) I. The Staff (Stabb in charge)
Lecture—4 hours; field trip. Prerequisite: Art History 1A or the equivalent; background in art or design history recommended. History of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects. GE credit: ArtHum, Wrt.

144. History of Interior Design (4) III. Plummer
Lecture—4 hours. Prerequisite: course 140 and Art 1C or the equivalent. History of interior design in Europe and America from the classical period to modern times. Emphasis on the dwelling in its cultural setting and the development of the theory of modern interior design. GE credit: ArtHum, Wrt.

150. Computer-Assisted Drawing for Designers (4) II, III. The Staff
Studio—8 hours. Prerequisite: courses 21, 121. Computer-assisted drafting for interior architecture and design.

152A. Visual Communication: Graphic Design Production (4) I. Sylva
Studio—8 hours. Prerequisite: course 22 or consent of instructor. Priority given to Design majors. Focus on the understanding of symbolism and representation as essential components to the development of effective logos and identity systems. Emphasis on the need to incorporate these design strategies within the context of computer-generated prepress limitations. Not open for credit to students who have taken course 25.

152B. Visual Communication: Message Campaign Design (4) III. Sylva
Studio—8 hours. Prerequisite: course 152A or consent of instructor. Priority given to Design majors. By analyzing and utilizing strategies used in advertising, this class explores the power of visual media to change public opinion on issues of social concern and human rights. Visual designs will be created on Macintosh platforms. Not open for credit to students who have taken course 133A.

153. Visual Communication: Internet and Interactive Design (4) II. Sylva
Studio—8 hours. Prerequisite: course 22 or consent of instructor; course 152B highly recommended. Priority given to Design majors. Introduction to computer-based interactive design for World Wide Web, Intranet systems, CD-ROM, or kiosks. Emphasis in development of strategies for content development; visual cohesiveness between content and interface design; and graphic production techniques using Macintosh platform. Not open for credit to students who have taken course 133B.

160A. Textile Design: Patterning and Resists (4) II. Rivers
Studio—8 hours; required field trip. Prerequisite: courses 1, 14, 15 or the equivalent. Open to senior majors in Design and Textiles and Clothing. Exploration of the design, dyeing and patterning of hand-printed textiles; emphasis on the unique qualities of the individual producer. Techniques include tie-dye, direct dyeing (with fiber-reactive dyes and indigo) and batik resists.

160B. Textile Design: Screen Printing and Advanced Technique (4) III. Rivers
Studio—8 hours; required field trip. Prerequisite: course 160A. Open to senior majors in Design and Textiles and Clothing. Exploration of the design, dyeing and patterning of hand-printed textiles; emphasis on the unique quality of the individual producer. Techniques include silk screen printing, photo silkscreen, and advanced dyeing processes.

170A. Costume Design (4) I. Stabb
Studio—8 hours; required field trip. Prerequisite: courses 1, 14, 15, 77B (or the equivalent); course 142A taken concurrently recommended. Open to Design and Textiles and Clothing majors. Exploration of costume design as an expression of contemporary and projected individual image. Emphasis on one-of-a-kind garments in relationship to surface design and archetypal forms.

170B. Apparel Design (4) II. Stabb
Studio—8 hours; required field trip. Prerequisite: courses 77B, 170A. Exploration of apparel design processes for industry within the social and physical context. Emphasis on two-dimensional conceptualization of ideas utilizing commercial textiles for ready-to-wear.

177. Apparel Design for Consumer Cultures (4) III. Hethorn
Studio—8 hours. Prerequisite: course 170B. Principles and processes of designing apparel for various user groups. The relationship among clothing, the body, and the environment is addressed in meeting functional and aesthetic concerns.

180A. Advanced Interior Architecture (4) I. Harrison
Studio—8 hours; field trip. Prerequisite: course 134C and senior standing. Advanced problems in interior architectural design emphasizing re-use of existing buildings. Focus is on commercial and retail environments, code requirements, color and lighting.

180B. Advanced Interior Architecture (4) II. Harrison
Studio—8 hours; field trip. Prerequisite: course 180A. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments.

180C. Senior Project in Interior Architecture (4) III. Berteaux
Studio—8 hours. Prerequisite: course 180B, 193A; course 193B concurrently. A comprehensive design project defined and carried out individually by each student as a senior project, working from a detailed program developed winter quarter of a subject in interior architecture of special interest to the student.

***190. Proseminar** (1) II, III.
Seminar—1 hour. Prerequisite: design major or consent of instructor. Philosophies of design explored through discussion and presentation of research results. May be repeated three times for credit. (P/NP grading only.)

191A-D. Workshops in Design (4-12) I, II, III. The Staff (Stabb in charge)
Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 14, 15; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: **(A)** Costume; **(B)** Environment; **(C)** Graphics; **(D)** Textiles. Credit limited to 12 units in one section or a combination of sections. Letter grading by contract.

192. Internship (1-6) I, II, III summer. The Staff (Stabb in charge)
Internship—3–18 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in areas of design including environmental, costume, textile, museum, display and interior design. Enrollment limited to 3 units per quarter or 6 units per summer session. (P/NP grading only.)

193A. Research for Senior Project in Interior Architecture (2) II. Berteaux
Lecture/discussion—2 hours. Prerequisite: course 180A; course 180B concurrently. Problem-focused research for senior students in interior architecture. Selection and research of a topic for a senior project in course 180C and the development of a preliminary program for the selected project. (P/NP grading only.)

193B. Senior Project Documentation (1) III. Berteaux
Lecture/discussion—1 hour. Prerequisite: course 193A, 180B; course 180C concurrently. Revision and completion of research begun in course 193A and the documentation of the completed senior project in course 180C. Documentation to be done on the computer and produced in tabloid-sized booklet. (P/NP grading only.)

197T. Tutoring in Design (1-5) I, II, III. The Staff (Stabb in charge)
Discussion—3-15 hours. Prerequisite: upper division standing and consent of instructor. Leading of small discussion groups or studio meetings affiliated with one of the department's regular courses. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Stabb in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study of Advanced Undergraduates (1-5) I, II, III. The Staff (Stabb in charge)
(P/NP grading only.)

Graduate Courses

221. Experimental Approaches to Textile and Costume Design Media and Methods (4) I. The Staff
Lecture/discussion—2 hours; seminar—1 hour; term paper required. Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. Covers perspectives on theoretical and aesthetic issues such as methodology in historical, contemporary and ethnographic fiber/fabric media. Students apply theories to their creative explorations for presentation and discussion.

***222. Seminar in Costume and Textile Design Criticism** (4) II. The Staff
Seminar—2 hours; discussion—1 hour; variable—1 hour. Prerequisite: course 221, graduate standing in Textile Arts and Costume Design or consent of instructor. An open forum which addresses criticism and communication in relation to creative work in textile arts and costume design through seminar, readings, field trips and discussion.

224. Seminar in Textile and Costume Design Research (4) I, II, III. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 222; to be taken concurrently with course 142A (fall), 142B (spring) or 143 (winter) with separate discussion section; graduate standing in Textile Arts and Costume Design or consent of instructor. Required of first-year students. Students utilize existing historical and ethnographic materials as a point of departure for creative work through research and examination of textile/costume specimens with oral and written presentation of findings. May be repeated for credit.

290. Seminar in Design (4) II, III. The Staff
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit.

292. Practicum in Textile Arts/Costume Design (1-12) I, II, III. The Staff
Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. Interaction with a working professional in the student's field of interest to apply theories and concepts to working practice. (S/U grading only.)

298. Directed Group Study for Graduate Students (1-5) I, II, III. The Staff (Rivers in charge)
Studio. Prerequisite: consent of instructor. (S/U grading only.)

299. Individual Focused Study (1-12) III. The Staff
Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. Advanced study in studio practice on independent projects with faculty consultation. May be repeated for credit.

299D. Project Concentration (1-12) I, II, III. The Staff
Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. A minimum of 22 units must be taken in Project Concentration and Individual Focused Study. Student creates a body of original work at a professional level, with written and visual documentation of process and concepts underlying the project, culminating in public presentation. May be repeated for credit. (S/U grading only.)

*Course not offered this academic year.

Dietetics

(College of Agricultural and Environmental Sciences)

The Major Program

The dietetics major provides students with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, and management. This major fulfills the academic requirements for admission into a dietetics internship or the equivalent which must be completed before qualifying for registration as a dietitian.

The Program. The dietetics major takes the same basic core of nutrition classes as nutrition science majors, but in dietetics there is less emphasis on laboratory aspects of the science courses. Instead, dietetics majors take additional courses such as education, sociology, communication skills, and food service management to prepare for work with the public. Dietetics students spend the first two years completing preparatory course work in the basic biological sciences, along with several of the social sciences. In the final two years, students take courses in normal and clinical nutrition, food science, biochemistry, and management techniques.

Career Alternatives. The dietetics major qualifies students to apply for the American Dietetics Association "accredited internship," enabling them to become a Registered Dietitian, the professional credential necessary to work in a clinical setting. Once dietitians are registered, they generally seek employment in administrative, therapeutic, teaching, research, or public health/public service positions in clinics, hospitals, schools, or other similar institutions. There is a growing role for dietitians working in settings outside of the traditional hospital (for example, in state and federal nutrition programs, nutrition education, Peace Corps and Cooperative Extension work). Students who complete the undergraduate preparation in dietetics are also qualified to enter graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

Written/Oral.....8
Written expression (English 1 or 3) 4
Oral expression (Rhetoric and Communication 1) 4
(Above courses simultaneously satisfy College requirement.)

Preparatory Subject Matter 56-58
Biological sciences (Biological Sciences 1A, 1B).....10
Chemistry (Chemistry 2A, 2B, 8A, 8B).....16

Computer science (Agricultural Systems and Environment 21 or Computer Science Engineering 10 or 15) 3-4
Economic principles (Economics 1A or 1B)..5
Microbiology (Microbiology 102, 102L or Food Science and Technology 104, 140L).....6
Psychology (Psychology 1).....4
Social science theory (Sociology 1 or 3 or Anthropology 2.....4-5
Statistics (Statistics 13) 4

Breadth/General Education.....6-24
Satisfaction of General Education requirement

Depth Subject Matter 71
Agricultural and Resource Economics 112 ..4
Community and Regional Development 173 or Education 110.....4
Biological chemistry (Biological Sciences 102 and 103).....6
Food Science and Technology 100A, 100B, 101A, 101B 10
Food Service Management 120, 120L, 121, 122, 123 14
Nutrition 110, 111, 113, 116A, 116AL, 116B 116BL, 118, 190.....25
Physiology (Neurobiology, Physiology and Behavior 101, 101L).....7

Unrestricted Electives 20-48

Total Units for the Major 180

Major Adviser. A.J. Clifford *(Nutrition).*

Advising Center for the major is located in 1202E Meyer Hall (916-752-2512).

Graduate Study. See the Graduate Studies section in this catalog.

Dramatic Art

Programs in Dance

(College of Letters and Science)

Janelle Reinelt, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Art Building (916-752-0888)

Faculty

Sarah Pia Anderson, Professor
Bobbie J. Bolden, M.A. Lecturer
Roderick Ceballos, M.F.A., Assistant Professor
Jeffrey Hunt, M.F.A., Assistant Professor
Phyllis J. Kress, M.F.A., Lecturer
Janelle Reinelt, Ph.D., Professor
Barbara Sellers-Young, Ph.D., Associate Professor
Darrell F. Winn, M.A., Lecturer
William B. Worthen, Ph.D., Professor *(Dramatic Art, English)*

Emeriti Faculty

Ruby Cohn, Ph.D., Professor Emerita
Harry C. Johnson, M.A., Professor Emeritus
William E. Kleb, D.F.A., Professor Emeritus
Robert K. Sarlós, Ph.D., Professor Emeritus
Daniel E. Snyder, Professor Emeritus
Alan A. Stambusky, Ph.D., Professor Emeritus

The Major Program

The A.B. degree in Dramatic Art provides students with an appreciation for and understanding of performance and its role in culture and society and provides a strong foundation in all aspects of drama, theater, and dance performance and production. While this is not a pre-professional program with a high degree of specialization, students can build significant skills in specific areas as well as achieving the broad goals of the degree.

Productions and Facilities. Productions each year are separated into two "seasons." The University Theatre Season usually consists of five or six major productions of established plays and dance productions. The Studio Season consists of smaller productions of new student-written plays and established plays. Also included in the production program are occasional major presentations of an experimental works and many class-related projects.

Guest Artists. The Granada Visiting Artists Program brings distinguished professional British directors to the campus each year, teaching and directing in residence for a quarter. These working professional artists take the role of professor, interacting closely with students in the classroom and rehearsal halls and providing them excellent pre-professional experiences of theater practice.

Career Alternatives. The program enables students to pursue a variety of opportunities after graduation, including graduate education, public sector arts employment, advanced professional training programs, and, in some cases, professional work.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 26
Dramatic Art 20, 24, 25, 26 14
Dramatic Art 21A or 14.....4
Additional units to achieve a total of 26 lower division units chosen from Dramatic Art 21B, 40A, 40B, 41A, 41B, 98, 99, African American and African Studies 51 or courses in other departments with adviser's approval.

Depth Subject Matter 40
Dramatic Art 127A, 156A, 156B, 156C 16
Dramatic Art 127B, 160A 4
Two courses chosen from Dramatic Art 124B, 124C, 124D 8
Two courses chosen from Dramtic Art 150, 153, 154, 155, 159 8
A minimum of 4 elective units chosen from the following: Dramatic Art 121A, 121B, 122A, 122B, 124A, 124B, 124C, 124D, 125, 130, 140A, 140B, 143, 170, or courses in other departments with adviser's approval 4

Additional Requirements.....14
During the undergraduate career, majors are to participate in University Theatre Season and Studio productions. Participation must include work in three of the following four areas: acting/dance, design, studio (scenic, costume, lighting, painting, props, sound), directing/ playwriting/stage management. In addition, majors are expected to serve on a running crew a minimum of one quarter per academic year. Majors are also expected to attend theatre performances.

Total Units for the Major 80

Minor Program Requirements:

UNITS

Dramatic Art.....20
Dramatic Art 156A, 156B, 156C.....12
One of Dramatic Art 124B, 124C, 124D.....4 (Plus prerequisites)

Additional Requirements.....4
During the undergraduate career, minors are to participate in University Theatre Season and Studio productions. Participation must include work in two of the four areas required by the major. Minors are expected to attend theatre performances.

Transfer Students. As described above, all students completing a major in Dramatic Art must participate in dramatic productions, including work in at least three of the following four areas: acting/dance, design, studio (scenic, costume, lighting, painting, props, sound), directing/play writing/stage management. Such experience gained prior to transfer to UC Davis may count toward partial satisfaction of this requirement; transfer students should see the major adviser for an evaluation of your previous experience. While in residence at UC Davis, transfer students are required to participate in a minimum of five dramatic productions and that participation must include work in at least three of the four areas specified above.

Graduate Study. The Department of Dramatic Art offers programs of study and research leading to the M.F.A. (acting, design, directing, or play writing), and Ph.D. (theatre research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser. B. Sellers-Young.

Courses in Dramatic Art (DRA)

Lower Division Courses

1. Theatre, Performance and Culture (4) I, II, III. The Staff
Lecture/discussion—4 hours. Introductory investigation of the nature of all performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, dance, sports, political rallies and demonstrations, religious celebrations, civic pageants and "occasions." Investigation of the border between ritual and performance. GE credit: ArtHum, Div, Wrt.

10. Introduction to Acting (3) I, II, III. The Staff
Laboratory/discussion—4 hours; term paper. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art.

14. Introduction to Contemporary Dance (2) I, II, III. Bolden
Laboratory/discussion—4 hours. Introduction to basic movement skills used in contemporary dance. Focus on holistically preparing the body for dance. Basic techniques and terminology used in ballet, modern or jazz dance and short combinations emphasizing use of space, quality, and rhythm.

20. Introduction to Dramatic Art (4) I, III. The Staff
Lecture—3 hours; discussion—1 hour. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts. GE credit: ArtHum.

21A. Fundamentals of Acting (4) II. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.

21B. Fundamentals of Acting (4) III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on character analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.

24. Visual Aspects of Dramatic Art (4) III. Hunt
Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.

25. Technical Aspects of Dramatic Production (3) II. The Staff
Lecture—3 hours. Technical principles of dramatic production emphasizing the three areas of scenic, costume and lighting studios. Subjects covered include basic tools, materials and equipment, production practices; and the interdisciplinary and collaborative nature of dramatic production.

26. Performing Arts Production Management (3) I. Winn
Lecture—3 hours. Theoretical study of performing arts administration and backstage operations from

audition through performance. Techniques of scheduling, production management, stage management, technical direction, audience control, box office, promotion, safety, accommodations for persons with disabilities and emergency procedures.

30. Theatre Laboratory (1-5) I, II, III. The Staff
Prerequisite: course 25 or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.

40A. Beginning Modern Dance (2) I. Bolden
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Fundamentals of modern dance focusing primarily on the development of techniques and creative problem solving. Basic anatomy, dance terminology, and a general overview of modern dance history.

40B. Intermediate Modern Dance (2) II. Bolden
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Modern dance techniques. Basic anatomy, dance terminology, and a general overview of modern dance history.

41A. Beginning Jazz Dance (2) II. Bolden
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Introduction to the fundamentals of jazz dance, including warm-ups, dance techniques, and combinations. A small portion of the class time is devoted to basic anatomy, dance terminology, and a general overview of jazz dance history.

41B. Intermediate Jazz Dance (2) III. Bolden
Laboratory/discussion—4 hours. Prerequisite: course 41A. Warm-ups, dance techniques and combinations at the intermediate level. A small portion of the class time is devoted to basic anatomy, dance terminology and a general overview of jazz styles of historically significant jazz choreographers and leading contemporary jazz choreographers.

42A. Beginning Ballet (2) III. The Staff
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Introduction to the fundamentals of ballet, focusing on the development of technique through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history.

42B. Intermediate Ballet (2) I. The Staff
Laboratory/discussion—4 hours. Prerequisite: course 42A or consent of instructor. Barre and center work at the intermediate level. Development and refinement of technique will be achieved through proper alignment, rhythmic, and qualitative understanding. Anatomy, ballet terminology, and dance history.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

115. Advanced Study of Major Film Makers (4) III. The Staff
Lecture/discussion—3 hours; film viewing—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied.

121A. Advanced Acting: Mask, Myth, and Tragedy (4) I. The Staff
Lecture/laboratory—6 hours. Prerequisite: course 21B and consent of instructor. Theory and practice of acting focused on the performance skills necessary to enact verse plays. Specific concentration on language as vocal and physical metaphor. Offered in alternate years.

121B. Advanced Acting: Comedy from Farce to Manners (4) II. The Staff
Lecture/laboratory—6 hours. Prerequisite: courses 21B, 121A and consent of instructor. Theory and practice of acting in comic plays. Specific issues addressed will be comic characterization, physical mask, and timing. Offered in alternate years.

***122A. Advanced Acting: Realism** (4) I. The Staff
Lecture/laboratory—6 hours. Prerequisite: course 21B and consent of instructor. The issues of Stanislavski realism are explored through selected plays. Script analysis using improvisation and emotional scoring. Offered in alternate years.

***122B. Advanced Acting: Non-Realism** (4) II. The Staff
Lecture/laboratory—6 hours. Prerequisite: courses 21B, 122A and consent of instructor. Exploration of the acting techniques needed to perform a non-realistic script. Different avant-garde movements will be examined through performance of the scripts. Offered in alternate years.

***124A. Principles of Theatrical Design: Scenery** (4) I. J. Hunt
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction.

124B. Principles of Theatrical Design: Scenery (4) I. J. Hunt
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

124C. Principles of Theatrical Design: Lighting (4) III. Winn
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

124D. Principles of Theatrical Design: Costume (4) II. Kress
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.

125. Scenic Painting: Studio (4) II. Hunt
Lecture—2 hours; studio—3 hours; laboratory—3 hours. Prerequisite: upper division standing in Dramatic Art, Art Studio, or Design; or course 24 or 25, or consent of instructor. Scene painting techniques, practices and materials. Course satisfies production requirement in studio category. May be repeated once with consent of instructor. Offered in alternate years.

127A. Principles of Directing (4) I. Anderson
Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 21A, 26; two of 156A, 156B, 156C; or consent of instructor. The director's creative approach to the play and to its staging.

127B. Principles of Directing (4) II. Anderson
Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A and consent of instructor for non-majors. The director's creative approach to the actor.

***130. Approaches to Theatrical Design: Practice and Theory** (4) II. Hunt
Seminar—2 hours; studio—4 hours. Prerequisite: upper division standing in Dramatic Art, Art Studio or Design. Advanced scenic design study in specific areas including but not limited to: research, design styles and concepts, new materials and techniques, photography, projections, computer technology, spectacle and special effects, and alternative theatre forms and genres. Course satisfies Dramatic Art production requirement in Design. Offered in alternate years.

140A. Dance Composition I (3) II. Bolden
Lecture/laboratory—5 hours. Prerequisite: courses 40A, 41A, and 42A, or consent of instructor. Introduction to the craft of choreography. Students will compose phrases and present movement studies based on the elements of choreography: motivation, space, time, force/energy.

140B. Dance Composition II (3) III. Bolden
Lecture/laboratory—5 hours. Prerequisite: course 140A. Continuation of the study of choreography, focusing on the development of group choreography: duets, trios, quartets and group work, form, and accompaniment.

143. Dance and Movement Studio (1-4) I, II, III. Bolden
Laboratory/discussion—2-8 hours. Prerequisite: course 14 or consent of instructor. Special studies in dance and movement such as African, Balinese, Baroque, Chinese, European, and stage combat. Offered as needed for stage productions. May be repeated for credit for a total of 8 units.

150. American Theatre and Drama (4) II. The Staff
Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***153. The American Musical** (4) III. The Staff
Lecture—4 hours. History and development of the American Musical as a unique theatrical form. Offered in alternate years.

154. Asian Theatre and Drama: Contexts and Forms (4) II. Sellers-Young
Lecture/discussion—4 hours. Prerequisite: upper division standing. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance—the fusion of Asian and Western traditions. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

155. Representing Race in Performance (4) III. The Staff
Lecture—4 hours. Examination of how "race" is represented and performed in American culture. Course will feature different sub-headings such as "African American Theatre" or "Asian-Americans on Stage." May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***155A. African American Dance and Culture in the United States, Brazil and the Caribbean** (4) II. Bolden
Lecture/discussion—4 hours. A comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (Same course as African American and African Studies 155A.) Offered in alternate years.

156A. History of Theatre and Dance: Ancient to 1650 (4) I. The Staff
Lecture—4 hours. Overview of theatre and dance as it has come to be recognized in ancient societies through to 1650. Performance traditions studied include Greek, Indian, Aztec, Roman, Japanese (Noh), through the Renaissance. GE credit: ArtHum, Div, Wrt.

156B. History of Theatre and Dance: 1650-1900 (4) III. The Staff
Lecture—4 hours. Overview of theatre and dance between 1650 and 1900. Dance and theatre are related to the specific social and political organizations of court society in 17th and 18th century France, Germany and England, and to Japanese society. GE credit: ArtHum, Div, Wrt.

156C. History of Theatre and Dance: The Twentieth Century (4) II. The Staff
Lecture—4 hours. Overview of theatre and dance in the twentieth century. Although largely focused on Western theatrical practices, the relationship between East and West performance practices will be studied and contemporary Japanese theatre will be included. GE credit: ArtHum, Div, Wrt.

159. Contemporary Experimental Theatre and Drama (4) II. The Staff
Lecture—4 hours. Examination and evaluation of the "New Theatre." Course includes attending theatre events.

160A-160B. Principles of Playwriting (4-4) I-II. The Staff
Lecture/seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments; course 160A prerequisite for 160B or consent of instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays.

170. Media Theatre (3) I. Hunt
Lecture—1 hour; rehearsal—2 hours; performance—1 hour. Prerequisite: upper division standing in Dramatic Art, Music, Art Studio, Design, Computer Science, or Engineering: Computer Science, or consent of instructor. New media and application of theatre design and performance. Emphasis on collaborative process in relationship to integration of emerging technologies and formation of new theatrical works. Development of collaborative performance through lecture, demonstration, improvisation and experimentation. May be repeated once for credit.

180. Theatre Laboratory (1-5) I, II, III. The Staff
Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit.

192. Internship in Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division or graduate work in dramatic art; upper division course related to the project; consent of instructor and Department Chairperson. Internship outside the academic department enabling students to practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (3-3) I, II, III. The Staff
Independent study—9 hours. Prerequisite: qualification for Letters and Science Honors Program and admission to Dramatic Art Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Dramatic Art. (Deferred grading only, pending completion of sequence).

197T. Tutoring in Dramatic Art (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: upper division or graduate standing with major in dramatic art; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

***200. Methods and Materials in Theatre Research** (4) I. The Staff
Seminar—3 hours; term paper. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (2) I, II, III. The Staff
Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. May be repeated for credit.

212. Advanced Stage Movement (2) I, II, III. Sellers-Young
Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythmic movement patterns relating to acting problems in classic and modern plays. May be repeated for credit.

221. Special Problems in Advanced Acting (4) I, II, III. Granada Artist, The Staff
Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit.

***224A. Visual Problems in Theatre and Performance** (4) III. Hunt
Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to Dramatic Art, Art History, Art Studio, and Design majors. May be repeated for credit.

***224B. Advanced Principles and Theories of Theatrical Design** (4) II. Hunt
Seminar—3 hours; term paper. Selected problems in the design of stage scenery and costumes; practice in design. May be repeated for credit.

***224C. Advanced Principles and Theories of Theatrical Design** (4) III. The Staff
Seminar—3 hours; term paper. Design of a production for three different types of theatres: open stage, arena, and proscenium. May be repeated for credit.

***224D. Advanced Principles and Theories of Theatrical Costume Design** (4) III. Kress
Seminar—3 hours; research and design projects—30 hours (minimum) total. Prerequisite: course 124D or consent of instructor. Costume design projects emphasizing research, principles, and theories; the planning and presentation of costume renderings, detail accessory sketches, and scale drawings of patterns. Projects from classic theatre, musical comedy, ballet, and opera. Offered in alternate years.

***224E. Advanced Principles and Theories of Theatrical Lighting Design** (4) II. Winn
Seminar—3 hours; laboratory—2 hours. Prerequisite: course 124C, a scenic design course, and consent of instructor. Design concepts, script/score analysis, color, composition and style. Projects presented in studio atmosphere. Also included: renderings, written analyses, and drafted plots. Offered in alternate years.

***227. Seminar in Directing Theory: Realism** (4) III. Granada Artist
Seminar—3 hours; term project. Modern directing theory as it applies to theatrical realism; development of directorial concepts for productions of selected realistic plays; emphasis on textual analysis. Offered in alternate years.

***228. Seminar in Directing Theory: Non-Realism** (4) III. Granada Artist
Seminar—3 hours; term paper. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays—Greek to the present; emphasis on textual analysis. Offered in alternate years.

***229. Special Problems in Directing** (5) I, II, III. The Staff and Granada Artist
Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated for credit.

***230A-230B. Classic and Medieval Theatre** (4-4) II-III. The Staff
Seminar—3 hours; term paper. The theatre of Greece, Rome and Middle Ages; emphasis on relationship of dramas of the period to physical circumstances of production. Course 230A (may be taken separately) includes readings and discussion; 230B emphasizes research culminating in a substantial scholarly paper.

***235A-235B. Renaissance and Baroque Theatre** (4-4) II-III. The Staff
Seminar—3 hours; term paper. The theatre of Italy, Spain, England, and France, 1500-1660; emphasis on relationship of dramas of the period to physical circumstances of production. Course 235A (may be taken separately) includes readings and discussion; 235B emphasizes research culminating in a scholarly paper.

***240A-240B. Neoclassic and Romantic Theatre** (4-4) II-III. The Staff
Seminar—3 hours; term paper. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of dramas of the period to physical circumstances of production. Course 240A (may be taken separately) includes readings and discussion; 240B emphasizes research culminating in a scholarly paper.

***250. Modern Theatre** (4) II. The Staff
Seminar—3 hours; term paper. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Offered in alternate years.

***259. Topics in Contemporary Theatre and Performance** (4) I, II, III. Reinelt, Cohn and staff
Seminar—3 hours; term paper. Special topics designed to study in depth aspects of contemporary performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship (e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated five times for credit.

***260. Advanced Playwriting** (4) I, II, III. The Staff
Seminar—3 hours; term paper. Dramatic structure, character, and dialogue. Advanced projects in playwriting. May be repeated for credit.

***265A. Theory of Dramatic Art: Modes of Production** (4) II. The Staff
Seminar—3 hours; term paper. Introduces students to literature of theatrical practice, cultural and aesthetic theory, as related to practical stage performance. Offered in alternate years.

265B. Theory of Dramatic Art: Signification and the Body (4) III. Reinelt
Seminar—3 hours; term paper. Introduce students to analysis of the body in performance, drawing on theoretical models from various fields. Offered in alternate years.

265C. Theory of Dramatic Art: Technologies of Difference (4) I. The Staff
Seminar—3 hours; term paper. Introduce students to history, theory, practice of staging social and cultural difference. Offered in alternate years.

***265D. Theory of Dramatic Art** (4) II. The Staff
Seminar—3 hours; term paper. Theory and aesthetic principles of dramatic art as a fine art. Offered in alternate years. (Former course 265.)

280. Theatre Laboratory (1-12) I, II, III. The Staff
Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Individual Study (1-12) I, II, III, The Staff (Chairperson in charge)
(S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

413. Stage Make-up (1) II. The Staff
Lecture/laboratory—2 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

Earth Sciences

See Hydrologic Sciences (A Graduate Group); Hydrology; Environmental and Resource Sciences; Soil and Water Science; and Soil Science

East Asian Studies

(College of Letters and Science)

Michelle Yeh, Ph.D., Program Director

Program Office, 522 Sproul Hall (916-752-4995)

Faculty

Beverly Bossler, Ph.D., Associate Professor *(History)*
Robert Borgen, Ph.D. Professor *(Chinese and Japanese, History)*
Chia-ning Chang, Ph.D. Associate Professor *(Chinese and Japanese)*
Kyu Hyun Kim, Ph.D. Assistant Professor *(Chinese and Japanese, History)*
Whalen W. Lai, Ph.D. Professor *(Chinese and Japanese, Religious Studies)*
Ming-Cheng Lo, Ph.D. Assistant Professor *(Sociology)*
Susan Mann, Ph.D., Professor *(History)*
Don C. Price, Ph.D., Professor *(History)*
Barbara Sellers-Young, Ph.D., Associate Professor *(Dramatic Art)*
G. William Skinner, Ph.D. Professor *(Anthropology)*
Janet S. Smith, Ph.D., Professor *(Anthropology)*
Michelle Yeh, Ph.D., Professor *(Chinese and Japanese)*

Emeriti Faculty

Mary H. Fong, PhD., Professor Emerita
Donald Gibbs, Ph.D., Associate Professor Emeritus
Joyce K. Kallgren, Ph.D., Professor Emerita
Kwang-Ching Liu, Ph.D., Professor Emeritus
Benjamin Wallacker, Ph.D., Professor Emeritus

The Major Program

The East Asian studies major gives the student an understanding of East Asia (especially China and Japan) through interdisciplinary studies that combine sustained work in an East Asian language with courses on East Asian countries.

The Program. The program offers core courses in East Asian history, humanities, social sciences, and languages. After taking the core courses in conjunction with two years or more of either Chinese or Japanese language study, the student chooses additional courses focusing on a special field of interest, such as anthropology or history. Since six quarters of language work are required, students normally should apply to the East Asian studies program no later than their sophomore year.

Career Alternatives. The program provides preparation either for a career that involves working with East Asian affairs and people (e.g., journalism, business, government service, teaching, and counseling), or as preparation for graduate studies in the East Asian field.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 41-42
History 9A, 9B 8
One course from Art History 1D, Chinese 10, 11, Comparative Literature 53A, Japanese 10, 25, Religious Studies 70, 75.....3-4
Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2-3-4-5-6; Japanese 1-2-3-4-5-6).....30

Depth Subject Matter 36
Must include at least 8 units of core courses from *each* of the following three categories.

History:

History 191A, 191B, 191C, 191D, 191E, 191F; 194A-194B or 194B-194C

Social Science:

Anthropology 148A, 148B, 149A, 149B; Economics 171; *Geography 127; Political Science 148A, 148B; *Sociology 147

Humanities:

Art History 163A, 163B, 163C, 164; Chinese 104, 106, 107, 109, 131, 132; Japanese 101, 102, 103; Religious Studies 172

At least 12 additional units must be selected from the above courses, or from the following:

Anthropology 110, 112, 117, 119, 120, 122, 123, 124, 128; Chinese (any upper division course); Economics 115A, 115B, 116, 160A, 160B, 162; Geography 143; History 102G, 102H, 102N; Japanese (any upper division course); Linguistics 100; Political Science 127, 133, 138, 145, 148C; Sociology 118, 141, 170, 183. (Or other appropriate courses, including individual and group study courses (198, 199), as approved by the Committee in charge.)

Total Units for the Major 77-78

Recommended
Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison for a deeper understanding of America's relations with East Asia.

Minor Program Requirements:

Courses taken for the minor are expected to reflect a predominant interest in either China or Japan, but also to provide some exposure to the other of the two countries. All courses counting towards the East Asian Studies major, including individual and group study courses (198, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominantly with China, Japan, or both.

UNITS

East Asian Studies 22
History 9B and 18 upper division units, of which at least 12 must be in courses focusing on China; OR History 9A and 18 upper division units, of which at least 12 must be in courses focusing on Japan 22

Major Advisers. Consult Program Director.

Courses in East Asian Studies. The following courses count toward the major and are open to students throughout the campus. Refer to departmental listings for course descriptions.

Anthropology
148A. Traditional Chinese Society
148B. Family, Gender, and Population in Contemporary China
149A. Traditional Japanese Society
149B. Contemporary Japanese Society

Art History
1D. Asian Art
163A. Chinese Art
163B. Chinese Painting
163C. Painting in the People's Republic of China
164. The Arts of Japan

Chinese
All courses.

Comparative Literature
53A. Literature of China and Japan
153. Forms of Asian Literature

Economics
171. Economy of East Asia

Geography
*127. Contemporary East Asia

History
9A. History of East Asian Civilization (China)
9B. History of East Asian Civilization (Japan)
102G. Undergraduate Proseminar: China to 1800
102H. Undergraduate Proseminar: China since 1800
102N. Undergraduate Proseminar: Japan
191A. Classical China
191B. High Imperial China
191C. Late Imperial China
191D. Nineteenth-Century China
191E. The Chinese Revolution
191F. History of the People's Republic of China, 1949 to the Present
194A. Aristocratic and Feudal Japan
194B. Early Modern Japan
194C. Modern Japan
194D. Business and Labor in Modern Japan
194E. Education and Technology in Modern Japan

Japanese
All courses.

Linguistics
*100. Languages of Eastern Asia

Political Science
133. The American Role in East Asia
138. International Relations: East Asia
148A. Government and Politics in East Asia: China
148B. Government and Politics in East Asia: Pacific Rim
148C. Government and Politics in East Asia: Southeast Asia

Religious Studies
70. Introduction to Buddhism
75. Chinese Philosophy: An Introduction
172. Ch'an (Zen) Buddhism

Sociology
*147. Sociological Perspectives on East Asia

Courses in East Asian Studies (EAS)

Upper Division Courses

***113. Cinema and Society in China** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: one course from History 190C, 193, or consent of instructor. Knowledge of Chinese not required. Viewing and analysis of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic technique, social values and film topics from 1930s to today. Not open for credit to students who have completed Chinese 113. GE credit: ArtHum, Div, Wrt.

192. East Asian Studies Internship (1-12) I, II, III. The Staff
Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.)

196A-196B. Honors Seminar (4-4) I-II. The Staff
Seminar—2 hours; conference—2 hours. Prerequisite: a GPA of 3.5 in the major, senior standing, and consent of instructor. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

*Course not offered this academic year.

Ecology (A Graduate Group)

J. H. Lieth, Ph.D., Chairperson of the Group

Group Office, 2148 Wickson Hall (916-752-6752)

Faculty. The Group includes faculty from 26 departments in five schools and colleges, and the Bodega Marine Laboratory.

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in several areas of specialization within the spectrum of ecology.

The Ecology program is one of the most diverse on the Davis campus. In order to accommodate varied student interests, the Group depends on close consultation between students and faculty for program development. Several curricular plans are now available in the following areas of emphasis: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy analysis, human ecology, integrative ecology, physiological ecology, and restoration ecology. For further details, contact the group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed two courses each in introductory biology, general chemistry and physics; one course each in calculus, ecology, statistics, and evolution are also required. Applicants in human ecology areas may substitute quantitative social science courses for up to two courses of chemistry or physics. Each of the three broad areas requires certain advanced preparation appropriate to the option. Details may be found in the Group Announcement.

Graduate Advisers. J.H. Leith, K.M. Scow.

Courses in Ecology (ECL)

Graduate Courses

200A. Principles and Application of Ecological Theory (4) I. Foin
Lecture—3 hours; discussion—1 hour. Prerequisite: first course in ecology; Statistics 102; Mathematics 16A, 16B. Critical evaluation of ecological theory and applications to ecological management. Historical development of ecological theory is emphasized. Critical evaluation of ecological principles pertaining to the structure and dynamic properties of ecological systems, their organization and evolution.

200B. Principles and Application of Ecological Theory (4) II. Foin
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A. Continuation of course 200A. Critical evaluation of theory and application in the areas of ecological adaptation and system plasticity, spatial and temporal scales, ecological energetics, and system dynamics. Synthesis of ecological theory into testable principles.

201. Ecosystems and Landscape Ecology (4) III. Ustin
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A and 200B. Overview of ecosystem and landscape principles (structure, energy, nutrient flow, species diversity, landscape heterogeneity, change and stability), building on ecological principles and theory. Introduction to analysis tools (remote sensing, geographic information systems, modeling) applied to landscape systems.

203. Physiological Ecology (3) III. Cech
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Studies 100; Neurobiology, Physiology and Behavior 110 or Plant Biology 111 or Environmental Studies 129; elementary calculus. A comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of each animal group.

***204. Population and Community Ecology** (4) I. E. Caswell-Chen
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Evolution and Ecology 101, Mathematics 21A-21B or consent of instructor; Mathematics 22B recommended. Review of major concepts of population ecology and community ecology, with emphasis on the rationale of theory and use of theory as applied in the ecology of natural and managed systems.

205. Community Ecology (4) I. Karban, Lawler
Lecture—2 hours; discussion—2 hours. Prerequisite: Environmental Studies 100, Evolution and Ecology 101, or Plant Biology 117. Introduction to literature and contemporary research into processes structuring ecological communities.

206. Concepts and Methods in Plant Community Ecology (4) I. Rejmanek, Barbour
Lecture—3 hours; laboratory—4 hours. Prerequisite: introductory courses in statistics and plant ecology; consent of instructor. Principles and techniques of vegetation analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures, association analysis, ordination, processes and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories.

207. Plant Population Biology (3) II. Rice (Agronomy)
Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104) and advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Agronomy 207.)

208. Issues in Conservation Biology (4) II. Harrison
Lecture—3 hours; discussion—1 hour. Prerequisite: one of Environmental Studies 100, Zoology 125, Botany 117, or Entomology 106. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and discussing primary literature. Specific topics will reflect the research interests of UCD conservation biology faculty.

***210. Advanced Topics in Human Ecology** (4) III. Orlove
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Course stresses the commonalities that human ecologists have as social scientists who specialize in problems relating human populations and environmental variables. General epistemological issues and theoretical models are reviewed. Similarities and differences of human and biological ecology are examined. Offered in alternate years.

***211. Advanced Topics in Cultural Ecology** (3) I. Orlove
Lecture—3 hours. Prerequisite: graduate standing. Discussion and evaluation of theories which relate environment, culture and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in alternate years. (Same course as Anthropology 211.)

212A. Environmental Policy Process (4) III. Sabatier
Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Studies 160) or environmental law (e.g., Environmental Studies 161); course in bureaucratic theory (e.g., Political Science 187 or Environmental Studies 166); course in statistics (e.g., Sociology 106 or Agricultural and Resource Economics 106). Introduction to selected topics in the policy process, applications to the field of environmental policy. Develops critical reading skills, understanding of frameworks of the policy process and political behavior, and an ability to apply multiple frameworks to the same phenomena. Offered in alternate years. (Same course as Environmental Studies 212A.)

212B. Environmental Policy Evaluation (4) II. Schwartz
Lecture—1 hour; discussion—1 hour; seminar—2 hours. Prerequisite: intermediate microeconomics (e.g., Economics 100); Statistics 108 or Agricultural and Resource Economics 106; policy analysis (e.g., Environmental Studies 168A or the equivalent); Agricultural and Resource Economics 176. Methods and practices of policy analysis; philosophical and intellectual bases of policy analysis and the political role of policy analysis. (Same course as Environmental Studies 212B.)

213. Population, Environment, and Social Structure (4) III. Cramer
Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environment and resources. Relationships among population dynamics, resource scarcity and environmental problems, and social structure; focus on demographic content of global ecological models and simulations, ecological content of modern demographic theories, and debates about scarcity, inequality, and social conflict and change. Offered in alternate years.

214. Use of Temporal/Spatial Landscape Analysis in Conservation (4) II. Schonewald
Lecture/discussion—3 hours; laboratory—3 hours. Multi-disciplinary analysis of geometric and temporal landscape change applied to conservation. Population and economic change are examined in the context of the spread of urban, rural and transportation systems in fragmentation of habitat. Laboratory applies methodologies to analysis of specific sites. Offered in alternate years.

215. Thermal Ecology and Energetics (3) II. Weathers
Lecture—2 hours; discussion—1 hour. Prerequisite: general chemistry and physics and ecology (e.g., Environmental Studies 100). Review of principles that govern thermal and energy relations of organisms and the application of energy budget analysis to diverse ecological problems. Scaling (allometric analyses) and comparative methods emphasized as techniques for developing empirical ecological theories. Offered in alternate years.

216. Ecology and Agriculture (3) I. Jackson
Lecture/discussion—3 hours. Prerequisite: Plant Biology 142 or consent of instructor. Ecological principles and relationships as applied to agriculture. Integration of ecological approaches into agricultural research to develop environmentally sound management practices. Topics include crop autoecology, biotic interactions among crops and pests, and crop systems ecology. (Same course as Vegetable Crops 216.)

***217. Conservation and Sustainable Development in Third World Nations** (4) II. Orlove
Lecture/discussion—3 hours; fieldwork—2 hours. Prerequisite: at least one course from two of these three groups: (a) Environmental Studies 160, 161, 168A, 168B; (b) Environmental Studies 101, 133, International Agricultural Development 103, Geography 142; (c) Anthropology 126, 131, Geography 141, Sociology 144, 145A, 145B. Examination of the patterns of resource ownership, control and management in agricultural lands, extractive zones (fisheries, forests) and wildlands, with emphases on conservation and sustainability. Comparison of industrial democracies and poorer nations. (Same course as International Agricultural Development 217.)

219. Ecosystem Biogeochemistry (4) III. Dahlgren, Bledsoe
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils are recommended; undergraduates accepted with consent of instructor. Multi-disciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere, and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Soil Science 219.)

220. Chemical Ecology of Plant–Insect Interactions (4) II. Duffey
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory organic chemistry and biochemistry. Investigation of the interface between plants, herbivorous insects and their natural enemies from a mechanistic point of view, stressing principles of biochemistry, physiology and toxicology, rather than those of ecology. Major emphasis placed on plant natural products. (Same course as Entomology 220.)

225. Terrestrial Field Ecology (4) III. Karban
Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Entomology 225/Population Biology 225.)

230. Analysis of a Selected Ecosystem (2) I. Bledsoe, Dalhgren
Seminar—1 hour; discussion—1 hour. To introduce students to diverse ecosystems through a series of seminars, to teach students about ecosystem processes, and to provide a format for students to evaluate critically ecosystem research.

231. Mathematical Methods in Population Biology (3) I. Hastings
Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Same course as Population Biology 231.)

232. Theoretical Ecology (3) II. Hastings
Lecture—3 hours. Prerequisite: course 204 or the equivalent, and Mathematics 16C or 21C; or one of courses 100 or 121 or Evolution and Ecology 101, and a strong mathematics background (Mathematics 22A-22B-22C or the equivalent). Examination of major conceptual and methodological issues in theoretical ecology. Model formulation and development will be emphasized. Topics will vary from year to year. May be repeated for credit. Offered in alternate years.

290. Seminar in Ecology (1-4) I, II, III. The Staff (Chairperson in charge)
Seminar—1-4 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.)

291. Biological Conservation (3) II. Schonewald
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Examines characteristics of populations that make them vulnerable to extinction and examines various methods that can be used in the restoration process. Although both plants and animals are of interest, emphasis will be on vertebrates. Offered in alternate years.

296. Topics in Ecology and Evolution (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by visiting lecturers, UCD faculty, and graduate students. May be repeated for credit. (Same course as Population Biology 292.) (S/U grading only.)

297T. Tutoring in Ecology (1-4) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in ecology; consent of instructor. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. (Chairperson in charge)
Prerequisite: graduate standing. (S/U grading only.)

Economics

(College of Letters and Science)

Martine Quinzii, Ph.D., Chairperson of the Department

Department Office, 1113 Social Sciences and Humanities Building (916-752-0741)

Faculty

Paul Bergin, Ph.D., Assistant Professor
Giacomo Bonanno, Ph.D., Professor
Lee Branstetter, Ph.D., Assistant Professor
Colin Cameron, Ph.D., Associate Professor
Gregory Clark, Ph.D., Professor
Robert C. Feenstra, Ph.D., Professor
L. Jay Helms, Ph.D., Associate Professor
Kevin D. Hoover, D.Phil., Professor
Peter H. Lindert, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Louis Makowski, Ph.D., Professor
Klaus Nehring, Ph.D., Assistant Professor
Alan L. Olmstead, Ph.D., Professor
Marianne E. Page, Ph.D., Assistant Professor
Martine Quinzii, Ph.D., Professor
John E. Roemer, Ph.D., Professor
Kevin D. Salyer, Ph.D., Associate Professor
Steven M. Sheffrin, Ph.D., Professor
Joaquim Silvestre, Ph.D., Professor
Deborah Swenson, Ph.D., Assistant Professor
Gary M. Walton, Ph.D., Professor *(Economics, Management)*
Wing T. Woo, Ph.D., Professor

Emeriti Faculty

Andrzej Brzeski, Ph.D., Professor Emeritus
Bruce Glassburner, Ph.D., Professor Emeritus
W. Eric Gustafson, Ph.D., Senior Lecturer Emeritus, *Academic Senate Distinguished Teaching Award*
Hiromitsu Kaneda, Ph.D., Professor Emeritus
Thomas Mayer, Ph.D., Professor Emeritus
T. Y. Shen, Professor Emeritus
Elias H. Tuma, Ph.D., Professor Emeritus
Leon L. Wegge, Ph.D., Professor Emeritus

The Major Program

Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these resources are turned into the things people want.

The Program. Economics majors complete an introductory course sequence in economics, in addition to several courses in quantitative methods. Intermediate theory and economic history are taken on the upper division level and then students are free to concentrate the remainder of their units in various areas of interest including more courses in economic theory or history, international economics, labor, industry, alternative economic systems, economic development, public finance, econometrics, or mathematical economics.

Internships and Career Alternatives. Internships for economics majors have been arranged at banks, brokerages, other business enterprises, and governmental units. The internships must complement the student's course work. A degree in economics is excellent preparation for students who want to go on to law school, business school, advanced work in economics, or graduate work in international relations. It is also a good background for careers in management and positions with the government.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**22-26**
Economics 1A-1B	10
Statistics 13, 32, or 102	3–4
Mathematics 16A-16B-16C or 21A-21B-21C	9-12
Depth Subject Matter	**40**
Economics 100, 101	10
One course from Economics 110A, 110B, 111A, 111B	4
One course sequence from Economics 110A-110B; 111A-111B; 115A-115B; 121A-134; 121A-121B; 130-131; 136A-136B; 151A-151B; 160A-160B	8
Additional economics courses to achieve a minimum of 40 upper division units	18
Total Units for the Major	**62–66**

Recommended
Students considering graduate study in economics or business administration are strongly urged to take Mathematics 21A-21B-21C and 22A.

The Economics Department suggests that Economics 100 and 101 be taken as soon as possible after the introductory courses.

Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental adviser is required in all such cases.

Graduation with High or Highest Honors. To be eligible for departmental recommendation for High or Highest Honors in Economics at graduation, a student must take all upper division courses in Economics for a letter grade, earn at least a 3.5 grade-point average in those courses, and complete at least eight units of course work that result in the submission of an Honors project. Consult the College of Letters and Science section of this catalog and contact the Department for more information.

Major Advisers. Contact Department Office.

American History and Institutions. This University requirement can be satisfied by completion of Economics 111A, 111B. (See also under University requirements.)

Graduate Study. Students who meet the admission requirements of Graduate Studies and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics).

For information on admission to graduate study, degree requirements, and financial aid, consult the *Graduate Announcement* and contact the chairperson of the departmental graduate committee.

Graduate Advisers. Contact Department Office.

Courses in Economics (ECN)

Lower Division Courses

1A. Principles of Microeconomics (5) I, II, III. The Staff
Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: SocSci.

1B. Principles of Macroeconomics (5) I, II, III. The Staff
Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment, and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. GE credit: SocSci.

***90X. Lower Division Seminar** (1-2) I. The Staff
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Economics through shared readings, discussions, and written assignments. May not be repeated for credit. Limited enrollment.

*Course not offered this academic year.

92. Internship and Field Work (1-12) I, II, III. The Staff
Internship—3-36 hours; term paper. Prerequisite: junior or senior standing; availability of internship position or approved field work project; stock-brokerage interns must have completed Management 11A-11B; consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.)

98. Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Intermediate Micro Theory (5) I, II, III. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A, 1B; Mathematics 16A-16B or 21A-21B with a grade of a C– or better in each course. Price and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open for credit to students who have completed Agricultural and Resource Economics 100A or 100B. Only 2 units of credit will be allowed to students who have credit for course 104.

101. Intermediate Macro Theory (5) I, II, III. The Staff
Lecture—4 hours; discussion 1 hour. Prerequisite: courses 1A, 1B; Mathematics 16A-16B or 21A-21B with a grade of a C– or better in each course. Theory of income, employment and prices under static and dynamic conditions, and long term growth. Only 2 units of credit will be allowed to students who have credit for course 105.

***103. Economics of Uncertainty and Information** (4) III. Bonnano
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, Mathematics 16A and 16B or Mathematics 21A and 21B. Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signalling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle.

***104. Intermediate Microeconomics** (4) I. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B and Mathematics 16A or 21A. Price and distribution theory under conditions of perfect and imperfect competition. Not open for credit to students who have completed course 100 or Agricultural and Resource Economics 100A or 100B. Intended for non-majors. GE credit: SocSci.

105. Intermediate Macroeconomics (4) I. Bergin; II. Sheffrin
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B and Mathematics 16A or 21A. Theory of income, employment and prices, with policy implications. Not open for credit to students who have completed course 101. Intended for non-majors. GE credit: SocSci.

110A. European Economic History Before 1700 (4) I. Clark
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Topics in economic change in Europe prior to year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development. GE credit: SocSci, Div.

110B. European Economic History since 1700 (4) III. Clark
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A-1B or consent of instructor. Topics in economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development. GE credit: SocSci.

111A. Economic History (4) II. Walton
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the United States from Colonial times to 1865; reference to other regions in the Western Hemisphere. GE credit: SocSci.

111B. Economic History (4) III. Lindert
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, or consent of instructor. Survey of economic change in the United States from 1865 to the post World War II era. GE credit: SocSci.

115A. Economic Development (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Major issues encountered in emerging from international poverty, including problems of growth and structural change, human welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (Same course as Agricultural and Resource Economics 115A.) GE credit: SocSci, Div.

115B. Economic Development (4) II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (Same course as Agricultural and Resource Economics 115B.) GE credit: SocSci.

116. Comparative Economic Systems (4) II. Roemer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, Mathematics 16A and 16B, or 21A and 21B. Economic analysis of the relative virtues of capitalism and socialism, including welfare economics. Marxian exploitation theory, the socialist calculation debate (Hayek and Lange), alternative capitalist systems (Japan, Germany, U.S.) and contemporary models of market socialism. GE credit: SocSci.

121A. Industrial Organization (4) I. Bonanno
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 104, or consent of instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries. GE credit: SocSci.

***121B. Industrial Organization** (4) III. Borenstein
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries. GE credit: SocSci.

***123. Ecology and Economics** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Economies and populations as self-regulating systems; economic regulation of man's interaction with its environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources; prospects for agricultural growth. GE credit: SocSci.

***125. Urban Economics** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, and 100 or 104. Explores the market forces behind the development of cities, explaining the existence of cities and the spatial distribution of activity within cities. Explores the effects of policies that address problems such as poverty, inadequate housing, congestion, pollution, inferior education, and crime. GE credit: SocSci.

130. Public Microeconomics (4) I. Silvestre
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, or consent of instructor. Public expenditures; theory and applications. Efficiency and equity of competitive markets; externalities, public goods, and market failures; positive and normative aspects of public policy for expenditure, including benefit-cost analysis. Topics include consumer protection, pollution, education, poverty and crime.

131. Public Finance (4) I. Helms
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104. Assessing the economic burden of taxation; equity and efficiency considerations in tax design; structure and economic effects of the U.S. tax system (including personal income tax, corporation income tax, and property tax); tax loopholes; recent developments; tax reform proposals.

134. Financial Economics (4) I. Nehring; III. Quinzii
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or 104; Mathematics 16A; Statistics 13. General background and rationale of corporation; finance as resource allocation over time; decision making under uncertainty and the role of information; capital market and interest rate structure; financial decisions. Students who have completed Agricultural and Resource Economics 171A may not receive credit for this course.

135. Money, Banks and Financial Institutions (4) III. Hoover
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B. Monetary institutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

136A. Monetary Theory (4) I. Makowski
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 105. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

136B. Monetary Policy (4) II. Salyer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 136A. Analysis of the role of financial intermediaries in the economy and the theory and practice of monetary policy.

140. Econometrics (4) II. Cameron; III. The Staff
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 100 or 104, and 101 or 105; Mathematics 16A-16B or 21A; Statistics 13. Introduction of problems of observation, estimation and hypotheses testing in economics through the study of the theory and application of linear regression models, critical evaluation of selected examples of empirical research and exercises in applied economics.

151A. Economics of the Labor Market (4) I. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104. Theory of labor supply and demand; determination of wages and employment in the labor market. Economic theories of labor unions. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages.

151B. Economics of Human Resources (4) II. Page
Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. Human resource analysis; introduction to human capital theory and economics of education; the basic theory of wage differentials, including theories of labor market discrimination; income distribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy.

160A. International Microeconomics (4) I. Feenstra; III. Branstetter
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or 104, or consent of instructor. International trade theory: impact of trade on the domestic and world economies; public policy toward external trade. Students who have completed course 162 may receive only 2 units of credit for course 160A.

160B. International Macroeconomics (4) II. Woo; III. Bergin
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or 104, and course 101 or 105, or consent of instructor. Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues; international financial institutions and their policies. Students who have completed course 162 may receive only 2 units of credit for course 160B.

162. International Economic Relations (4) II, III. Swenson
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment. Emphasis on current policy issues. Course intended especially for non-majors. Not open for credit to students who have completed course 160A or 160B. GE credit: SocSci.

***170. Economy of the Middle East** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of the Middle East. Consult department for course scheduling.

171. Economy of East Asia (4) III. Branstetter
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of East Asia. Consult department for course scheduling.

***172. Economy of South Asia** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of South Asia. Consult department for course scheduling.

***173. Economy of South-East Asia** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of South East Asia. Consult department for course scheduling.

***174. Economy of Europe** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of Europe. Consult department for course scheduling.

***175. Economy of Sub-Sahara Africa** (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of the Sub-Sahara. Consult department for course scheduling.

190. Topics in Economics (4) II. Bonnano; III Lindert
Lecture/discussion-seminar—4 hours. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

***190X. Upper Division Seminar** (1-4) I. The Staff
Seminar—1-4 hours. Prerequisite: courses 100 or 104; and 101 or 105; and consent of instructor. In-depth examination at an upper division level of a special topic in Economics. Emphasis on focused analytical work. May not be repeated for credit. Limited enrollment.

192W. Internship in the Davis-in-Washington Program (6-8) I, III. The Staff
Internship—18-24 hours. Prerequisite: junior or senior standing in Economics; completion of 84 units of credits with a minimum grade-point average of 3.00; admission to the Davis-in-Washington Program. Internship in Washington, DC with associated research project. Students must arrange for a faculty sponsor before embarking on the internship. Maximum of 3 units will count toward satisfying Economics major requirements. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4) I-II-III. The Staff (Lindert in charge)
Independent study—3 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.5 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of course.)

197T. Tutoring in Economics (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—3-15 hours. Prerequisite: consent of instructor and chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. Units may not be counted toward satisfaction of major requirements. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Microeconomic Theory (5) I. Silvestre
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Agricultural and Resource Economics 200A.)

200B. Microeconomic Theory (5) II. Quinzii
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (Same course as Agricultural and Resource Economics 200B.)

200C. Microeconomic Theory (5) III. Makowski
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Agricultural and Resource Economics 200C.)

200D. Macroeconomic Theory (5) II. Sheffrin
Lecture—4 hours; discussion—1 hour. Prerequisite: course 101, Mathematics 21A, 21B, and 21C. Macro static theory of income, employment, and prices.

200E. Macroeconomic Theory (4) III. Salyer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently) and 200D. Macrodynamic theory of income, employment, and prices.

***201A. History of Economic Thought** (4) III. Hoover
Lecture—3 hours; discussion—1 hour. Economic thought from the classical Greece era to modern times. Offered in alternate years.

***201B. History of Economic Thought II** (4) I. Hoover
Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

***203A. Advanced Economic Theory** (4) I. Quinzii
Lecture—4 hours. Prerequisite: course 200A, 200B. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency; intertemporal economies; uncertainty.

***203B. Advanced Economic Theory: Game Theory** (4) II. Roemer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Covers the most recent developments in game theory, with the focus changing from year to year. Main topics are: refinements of Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory.

***203C. Topics in Economic Theory** (4) III. Nehring
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Selected topics in contemporary microeconomic theory. May be repeated for credit with the consent of the Graduate Studies Committee.

204. Microeconomic Analysis (5) I. Sexton (Agricultural and Resource Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 (or 100M) or Agricultural and Resource Economics 100A-100B; Mathematics 21A, 21B and 21C (or Mathematics 16A, 16B and 16C); open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Agricultural and Resource Economics 204.)

***207. Contemporary Economics Seminar** (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (S/U grading only.)

209A. Economics of Distributive Justice (4) I. Roemer
Lecture—4 hours. Prerequisite: course 200B. Introduction to social choice theory; envy-free allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers J. Rawls, R. Dworkin, R. Nozick, and G.A. Cohen.

209B. Public Ownership Economics (4) III. Silvestre
Lecture—4 hours. Prerequisite: course 200B. Public ownership from the viewpoint of microeconomics, in particular general equilibrium and welfare economics. Topics include returns to scale and firm ownership, common-pool resources, externalities, and solution concepts for economies with public and private ownership. Offered in alternate years.

209C. Foundations of Decision Theory (4) II. Nehring
Lecture—4 hours. Prerequisite: course 200B. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include intertemporal decision; learning; incompleteness and ambiguity; individual and social choice; game theory as interactive decision theory; bounded rationality. Offered in alternate years.

210A. Economic History (4) I. Clark
Lecture/discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest.

***210B. Economic History** (4) I. Olmstead
Lecture/discussion—4 hours. The United States from Colonial times to the present. Other areas of the western hemisphere may be studied, according to student interest.

210C. Economic History (4) III. Lindert
Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.)

214. Development Economics (4) I. The Staff
Lecture—4 hours. Prerequisite: Agricultural and Resource Economics 100A, 100B, course 101; Agricultural and Resource Economics/Economics 204 and course 160A-160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Agricultural and Resource Economics 214.)

215A. Agriculture and Economic Development (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics 200A or 204 and 214. Agricultural development theory and application. Analysis of rural-urban linkages and their role in economic development, food price policy, and interactions between economic development and the environment. Analytical focus on household-farm and intersectoral models. (Same course as Agricultural and Resource Economics 215A.)

215B. Open Macroeconomics of Development (4) II. Woo
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics

200A or 204, 200D or 205, and 214 or 215A. Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic anaytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Agricultural and Resource Economics 215B.)

215C. Empirical Approaches to Development Analysis (4) III. Taylor
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics 215A, 215B. Extension of development models for policy analysis including Household-Farm models, models of resource allocation under uncertainty. Social Accounting Matrix and Computable General Equilibrium models. Analysis and case studies of methods of project evaluation with and without income-distribution weights. (Same course as Agricultural and Resource Economics 215C.)

221A. Industrial Organization (4) I. Bonanno
Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic performance under conditions of limited governmental interference.

221B. Industrial Organization (4) II. Branstetter
Lecture—2 hours; seminar—2 hours. Social standards and public policies toward the business sector of the economy.

221C. Topics in Industrial Organization (4) III. The Staff
Lecture—3 hours; seminar—1 hour. Prerequisite: course 221A. Advanced topics in industrial organization and in applied microeconomics. Emphasis on current research. Content may vary from year to year.

***225. Urban Economics** (4) III. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: course 200A or 204. Explains development of cities and land-use patterns within cities. Explores efficiency and equity effects of local spending and taxes. Analysis of urban problems such as transportation (congestion, pollution, mass transit), crime, and inadequate housing.

230A. Public Economics (4) I. Helms
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; evaluation of effective tax rates.

230B. Public Economics (4) II. Page
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Effects of tax policies on economic behavior; production, consumption, savings, investment, and labor supply. Distribution and equity: social welfare evaluation and the measurement of inequity.

230C. Public Economics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Advanced topics in economics of the public sector, with emphasis on current research. Content may vary from year to year.

235A. Alternative Approaches to Monetary Analysis (4) II. Hoover
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D (may be taken concurrently). Focuses on relation between changes in money supply and changes in nominal GNP. Also discusses the effect of changes in money supply on interest rates.

235B. Monetary Theory (4) III. Salyer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 235A. Emphasizes problem of finding an appropriate place for money in microeconomic/general equilibrium models. Consideration given to meaning of money, its relation to inflation and the real economy and to its role in models of finance.

***235C. Monetary Policy** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Organization of the Federal Reserve Bank, the definition of money, goals and tools of monetary policy, alternative targets for monetary policy, impact of monetary policy, the problem of lags, alternative policies.

240A. Econometric Methods (4) II. Green
Lecture—4 hours. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Agricultural and Resource Economics 240A.)

240B. Econometric Methods (4) III. Chalfant (Agricultural and Resource Economics)
Lecture—4 hours. Prerequisite: course 240A. Topics include analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regression, classical hypothesis tests, and identification and estimation of simultaneous equation models. (Same course as Agricultural and Resource Economics 240B.)

240C. Econometric Theory (4) I. Havenner
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; nonlinear and dynamic econometric models; asymptotic distribution theory. (Same course as Agricultural and Resource Economics 240C.)

240D. Topics in Econometrics (4) II. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Agricultural and Resource Economics 240D.)

***250A. Labor Economics** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A-150B or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues.

***250B. Labor Economics** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A or consent of instructor; course 204 or 200A recommended. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis.

256. Applied Econometrics (4) II. Heien
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 106 or Economics 140, or the equivalent. Application of statistical tools to economic and business analysis. Emphasis on regression analysis, problems of specification, and model development. (Same course as Agricultural and Resource Economics 256.)

260A. International Economics (4) I. Feenstra
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions.

260B. International Economics (4) II. Woo
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200D and 200E. Balance of payments adjustment mechanisms; foreign exchange markets' theories of balance of payments policy and international monetary mechanisms.

260C. Topics in International Trade (4) III. Swenson
Seminar—4 hours. Prerequisite: course 260A, 260B. Current literature in international trade theory.

260D. Topics in International Macroeconomics (4) III. Bergin
Seminar—4 hours. Prerequisite: course 260B or consent of instructor. Survey of current literature in international macroeconomic theory.

***280. Orientation to Economic Research** (2) I. The Staff
Discussion—2 hours. Course tries to bridge the gap between students' classwork and their subsequent research. It deals with topics such as the origination of a research project, some mechanics of empirical research and hints on the submission of research papers. (S/U grading only.)

***290. Topics in Economics** (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and graduate standing. (S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
(S/U grading only.)

Professional Course

397. Teaching of Economics (2) I. Walton
Lecture/discussion—2 hours. Prerequisite: graduate standing in economics. Teaching of economics: methods of instruction, organization of courses, examination and evaluation procedures. (S/U grading only.)

Economy, Justice, and Society

John E. Roemer, Ph.D., Program Director and Professor of Economics

Program Office, 1135 Social Sciences and Humanities Building (916-752-0743)

Committee in Charge

Klaus Nehring, Ph.D. *(Economics)*
John Roemer, Ph.D. *(Economics)*
Joaquim Silvestre, Ph.D. *(Economics)*
David Copp, Ph.D. *(Philosophy)*
Gerald Dworkin, Ph.D. *(Philosophy)*
Scott Gartner, Ph.D. *(Political Science)*
Robert Jackman, Ph.D. *(Political Science)*
Fred Block, Ph.D. *(Sociology)*

Graduate Study. The Program on Economy, Justice, and Society offers a designated emphasis in Economy, Justice, and Society open to students pursuing a doctoral degree in philosophy, political science, or economics. The designated emphasis provides interdisciplinary training in related aspects of economic theory, political theory, and political philosophy. Students take one or two core courses offered by the program, a designated field in their home department, a choice of two designated courses in the other two departments, and attend an advanced workshop/seminar run by the program. For students choosing the emphasis, these requirements will be in lieu of some requirements for the Ph.D. in the participating departments. Upon graduation, students receive a Ph.D. in their major with a designated emphasis in Economy, Justice, and Society.

Graduate Adviser. Consult program office or a program graduate adviser in one of the three departments listed above.

Courses in Economy, Justice, and Society (EJS)

Upper Division Course

***100. Microeconomic Theory** (4) III. Nehring
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or graduate standing. Basic concepts, modes of reasoning and fundamental results in modern microeconomics. Emphasis on, first, Utility Theory; second, the logic of the equilibrium method; third, welfare economics and public policy.

Graduate Courses

***207. Interdisciplinary Social Analysis** (3) II. The Staff
Lecture—2 hours; term paper. Prerequisite: graduate standing in Economics, Philosophy, or Political Sci-

ence; course 100, Philosophy 117, or the equivalents. Analysis of practical and theoretical social problems with tools of economic theory, philosophy, and political theory, e.g., the welfare state, risk and public policy, equality of opportunity, individual rationality and cooperation.

209A. Economic Models of Distributive Justice (4) I. Roemer
Lecture—4 hours. Prerequisite: course 100 or the equivalent, and graduate standing. Introduction to social choice theory; envy-free allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers. Offered in alternate years.

209B. Economic Models of Public Ownership (4) III. Silvestre
Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Public ownership from the viewpoint of microeconomics, in particular, general equilibrium and welfare economics. Topics include returns to scale and firm ownership, common-pool resources, externalities, and solution concepts for economies with public and private ownership. Offered in alternate years.

209C. Foundations of Decision Theory (4) II. Nehring
Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include intertemporal decision; learning; incompleteness and ambiguity; individual and social choice; game theory as interactive decision theory; bounded rationality. Offered in alternate years.

***290. Interdisciplinary Social Analysis** (3) II. The Staff (Director in charge)
Seminar—2 hours; term paper. Prerequisite: graduate standing in economics, philosophy or political science; course 100, Philosophy 117, or the equivalents. Analysis of practical and theoretical social problems with tools of economic theory, philosophy, and political theory, e.g., the welfare state, risk and public policy, equality of opportunity, individual rationality and cooperation.

Education

(Intercollege Division)

Fred H. Genesee, Ph.D., Director of the Division (2079 Academic Surge)

Robert A. DeVillar, Ph.D., Director of the UC Educational Research Center, Fresno and UC Co-Director of the UCD/CSU Fresno Joint Doctoral Program in Educational Leadership, Fresno

Barbara J. Merino, Ph.D., Director of Teacher Education

Barbara G. Goldman, Ph.D., Associate Director of Teacher Education

Sandra M. Murphy, Ph.D., Director, CRESS Center

Jill Wilson, Ph.D., Associate Director, CRESS Center

Division Office, 2074 Academic Surge (916-752-8258; FAX: 916-752-5411)

Student Services, 2078 Academic Surge (916-752-0757)

CRESS Center Office, 2060 Academic Surge (916-752-0281; FAX: 916-752-6135)

UCD/CSU Fresno Joint Doctoral Program Office, 5005 North Maple Ave., Fresno, CA 93740-0117 (209-278-0427; FAX: 209-278-0457)

UC Educational Research Center, Fresno, 351 East Barstow Ave., Suite 101, Fresno, CA 93710 (209-228-2050; FAX: 209-228-2055)

Faculty

Concha Delgado-Gaitan, Ph.D., Professor
Robert A. DeVillar, Ph.D., Associate Professor
Sharon S. Dugdale, Ph.D., Professor
Richard A. Figueroa, Ph.D., Professor
Patricia C. Gandara, Ph.D., Associate Professor
Fred H. Genesee, Ph.D., Professor
Barbara G. Goldman, Ph.D., Lecturer in and Supervisor of Teacher Education *(Education, Human and Community Development)*
Pauline V. Holmes, M.A., Supervisor of Teacher Education
Anna T. Kato, Ed.D., Supervisor of Teacher Education
Maureen McMahon, Ph.D., Assistant Professor
Barbara J. Merino, Ph.D., Professor
Sandra M. Murphy, Ph.D., Professor
J. Richard Pomeroy, M.A., Supervisor of Teacher Education
Jonathan H. Sandoval, Ph.D., Professor
Robert M. Van Dyne, Ed.D., Supervisor of Teacher Education
Jon Wagner, Ph.D., Professor
David R. Wampler, Ph.D., Lecturer in and Supervisor of Teacher Education
Karen A. Watson-Gegeo, Ph.D., Professor

Emeriti Faculty

Donald G. Arnstine, Ph.D., Professor Emeritus
Hugh C. Black, Ph.D., Professor Emeritus
G. Phillip Cartwright, Ph.D., Professor Emeritus
Douglas L. Minnis, Ed.D., Lecturer Emeritus
Julius M. Sassenrath, Ph.D., Professor Emeritus
Carlton J. Spring, Jr., Ph.D., Professor Emeritus
George D. Yonge, Ph.D., Professor Emeritus

Cooperative Research and Extension Services for Schools (CRESS) Staff

Sandra Murphy, Ph.D., Director, CRESS Center
Pam Castori, M.A., Director, California Science Project—Sacramento; Education Extension Specialist for Science
Kathy Dixon, Ph.D., Publications Coordinator
Barbara Hoffman, M.A., Director, Sierra North Arts Project
Pauline Holmes, M.A., Associate Director for Inservice Programs, Area 3 Writing Project
Judith Kysh, M.A., Education Extension Specialist for Mathematics; Co-Director, College Preparatory Mathematics; Director, Northern California Mathematics Project
Rachel Lodge, M.A., Associate Director, Healthy Start Field Office
Jayne Marlink, M.A., Director, Area 3 Writing Project
Rollie Otto, Ph.D., Director of the California Science Project
Keith Prior, B.A., Systems Analyst, Healthy Start Field Office
Tom Sallee, Ph.D., Co-Director, College Preparatory Mathematics Project
Lisa R. Villarreal, M.A., Director, Healthy Start Field Office
Jill Wilson, Ph.D., Associate Director, CRESS Center

Affiliated Faculty

Kathy Medina, M.A., Director, Area 3 History and Cultures Project

Programs of Study

The Division of Education offers a minor and programs of graduate graduate study described below. There is no undergraduate major in education.

Minor Program Requirements:

Education theory is considered to be the foundation for undergraduates to elect as a minor if they wish to *(1)* major in an allied program, *(2)* obtain a teaching credential, *(3)* obtain a master's degree in education or related field, *(4)* obtain a Ph.D. degree in education, *(5)* enter a profession that focuses on work with people, *(6)* seek employment in a governmental or industrial training program, or *(7)* obtain a better understanding of the issues and concerns of public and private education.

At least 16 units of the 20-unit minimum for the minor must be in Education. One course in a related field is acceptable for the minor.

	UNITS
Education	**20**
Education 100, 110, 120	12
Elective courses	8

The remaining 8 units may be taken from the following courses in Education, with the option of selecting one course from the list of approved elective courses outside of Education:

Education:
Education 115, 130, 151, 152, 153

Approved courses outside of Education:
Agricultural Education 100, 160, Human Development 100A, 100B, 101, 103, Linguistics 163, 166, 167, Psycology 130, 132, 136

Minor Advisers. A designated faculty member in the Division of Education may advise students and give final approval on the minor. For additional advising and information, contact D. Wampler (916-752-3196; e-mail: drwampler@ucdavis.edu), or the Student Services Office, 2078 Academic Surge.

Graduate Study

The Division of Education, in conjunction with the Graduate Group in Education, offers programs of study and research leading to the M.A. and Ph.D. degree in Education. The Ph.D. is offered by the Education Graduate Group. Detailed information regarding graduate study may be obtained by writing the Graduate Coordinator, Division of Education, 2078 Academic Surge.

Graduate Coordinator. K. Bray.

Graduate Advisers (M.A. and Ph.D. degree). J. Sandoval, P. Gandara, J. Wagner.

Teacher Education

For a statement of complete requirements and appointments with credential advisers, contact the Division Student Services Office, 2078 Academic Surge. Interested students are urged to do this *as early as possible* in their academic career.

Applicants to the elementary or secondary teaching credential programs should contact the Student Services Office for forms and procedural information early in the **fall quarter** of their senior year.

Teacher Education Faculty Advisers—Elementary. D.R. Wampler.

Bilingual Emphasis. B.J. Merino.

Teacher Education Faculty Advisers—Secondary. P. Holmes, R. Van Dyne.

Graduate Adviser. B. Merino, B. Goldman (Teaching Credential Program).

UCD/CSU Fresno Joint Doctoral Program (Ed.D.)

Karen Carey, (CSU Fresno) and Robert DeVillar (UC Davis), Program Directors

UC Davis office, 2078 Academic Surge (916-752-0761; FAX, 916-752-5411); e-mail: kbray@ucdavis.edu

CSU Fresno Program Office (209-278-0427; FAX: 209-278-0457); e-mail: diane_rivera-pasillas@csufresno.edu

The joint (UCD/CSU Fresno) doctoral program leads to the Doctorate in Education (Ed.D.) in Educational Leadership. Contact the CSU Fresno Program Office for information and application materials.

Courses in Education (EDU)

Lower Division Course

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

*Course not offered this academic year.

Upper Division Courses

100. Introduction to Schools (4) I, II, III. Wampler
Lecture—3 hours; field work—3 hours. Prerequisite: upper division standing. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding, and tutoring in schools.

110. Educational Psychology: General (4) I, II, III. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SocSci, Wrt.

***114. Quantitative Methods in Educational Research** (4) I. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers.

115. Educating Children with Disabilities (2) II, III. Figueroa, Sandoval
Lecture—2 hours. Prerequisite: upper division standing. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes.

120. Philosophical and Social Foundations of Education (4) III. Wagner
Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society. GE credit: SocSci, Wrt.

***130. Issues in Higher Education** (4) III. The Staff (Director in charge)
Discussion—3 hours; field work—3 hours. Prerequisite: upper division standing or consent of instructor. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university.

151. Language Development in the Chicano Child (3) I. Merino
Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish, and the role of dialect varieties in the classroom.

152. Communication Skills for Bilingual Teachers (3) III. The Staff (Merino in charge)
Lecture—2 hours; field work—3 hours. Prerequisite: course 151; Spanish 2, 8A-8B. The development of communication skills of prospective educators with an emphasis on the study and use of standard Spanish and Southwest Spanish dialects in teaching science, mathematics, social science, music, art, and language arts to bilingual elementary school pupils.

***153. Cultural Diversity and Education** (2) III. The Staff (Director in charge)
Lecture/discussion—2 hours. Prerequisite: upper division standing. Analysis of research on learning styles among culturally-diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool.

160A. Introduction to Peer Counseling (2) I, II. Counseling Center Staff
Lecture/discussion—2 hours. Prerequisite: upper division standing and consent of instructor. Introduction to peer counseling techniques and development of peer counseling skills. (P/NP grading only.)

160B. Issues in Peer Counseling (2) I, II, III. Counseling Center Staff
Lecture/discussion—2 hours. Prerequisite: upper division standing and consent of instructor; course 160A recommended. In-depth review and development of skills for specific counseling topics. May be repeated once for credit when topic differs. (P/NP grading only.)

163. Guidance and Counseling (4) III. Figueroa, Sandoval
Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment.

***180. Computers in Education** (3) I, II, III. Dugdale
Lecture—1 hour; seminar—1 hour; laboratory—1 hour. Prerequisite: upper division standing or graduate student. Applications of computers in education as instructional, intellectual, and communication tools. Not open for credit to students who have taken course 181 or 182.

***181. Instructional Applications of Computers** (2) Dugdale
Lecture/discussion—1 hour; seminar—1 hour. Prerequisite: Agricultural Systems and Environment 21 or appropriate microcomputer course, and consent of instructor. Applications of computers in K-12 instruction, with emphasis on software selection and use, subject and grade level focus, and curricular integration. Intended for students who already possess experience and skill with a variety of microcomputer applications, this course does not include the more general topics covered in course 180. Not open for credit to students who have completed course 180 or 182.

***182. Computer Project for Curricular Integration** (1) Dugdale
Seminar—1 hour. Prerequisite: Agricultural Systems and Environment 21 or appropriate microcomputer course, experience with instructional computing and consent of instructor. Design and implementation of a curricular unit to integrate computer technology into a K-12 classroom setting. A project-based seminar intended for students with substantial prior experience with instructional use of computers and related technologies. Not open for credit to students who have completed course 180 or 181.

192. Internship (1-3) I, II, III. The Staff
Internship—2-8 hours; discussion—1 hour. Prerequisite: upper division standing and consent of instructor. Internship as a tutor, teacher's aide, or peer counselor in a school or educational counseling setting under the supervision of a faculty member. May be repeated once for credit. (P/NP grading only.)

197T. Tutoring in Education (1-2) I, II, III. The Staff (Director in charge)
Tutoring—1-2 hours. Prerequisite: upper division standing and consent of instructor. Leading of small voluntary discussion groups affiliated with the Division's upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student's work. May be repeated once for credit for a total of 4 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

200. Educational Research (4) III. Sandoval
Lecture—2 hours; discussion—2 hours. Prerequisite: introductory statistics and graduate standing in education or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research.

201. Qualitative Research in Education (4) III. Wagner
Seminar—2 hours; lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments). (Former course 203.)

***202. Philosophy of Education: Models and Methods** (4) III. The Staff (Director in charge)
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examples of some major philosophical points of view about educational aims, illustrations of several types of philosophical discourse and argumentation, and an opportunity for students to locate and critique some contemporary studies in the philosophy of education. Offered in alternate years.

203. Educational Testing and Evaluation (4) II. Gandara
Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Introduces the theoretical assumptions underlying traditional test construction, as well as the basic statistical principles involved in the design, evaluation, and interpretation of standardized tests. Also introduces the debates surrounding the uses of different kinds of tests and evaluation tools.

205A. Ethnographic Research in Schools I: Current Theory and Practice (4) I. Watson-Gegeo
Lecture—4 hours. Prerequisite: graduate standing. Current literature from anthropology and society related to schools. Emphasis on the organizational structure of institutions, and the analysis of face-to-face interaction. Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts. (Former course 201A.)

205B. Ethnographic Research in Schools II: Field-Based Research Projects (4) II. Watson-Gegeo
Discussion—4 hours. Prerequisite: graduate standing and course 205A. Student research projects in specific schools with cooperative critical analysis of the design, data collection, and inferencing by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects. (Former course 201B.)

207. Concepts of the Curriculum (4) I. The Staff (Director in charge)
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis and argument for the establishment of a point of view, in the consideration of curriculum theory and practice. Classical and contemporary approaches to subject matter and activity emphases, hidden curriculum, and moral education.

***210. The Psychology of School Learning** (4) I. Sandoval
Lecture/discussion—4 hours. Study of human learning theory and research related to learning in school. Classical approaches of scholars such as Ausubel, Brunner, Gagne, Piaget, Vygotsky, Skinner. Review of contemporary issues of constructivism, metacognition, problem solving, learning strategies, science and mathematics learning.

***211. Psychopedagogics** (4) II. The Staff (Director in charge)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Phenomenological approach to the psychological aspects of the educational situation (psychopedagogics). A critical consideration of how psychopedagogics contributes to the theory and practice of education.

***213. Individual Assessment** (4) III. Sandoval
Lecture—4 hours. Prerequisite: courses 114 and 219, admission to school psychology credential program. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children's Ability.

***214. Assessment of Children's Personality** (4) III. Sandoval
Lecture—3 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program; courses 213 and 218; and familiarity with basic personality theory and theories of motivation. Study of the projective hypothesis; concepts of personality and its measurement; legal and ethical issues in personality assessment; interviewing techniques in assessment of social and affective functioning; specific measures in personality assessment; reporting on personality assessments; school interventions. Offered in alternate years.

215. Research on Achievement Motivation in Education (4) II. Spring
Seminar—3 hours; term paper. Prerequisite: graduate standing in Education or consent of instructor. Analysis and critique of recent research on cognitive processes related to achievement motivation in school settings. Topics include self-determination theory, attribution theory, goal theory, intrinsic and extrinsic motivation, learned helplessness. psychological reactance, gender and culture, and research design.

216. School-Based Prevention Programs (4) III. Sandoval
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Promotion of health and mental health in schools. Topics include the theoretical base, prevention models, specific examples of techniques and programs designed to prevent learning and adjustment problems, and evaluation issues. Offered in alternate years.

***218. Testing Minority Children** (4) I. Figueroa
Lecture—3 hours; field work—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizing tests and techniques that are appropriate for use with Hispanic students. The use of multicultural pluralistic assessment. Review studies and guidelines on use of tests with minority children. Offered in alternate years.

221. Culture and Social Organization of Schools (4) I. Wagner, Gandara
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Culture and social organization of schools. Examines perspectives of social researchers, educational policy-makers, and school members and their implications for educational research, policy and practice.

222. School Change and Educational Reform (4) II. Wagner
Lecture/discussion—2 hours; seminar—2 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent. Analysis of models, processes, and case studies of school change and educational reform with respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research. (Former course 204.)

223. Education and Social Policy (4) III. Gandara
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Focuses on understanding the social and political context of education in the U.S. and California and how education policy is formed in the broader public arena. Develops skills in educational policy analysis. Offered in alternate years. (Former course 237.)

***226. Culture and Social Organization of Higher Education** (4) II. Wagner, Sandoval, Gandara
Seminar—3 hours; field work—1 hour. Prerequisite: graduate standing or consent of instructor. Critical study of culture and social organization of higher education institutions policies and functions in the U.S., with some attention to other countries. Offered in alternate years.

***231. Culture and Learning** (4) II. Delgado-Gaitan
Seminar—4 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent, or consent of instructor. Analysis of major theories of relationships between learning and the sociocultural context in which learning takes place, issues related to the academic achievement of different language groups, and implications for research and pedagogical reform.

***232. Families and Communities as Educational Contexts** (4) I. Delgado-Gaitan
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Families and cultural communities are important social contexts of education for children. An interdisciplinary perspective is presented in an attempt to understand how learning in these social contexts influences the schooling of children.

***233. Anthropology of Education** (4) I. Delgado-Gaitan
Seminar—3 hours; term paper. Prerequisite: one of the following courses: Anthropology 117, 127, 129, or 222, or course 231, 201A, or 201B, or consent of instructor. Uses concepts of anthropology to examine education in such settings as family, community, and formal institutions of schooling. Course goal is to raise questions about educational issues often taken for granted and provide a perspective from which problems may be analyzed. Offered in alternate years. (P/NP grading only.)

***235. Critical Pedagogy** (4) III. Delgado-Gaitan
Seminar—4 hours. Prerequisite: Critical Theory 200A and graduate standing. A sociocultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences.

***241. Research on Reading and Spelling Acquisition** (4) III. Murphy
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis and critique of research on psychological processes in learning to read and spell. Topics include writing systems, theories of processes and acquisition, emergent reading, readiness, decoding, word reading, oral text reading, spelling stages, instructional methods, disability, dialect. Offered in alternate years.

242. Research on Text Comprehension (4) III. The Staff (Director in charge)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis of recent research related to cognitive processing of written texts. Topics include word decoding, schema theory, background knowledge, assimilation, accommodation, working memory, processing depth, vocabulary acquisition, sentence-level processes, text-level processes, text structure, implications for curriculum and instruction.

243. Research on the Teaching and Learning of Writing (4) III. Murphy
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Study of issues in research on composition; history of composition studies; data analysis techniques; product and process approaches; cognitive and social perspectives. Offered in alternate years.

***249. Discourse Analysis in Educational Settings** (4) II. Watson-Gegeo
Seminar—3 hours; term paper. Prerequisite: graduate standing and at least one previous course in linguistics or sociolinguistics, or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting. (Former course 239.)

***251. Research in Bilingual and Second Language Education** (3) III. Merino
Seminar—3 hours. Prerequisite: course 151; knowledge of a foreign language. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms, use of the vernacular in classrooms. Offered in alternate years.

***252. Multicultural Teaching and Curriculum** (3) III. Merino
Seminar—2 hours; field work—3 hours. Prerequisite: graduate standing or consent of instructor. Cross-cultural research on socialization, motivation, language acquisition and cognition and its application to effective classroom strategies and curriculum development for minority students. Students will develop and implement multicultural curriculum as well as use ethnographic research techniques in an educational setting. Offered in alternate years.

253. Language and Literacy in Linguistic Minorities (3) II. Merino, Watson-Gegeo
Seminar—2 hours; field work—3 hours. Prerequisite: familiarity with another language and culture; graduate standing. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum.

***255. Curriculum Development and Evaluation in Mathematics** (4) I. Dugdale
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division course work in mathematics or consent of instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, proposed changes, and evaluation issues. Selected curriculum projects will be examined.

***256A. Research in Mathematics Education** (4) II. Dugdale
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division course work in mathematics, or consent of instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evolution of trends, issues, theories and hypotheses in various areas of mathematics education research. Course emphasizes foundations. Offered in alternate years.

256B. Research in Mathematics Education (4) II. Dugdale
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division course work in mathematics, or consent of instructor. Current research issues and activities in mathematics education: status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Offered in alternate years.

257. Computer Technology in Mathematics Education (4) III. Dugdale
Seminar—4 hours. Prerequisite: graduate standing in Education with mathematics course work; or consent of instructor. The roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Offered in alternate years.

***275. Effective Teaching** (4) I. The Staff (Director in charge)
Seminar—4 hours. Review of research on the relationship of effective teacher behavior and student learning. Use of research on teacher effectiveness to develop teaching strategies. Ways to decide on the most appropriate instructional strategies in specific teaching situations.

290C. Research Conference in Education (1) I, II, III. The Staff (Director in charge)
Discussion—1 hour. Prerequisite: graduate standing. Presentations and critical discussions of research in education by graduate students with their major professor. May be repeated twice for credit. (S/U grading only.)

291. Proseminar in Education (3) I, II. Sandoval
Seminar—3 hours. Prerequisite: admission to the Ph.D. graduate program in Education. Seminar for first-year education doctoral students. The study of multi-disciplinary research approaches to educational issues. Reports and discussions of recent advances

in education . Speakers from the graduate group faculty in Education. May be taken twice for credit.

292. Special Topics in Education (2-4) I, II, III. The Staff (Director in charge)
Variable—2-4 hours. Prerequisite: completion of doctoral core courses in Education or consent of instructor. Selected topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit.

293. Topical Seminar in School Psychology (3) I, III, Sandoval
Seminar—3 hours. Prerequisite: graduate standing in Education and consent of instructor. Critical study of selected issues in education and school psychology related to the learning and mental health of children and adolescents in schools. May be repeated once for credit.

298. Group Study (1-5) I, II, III. The Staff (Director in charge)
(S/U grading only.)

299. Individual Study (1-6) I, II, III. The Staff (Director in charge)
Independent study—3-18 hours. Individual study under the direction of a faculty member. (S/U grading only.)

299D. Research (1-12) I, II, III. The Staff (Director in charge)
Independent study—3-36 hours. Research for individual graduate students. (S/U grading only.)

Professional Courses

300. Reading in the Elementary School (4) III. The Staff (Merino in charge)
Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.

301. Reading in the Secondary School (4) I, II. Murphy
Discussion—4 hours. Prerequisite: admission to graduate standing, enrollment in the secondary credential program, or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations.

302. Language Arts in the Elementary School (2) I. The Staff (Merino in charge)
Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools.

303. Art Education (3) III. The Staff (Merino in charge)
Lecture/discussion—2 hours; laboratory—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration.

304A. Teaching in the Elementary Schools (5-8) I. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.

304B. Teaching in the Elementary Schools (5-8) II. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions from the social, biological, and physical sciences. Emphasis on effective teaching methods.

304C. Teaching in the Elementary Schools (5-8) III. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Evaluation of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.

***305A. Teaching in the Middle Grades** (5-8) I. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.

***305B. Teaching in the Middle Grades** (5-8) II. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in intermediate grades. Selection, organization, and evaluation of teaching materials including audio-visual aids. Effective teaching methods in grades 4-9.

***305C. Teaching in the Middle Grades** (5-8) III. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in junior high school. Current conceptions of the junior high school with emphasis on effective teaching methods, and selection of curriculum materials. Alternative programs.

306A-306B-306C. Teaching in Secondary Schools (5-9) I, II, III. The Staff (Merino in charge)
Seminar—2 hours; student teaching—10-21 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education secondary school classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; audio-visual techniques. Must be repeated by undergraduates for a total of 15 units; 21 units by graduates in Exercise Science and Music, and 24 units by all other graduate students.

307. Methods in Elementary Science (2) III. Wampler
Lecture/discussion—2 hours. Prerequisite: acceptance into teacher education program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.

308. Methods in Elementary Social Studies (2) III. Wampler
Lecture/discussion—2 hours. Prerequisite: acceptance into a teacher education program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools.

***309. Early Childhood and Kindergarten Education** (3) III. The Staff (Merino in charge)
Lecture—3 hours. Prerequisite: upper division or professional standing. Methods, materials, and history of educational programs for the preschool through primary grades. Development of curriculum methods and materials which stress integration of appropriate subject areas with emotional, social, creative, physical, and cognitive development.

***322. Methods in Secondary Social Studies** (4) I. The Staff (Merino in charge)
Lecture—4 hours. Prerequisite: acceptance into credential program or consent of instructor. Methods and materials of teaching concepts and thinking skills. Recent developments in applying basic skills to the teaching of social studies.

323A. Physical Science in the Secondary School (3) I. The Staff (Merino in charge)
Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning.

323B. Life Sciences in the Secondary School (3) II. The Staff (Merino in charge)
Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school biology and life sciences. Emphasis on philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues.

324. Teaching Methods in Mathematics (3) II. Dugdale
Lecture—3 hours. Prerequisite: acceptance into a teacher education program; student teaching (concurrently); a mathematics background or consent of instructor. Methods and curriculum for teaching mathematics at the secondary level (grades 9-12). Review of innovative mathematics programs in the State.

325. Research and Methods in Secondary English Language Arts (4) III. The Staff
Discussion—4 hours. Prerequisite: admission to graduate standing or credential program in Education or consent of instructor. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations.

326. Teaching Language Minority Students in Secondary Schools: Methods and Research (4) II. Merino
Seminar—3 hours; field work—3 hours. Prerequisite: graduate standing in Education of consent of instructor. Research on principles, procedures and curricula for teaching discipline-specific concepts to language-minority students in secondary schools. Second-language acquisition principles and instructional strategies.

***351. Advanced Fieldwork in Bilingual Education: Teaching** (3-5) I. The Staff (Merino in charge)
Seminar—2 hours; field work—3-9 hours. Prerequisite: acceptance into a bilingual education specialist program. Discussion, analysis, and implementation of methods, techniques, and material in the bilingual/cross-cultural classroom, including team teaching with paraprofessionals, implementation of language-use models in the classroom, lesson planning, selection and use of bilingual/cross-cultural materials.

***352. Advanced Fieldwork in Bilingual Education: Evaluation and Supervision** (3-5) II. Merino
Seminar—2 hours; field work—3-9 hours. Prerequisite: upper division standing; acceptance into a bilingual/cross-cultural specialist credential program. Provides opportunity to acquire evaluation and supervisory skills in the field under the supervision of University staff and an experienced program evaluator/supervisor in bilingual/cross-cultural education.

***361A-361B-361C. School Psychology: Introduction** (3-3-3) I-II-III. Sandoval and staff
Seminar—2 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program. History and theory of school psychology. Application of psychological theory to educational problems. Reading and mathematics curriculum for school psychologists. Crisis intervention and counseling in the schools. Fieldwork in schools and other institutions serving children. (S/U grading only.)

***362A-362B-362C. School Psychology: Advanced** (3-3-3) I-II-III. Sandoval, Figueroa, Gandara
Seminar—2 hours; field work—4 hours. Prerequisite: courses 361A-361B-361C, 213, 218, 219. Theory and techniques of school-based mental health consulta-

tion and non-biased assessment. Legal principles related to special education practice and school psychology. Advanced case study techniques. (S/U grading only.)

***363A-363B-363C. School Psychology: Internship** (8-12) I, II, III. Sandoval, Figueroa, and staff
Seminar—2 hours; internship—18-32 hours. Prerequisite: admission to school psychology credential program; courses 361A-361B-361C, 362A-362B-362C, 213, 218, 219. Individual assessment and program evaluation, mental health consultation, intervention strategies to promote the school learning and adjustment of children. Selected topics in school psychology. (S/U grading only.)

398. Group Study (1-5) I, II, III. The Staff (Director in charge)
(S/U grading only.)

399. Individual Study (1-5) I, II, III. The Staff (Director in charge)
(S/U grading only.)

Education (A Graduate Group)

Jonathan H. Sandoval, Chairperson of the Group

Group Office, 2078 Academic Surge (916-752-0761; FAX: 916-752-5411); e-mail: kbray@ucdavis.edu

Faculty. Faculty are drawn from 12 departments in the Colleges of Letters and Science, and of Agriculture and Environmental Sciences.

Graduate Study. The Graduate Group in Education offers programs of study and research leading to the Ph.D. degree. Students may study topics in mathematics education, science education, and language and literacy education including bilingual education. Students may also concentrate in educational/school psychology, educational anthropology, and educational sociology and policy studies. Detailed information regarding graduate study may be obtained by writing the group administrative assistant.

Preparation. Students should have earned an M.A. degree or the equivalent in a discipline relevant to their proposed emphasis program. For example, students applying for the Instructional Studies emphasis in mathematics should have earned the M.A. or M.A.T. degree in mathematics; students applying to the Psychological Studies program should have an M.A. in psychology, or educational psychology.

Graduate Adviser. Consult the Education Graduate Group Office.

Courses. See Education for courses.

Education Abroad Program

Dennis Dutschke, Ph.D., E.A.P. Campus Director

Program Office, 153 Kerr Hall (916-752-3014; FAX: 916-754-8311; Web site: http://www.mrak.ucdavis.edu/provunder/eap/menu.htm

Programs of Study

The University of California offers overseas study programs in cooperation with more than 100 host universities and colleges in over 30 countries throughout the world. More than 1,500 UC students, primarily undergraduates, will take part in this program in 1997-98. Participating students remain registered on their home campuses while studying abroad and receive full academic credit for their work. Nearly 800 international students will attend under the auspices of the Education Abroad Program (EAP) in 1997-1998, often with scholarships provided through UC and their home institutions. As an academic program, EAP at UC Davis is dedicated to serving students and faculty by providing global educational and internship opportunities.

Full-year study programs are available in Australia, Austria, Barbados, Brazil, Canada, Chile, China, Costa Rica, Denmark, Egypt, England, France, Germany, Ghana, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Mexico, The Netherlands, New Zealand, Scotland, Singapore, Spain, Sweden, Taiwan, and Thailand.

EAP also offers short-term and special-focus programs. One-semester options are available in Brazil, Canada, Chile, Costa Rica, Denmark, Hungary, India, Indonesia, Italy, Sweden, and Thailand. One-term intensive language programs are available in Denmark, France, Germany, Italy, and Mexico. A field research program is offered in Mexico, two Tropical Biology programs in Costa Rica, and a Global Security and Development Studies and an Engineering spring program in Japan.

Selection of UC undergraduates is subject to the following minimum qualifications: 3.0 cumulative grade point average at the time of application and maintained through departure (not required for some short-term language and special-focus programs); endorsement of the UC Davis EAP selection committee; and completion of language courses as required. Many countries do not have a language requirement. About half of the programs require two years of college-level training in the language of the host country.

EAP opportunities are also open to qualified graduate students who have completed at least one full year of graduate work and have support of their graduate program and graduate dean. A detailed statement of the projected program of study is required.

UC faculty, who serve as directors at most Study Centers, provide academic counsel to students while abroad. Full credit is granted for courses satisfactorily completed, and approved courses are recorded on official UC transcripts. With careful planning, most EAP students make normal progress toward their UC degrees. Students may earn credit abroad towards their major, minor, general education, or graduation requirements, with approval of their UC major and college.

Participants pay the same fees as at UC Davis. Additional costs and fees include room and board, books and personal travel, round-trip transportation, on-site orientation and intensive language program (where applicable) and miscellaneous expenses. The cost of studying abroad is often comparable to that of studying on a UC campus, although costs vary from country to country.

Financial assistance is available to EAP students. Those already receiving UC financial aid maintain their eligibility for grants, loans, and scholarships while studying on EAP. Financial aid is based on the cost of studying at each EAP location. Students who might not normally be eligible for financial aid may qualify for the period they are in EAP. In addition to UC financial aid, EAP provides support through various scholarships and grants. Campus scholarships may also be available based on the country, academic merit, or academic field of study. Students should contact the campus EAP and Financial Aid office for additional information.

An EAP adviser can provide full details about the academic programs abroad, requirements, and application procedures. Staff will put students in touch with recent participants and academic advisers. Academic catalogs and detailed course listings are available.

Selection

Students are selected by a committee of UC Davis faculty and staff familiar with the host country. EAP applicants must participate in a Conversation/Culture partnership: EAP applicants meet with international students or scholars for a minimum of five hours to exchange language, culture and information about their respective countries before departure. In addition, the committee strongly recommends that prospective participants familiarize themselves with the country of their interest in preparation for the year abroad, through appropriate courses, books, magazine or journal articles, or newspapers. Lists of suggested courses and reading materials are available in the EAP Office.

Once the completed application materials have been filed, an applicant will be interviewed by a selection committee consisting of faculty and EAP returnees. Among other things, academic goals, some knowledge of the host country (and the United States) and proficiency in the language (when applicable), will receive considerable attention during the interviews.

Files of applicants receive the endorsement of the interview committee and the EAP director and are forwarded to the Systemwide Office of the EAP on the Santa Barbara campus, where further selection considerations are made.

Academic Program

In most situations, students from the University of California live as the students of the host country do, and in some cases students attend the same courses, taught by faculty of the host country in their own language. Thus, language skills are very important for about half of the EAP programs. To aid adjustment of UC students, tutorials are a part of the academic program at some centers. Tutorials assist in overcoming language problems and differences in educational practices and provide cultural background information presupposed in the courses. Tutorials are taught by graduate students or junior staff of the host university and are offered in association with courses in which a sufficient number of UC students have enrolled.

To assist in the adjustment and the academic work of the students, faculty members of the University of California serve as Directors and/or Associate Directors at most of the study centers abroad.

The academic program of each student includes: *(1)* an intensive preparatory course in the language of the host country (except for the programs in the Australia, Canada, Egypt, Ghana, Hungary, Ireland, and New Zealand, United Kingdom); *(2)* a quarter, a semester or a full year of academic courses; *(3)* broad opportunity to audit courses within the host university. It is expected that students will complete a minimum of 36 units during the academic year or 24 semester units in addition to units earned in the intensive language program.

Graduation Requirements

All prospective applicants, particularly students who intend to study abroad during their senior year, should carefully plan their course programs for Davis and abroad in order to satisfy university, college, and major/minor requirements for their degree. The provisional planning form in the application packet addresses these concerns.

Although units and grade points earned in the EAP are incorporated into the University transcript and GPA, departments and majors retain the right to determine which EAP courses will be accepted in satisfaction of major and minor requirements. Several major and minor programs have identified key upper division courses which must be completed in residence at Davis. Academic advisers should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must meet the University residence requirement. Students planning to graduate immediately upon completion of participation in the EAP may satisfy college residence requirements within the final 45 units preceding entrance into the EAP. In addition, subject to prior approval of the major department or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 35 units must be completed in residence in the student's college or university, 12 units of which must be completed after returning from EAP participation. With this option, no more than 55 units taken abroad may be applied

toward the unit requirement for graduation. The applicant's college dean is the source of information on the university residence requirement.

Students may satisfy GE requirements while on EAP. GE credit is determined by the student's college. Participants who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive their degree in September (candidacy filing dates are established by the Office of the Registrar). In some cases, transcripts from abroad may not be received in time to be posted on the student's Davis transcript for EAP returnees to be included on the June degree list. Such returning students may participate in the June commencement ceremony; however, their graduation date will be in September.

Study Centers

At any one center, the courses and fields of study open to UC students may be limited. Each host institution has special areas of excellence and strength. The listing below incorporates selected information concerning course work available at each study center. More detailed information is available in the flyers describing each of the centers and from the EAP advisers in 153 Kerr Hall.

In addition to the programs listed below, Davis students have access to a variety of non-UC programs of study and work abroad opportunities. Information can be obtained at the EAP Office in 153 Kerr Hall.

Europe

Austria. The program offers an opportunity to pursue a specialized interest to a limited number of highly qualified students for the academic year. A compulsory intensive language course in Vienna precedes the beginning of the academic year. All courses are taught in German.

University of Vienna. Eastern European studies (Balkans, Russia), fine arts (history of art, music, theater arts), folklore, history.

Vienna University of Economics and Business Administration.

Denmark. A compulsory summer intensive language program precedes the academic year or semester and continues through the fall semester. Most students concentrate on their major or a closely related field; independent study under tutorial supervision is expected. Students may also apply to the Summer Intensive Language Program only as a short-term program option.

University of Copenhagen. Broad availability of humanities and social sciences. Programs in communications, economics and international politics, history, linguistics, and medieval studies are of particular interest.

France. A compulsory intensive language course precedes the beginning of the academic year. All courses in the universities are taught in French. UC faculty directors are in residence at the Bordeaux, Lyon and Paris study centers in France.

A French language and culture Fall quarter progam is available at the *Centre International d'Etudes Francaises,* at Lyon.

Ecole Normale Supérieur, Paris. Course work in natural sciences, humanities, French and foreign literature, geography, and social sciences.

Ecole Normale Supérieur at Fontenay-Saint Cloud, Paris Region. Course work in social sciences and the humanities.

Ecole Polytechnique at Palaiseau, Paris Region. Course work in natural sciences and mathematics.

University of Bordeaux. Broad areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Anthropology) are well known.

University of Grenoble. Mainly in the social sciences through the *Université des Sciences Sociales* (Grenoble II); some humanities. Offerings in anthropology and psychology are limited. Not suitable for physical or life sciences.

University of Lyon. Social sciences, art history; modern languages and linguistics; Arabic studies.

Paris Center for Critical Studies. Film theory, literary criticism, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

Paris Center for Critical Studies. In addition to required core courses in French civilization, students take courses in humanities and social sciences, with emphasis on comparative cultural studies, French language, and critical studies.

University of Toulouse. EAP students take regular university courses at Toulouse I (Social Sciences) and Toulouse II (Humanities). Of particular note are courses in business/management studies, comparative literature, economics, international relations, and political science.

Germany. A compulsory intensive language and culture program precedes the beginning of the academic year. All courses are taught in German.

Language and Society Program, Bayreuth. Short Term program available for Spring quarter.

Georg-August University, Göttingen. Year or Spring quarter, *or* Gottengen Fall and Berlin Spring. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics.

Hungary. *Eötvös Loránd University, Budapest.* A fall semester or a year-long program are offered with an emphasis on Central European studies. Students take courses especially designated for EAP, and the courses are taught in English.

Italy. A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may become eligible for participation by attending a summer intensive-language program in Italy in order to attain the required third-year level, followed by the normal compulsory intensive-language program in Padua. A UC faculty director resident in Padua administers all EAP programs in Italy. All courses are taught in Italian.

Siena Language and Culture Spring Quarter (Siena) or semester (Venice/Siena) Program. Open to beginning (no prior language study required) and intermediate (at least one year of language study) Italian language students. Sophomores may apply. Good academic standing required.

Bocconi University, Milan. This institution offers studies in business administration, economics, management and public administration, with a special emphasis on Italian and European entrepreneurial systems.

University of Bologna. Humanities, social sciences, economics, history.

University of Padua. History of art (including archaeology), Italian literature (including linguistics), and political science (which includes history, social sciences, geography, and demography, as well as political science in the American sense). Sciences are not available for UC students.

University of Venice. Economics, history; history of art.

Scuola Normale Superiore, Pisa. Medieval and renaissance studies and links to faculty members need to be approved by the host university prior to admission into the program.

Accademia delle Belle Arti di Venezia, Venice. Art studio and some art history. Colored slides of portfolio of artistic work and successful completion of entrance examination required for admission.

Netherlands. Year or Fall/European Studies semester available. Courses in European history, politics, economics, international relations. Courses taught in English.

Spain. A compulsory intensive language program precedes the beginning of the academic year. All instruction is in Spanish.

University of Alcala de Henares. Spanish language and literature, history and economics.

University of Barcelona. Humanities (with emphasis on Spanish art, history, literature, linguistics) and some social sciences. EAP students are required to take at least two regular year-long courses at the University of Barcelona. (This is a cooperative program with the University of Illinois.)

University of Granada. EAP students take at least three courses each semester. Students will also take special program tutorials.

Complutense University of Madrid. Humanities and some social sciences. The core program, developed for the UC Study Center and other American programs, concentrates on Spanish studies in the broadest sense. Core and Study Center courses are taught by Spanish faculty. EAP students are required to take two regular year-long courses at the University of Madrid.

Autonomous University of Barcelona. Courses in most majors including Catalán studies, International Relations, and Environmental/Ecological studies.

Autonomous University of Madrid. Courses in natural sciences, physics, chemistry and biology, economics, history, geography, literature, and psychology.

Sweden. Fall term or year participation. Compulsory intensive language course during the summer for students who are not already fluent in Swedish. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of Swedish. Many courses are taught in English. Previous knowledge of Swedish is not required.

University of Lund. Broad curriculum. Excellent science programs.

United Kingdom and Ireland. The program, which includes 19 institutions listed below, is administered by a director and associate director located in London. Following selection for participation by the EAP administration, a student must still be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in that department only.

England: *University of Birmingham, University of East Anglia, University of Essex, Colchester, University of Hull, University of Kent at Canterbury, University of Lancaster, University of Leeds, University of London (Queen Mary and Westfield College), University of Sheffield, University of Sussex, University of Warwick, University of York.*

Ireland: *University College, Cork, University College, Galway.*

Scotland: *University of Edinburgh, University College, Glasgow, University of St. Andrews, University of Stirling.*

Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are available.

Russia. One semester-long (fall only) program available at the *European University of Moscow.* Intensive language study at the intermediate or advanced level for at least half of the units earned, and a wide range of area studies courses to chose from. Some course work wlll be available in English. Graduate student opportunities will be available for students with advanced Russian language training.

Middle East

Egypt. All courses are taught in English, except courses in Arabic language and literature.

The American University of Cairo. A broad curriculum offered by the Faculty of Arts and Sciences. All students are required to take at least one year-long course in Arabic. Offerings in science are limited.

Israel. A required, 10-week summer intensive language and cultural immersion program at the University in Haifa precedes the academic year.

Hebrew University, Jerusalem. Broad curriculum; emphasis on Israel and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English at the Hebrew University's Rothberg School for Overseas Students. The program offers courses in Judaic, Israeli, Middle Eastern studies, and a few courses in the general social sciences and humanities, science and business. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

Ben-Gurion University of the Negev, Beersheva. Intensive study abroad experience focusing on research. Two tracks are available: social-scientific study of Israel's ethnic minorities (Bedouin, Russian, Ethiopian) or laboratory study in the health sciences and the natural sciences in areas related to Israel's environment. Opportunities will be available for students to spend several hours per week in internship positions in various educational, social, community and health institutions in the Bedouin, Ethiopian, Russian and Israeli communities.

Asia

Hong Kong. A selection of courses is offered in English. Knowledge of Chinese is not required for acceptance; however, all students are required to complete at least two courses in Chinese culture, history, or language prior to departure. A compulsory intensive Cantonese program precedes the beginning of the academic year. All students are required to include 18 units of Mandarin or Cantonese in their annual program abroad.

Chinese University of Hong Kong. Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available.

India. Fall Semester or year program. Instruction is in English. A compulsory intensive language program in conversational Hindi precedes the academic year. Students will take a year-long core program focusing on development in modern India and Indian culture and tradition, as well as continue their study of Hindi. During the second and third quarters, students will also take regular course work at the University of Delhi.

University of Delhi. Humanities and social sciences are well represented, with some offerings in fine arts and mathematics.

Jawaharlal Nehru University, New Delhi. EAP students majoring in economics, development studies, environmental studies, political science, and social sciences will find extensive course work in these areas.

Indonesia. Fall semester or year program. Instruction is in English. An eight-week summer intensive-language program at *Gadjah Mada University* in Yogyakarta is required for all students. Those with less than two years of University-level Indonesian must then take a ten-week inter-term program of continued study of the language, with additional courses in Indonesian history and culture, taught in English. Students enroll in regular courses at one of five institutions for the second semester. Tutorial assistance may be available.

Gadjah Mada University. Agriculture, anthropology, biology, economics, geography, mathematics, philosophy, psychology, political science.

Institute Seni Indonesia (ISI). The Indonesian Institute of the Arts: visual arts, music, dance, theater, fine arts, ethno-musicology.

Japan. A variety of study opportunities are available to UC students. Language requirements vary depending upon the host institution and the academic focus of the program. A summer intensive language course prepares students for year-long programs. The programs are adminstered by a director located in Tokyo.

Doshisha University, Kyoto. Humanities and social sciences; emphasis on Japanese language and culture. This center serves students having more advanced study of Japanese; at least two, preferably three, years of UC Japanese language study.

Global Security Studies Program, Meiji Gakuin University, Yokohama. This spring quarter program provides students the opportunity to study economics, political science, world peace and security issues. Previous Japanese language study is preferred, but not required.

Inter-University Center for Japanese Language Studies (IUC), Yokohama. This program offers an intensive program of training for graduate students in Japanese language. The prerequisite is two years of university-level Japanese.

International Christian University, Mitaka (Tokyo). Humanities and social sciences; emphasis on Japanese language and intercultural communication. A limited number of courses taught in English are available. At least one year of university-level Japanese language study is required.

Nagoya University, Nagoya. This program is for graduate level economics students. The academic program includes intensive Japanese language study and research conducted under the supervision of a Japanese professor. The prerequisite is two years of university-level Japanese.

Osaka University, Osaka. Undergraduate students study Japanese language and a set program of economics courses. Instruction is in English during the fall semester and in Japanese during the spring. A minimum of two years of university-level Japanese is required.

Sophia University, Tokyo. Comparative culture studies, Japanese language and literature, history, political science, economics and business are available. Many are taught in English. The prerequisite is one year of university-level Japanese.

Tohoku University, Sendai. This program is primarily for graduate students in most fields with well-developed research projects. Participants will study Japanese language, in addition to working on their research projects under the guidance of a Japanese professor. Graduate study in Engineering may also be available. Undergraduates at the advanced level in Japanese may be able to participate in a language and culture program. The prerequisite is two to three years of university-level Japanese.

Tokyo Institute of Technology. Graduate students proficient in Japanese may do research and take courses in science and engineering.

Tsukuba University. Studies in the humanities, social and natural sciences and engineering.

Korea. Year or summer-plus-fall term with a required six-week intensive language program at Yonsei University. Students who are not fluent in Korean will take courses taught in English at Yonsei's Division of International Education. Courses in art history, business, economics, law, literature, philosophy, political science, and sociology are available.

People's Republic of China. EAP offers a full-year program in Beijing and a fall semester program at *Nankai University* in Tianjin. Intensive language study in Chinese is the primary emphasis of all programs.

Beijing University of Science and Technology. Students receive a half-year of academic credit and financial support for studying standard Chinese and teaching English to Chinese students. The prerequisite is two years of Chinese language and one course in teaching English as a foreign language.

Nankai University, Tianjin. This fall semester program includes Chinese language study and courses taught in English on Chinese culture and civilization. The prerequisite is one year of college-level Chinese. Students must take an intensive language program in July and August prior to the start of the semester.

Peking University. A year-long program focused on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Teaching to Foreigners Division of Peking University. The prerequisite for the program is two years of college-level Chinese.

Singapore. Semester or year program. Courses in biology (botany and zoology), business, economics, sociology, and Southeast Asian Studies.

Taiwan, Republic of China. Year program. Students participating in the Chinese Language and Culture Studies program in Taipei receive instruction in the Chinese language and enroll in lecture courses (taught in English) on Chinese culture and society arranged by CSU International Programs. Courses in art history, literature, economics, history and political science are available. Prior course work in Chinese culture, history and language are recommended.

National Taiwan University. (This is a cooperative program with California State University International Programs).

Thailand. Fall semester or year program. An eight-week summer intensive language program at *Chiangmai University* is required for all students. This is followed by a seven-week inter-term program of continued study of the Thai language, with additional courses in Thai history and culture, taught in English. Most students will remain at *Chiangmai University* for the second semester and continue taking courses in Thai language and area studies classes taught in English. Students with sufficient language background (more than two years of University-level Thai language) have the option of enrolling at *Chulalongkorn University* in Bangkok for the second semester. Instruction is in Thai, though English-speaking tutors are available.

It is possible to apply for the summer intensive-language program only. Students may take more advanced language courses in subsequent years.

Africa

Ghana. *University of Ghana, Legon-Accra.* Open to undergraduate and graduate students. Instruction is in English. As in the British system, students take a year-long program of study in a single area. End-of-year examinations are given only once and are mandatory for credit to be awarded.

Offerings include humanities and social sciences, with emphasis on African studies. There is a strong program in ethnomusicology.

Latin America

Brazil. Language requirement for admission to this program is two years of college-level Portuguese *or* the equivalent; *or* one year of college Spanish and one year of college Portuguese; *or* two years of college Spanish and intensive language course preceding the beginning of regular course work.

Pontifical Catholic University of Rio de Janeiro (PUC-Rio). A semester or year academic program which consists of Portuguese study and regular university courses in a wide range of fields.

Chile. Semester (Winter and Spring quarter equivalent) and year program. *Catholic University of Chile, Santiago de Chile.* A semester or year program is offered. Courses in Chilean history and society; Spanish language; Latin American development, ecology and the environment; and interdisciplinary women's studies are available.

University of Chile, Santiago.

Costa Rica. Semester (Winter and Spring quarter equivalent) and year program. *University of Costa Rica, San Jose.* As is appropriate in this hemisphere, the academic year extends from early March through December. UC participants leave in January. Applications for participation in this program are due in May for a January departure.

A mandatory intensive language program precedes the academic year. During the academic year, courses in Central American studies (history, literature, political science, etc.) form half of the curriculum, with the remaining courses taken from any of the faculties at the University of Costa Rica.

Costa Rica Tropical Biology Quarter at Monteverde and at Las Cruces. This Spring and Fall quarters program provides an unusual opportunity for undergraduates to study and do field research in a tropical cloud forest. Applicants should have completed a year of biology, including one upper division organismal biology course. Spanish language required.

Central America

Mexico. *Universidad Nacional Autonoma de Mexico (UNAM), Mexico City.* A required intensive language program precedes the beginning of the school year, augmented by courses in contemporary Mexico (history, art, literature, etc.). Students have the option of spending one semester (two UC quarters) at UNAM, or a full year. All instruction is in Spanish.

Barbados. Emphasis in Caribbean studies. One-year program.

*Course not offered this academic year.

Field Research Program (FRP) in Mexico. Available for either Fall or Spring semester, the FRP program begins in Mexico City with six weeks of intensive language courses and a course on contemporary Mexico. The final weeks of the program are spent doing research work in a city in Mexico to complement formal course work. Students must have completed a minimum of two years of university-level Spanish, or the equivalent, and have at least sophomore standing with good academic standing at the time of departure.

Language Program in TAXCO. Winter quarter available for language study at the 2nd-year level or advanced. At least sophomore standing with good academic status at the time of departure.

Summer Intensive Language Quarter in Morelia. This program provides total immersion in Mexican society and Spanish language instruction for students who have completed one year of university-level Spanish with a 3.0 GPA before departure. It is not appropriate for advanced students in Spanish. At least sophomore standing with a cumulative GPA of at least 3.0.

Canada

Students may enroll for a Fall semester or a full year. Studies on the major or a closely allied field are expected.

University of British Columbia (UBC), Vancouver. Most academic disciplines are available. Areas of special interest include Pacific Rim and Canadian Studies.

Australia and New Zealand

As is appropriate in the Southern Hemisphere, the academic year extends from the beginning of instruction in late February through the examination period, which ends in early December. UC participants leave in early February, and will be unable to attend classes during the winter term preceding departure. Applications for participation in these programs are due in May for a February departure. The universities follow the British system of higher education.

The Australian program includes the *University of New England* in Armindale; the *University of Queensland* in Brisbane; the *Australian National University* in Canberra; three institutions in the Melbourne area, *University of Melbourne, Monash University* and *La Trobe University*; the *University of Sydney,* and the *University of New South Wales* in Sydney; *University of Adelaide* and *Flinders University* in South Australia; and the *University of Woolongong.* A full range of academic programs is available. The Study Center accommodates a limited number of students. A UC faculty member in Melbourne directs all programs.

The New Zealand program includes the *University of Auckland, Lincoln College* in Christchurch, the *University of Otago* in Dunedin, *Massey University* in Palmerston North, *Victoria University* in Wellington and the *University of Waikato* in Hamilton. All academic disciplines are available; programs in textiles and engineering and a variety of agricultural sciences are of special interest.

Endocrinology (A Graduate Group)

Judith Turgeon, Ph.D., Chairperson of the Group

Group Office, 4136 Tupper Hall (Human Physiology, 752-3230)

Faculty. The Group includes faculty from the Schools of Medicine and Veterinary Medicine, the Division of Biological Sciences, and the College of Agricultural and Environmental Sciences.

Graduate Study. The interdepartmental Graduate Group in Endocrinology offers programs of study leading to the M.S. and Ph.D. degrees. Research and instruction are offered in topics ranging from endocrinological processes at the cellular and molecular levels to integrative systemic endocrinology. Graduate students receive a strong background in required basic cellular, biochemical and integrative endocrinology and related course work, plus have the opportunity to select specific fields of emphases such as molecular mechanisms of hormone action, signal transduction, metabolism regulation, growth factors, neuroendocrinology, and reproduction.

Graduate Advisers. Contact the Program Office.

Courses in Endocrinology (EDO)

Graduate Courses

***210. Methods in Endocrine Research** (4) I, II, III. The Staff
Laboratory—9 hours; discussion—1 hour. Prerequisite: consent of instructor. Ten-week assignment in endocrinology research laboratory. Individual research problem with emphasis on experimental design and methodological/analytical experience. Exposure to and experience with a range of endocrinology faculty research activities. May be repeated three times for credit. (S/U grading only.)

218. Mammalian Endocrinology and Homeostasis (4) III. Walsh, Turgeon
Lecture—4 hours. Prerequisite: Biological Sciences 102 and 103, Neurobiology, Physiology and Behavior 101, and consent of instructor. Biochemical, physiological, and regulatory properties of the mammalian endocrine system, at the molecular, cellular and systemic level. Signal transduction mechanisms and hormonal actions. Principles that regulate homeostasis, especially in organ–organ interrelationships, metabolism and minerals, fluids and electrolytes. Reproductive endocrinology.

220. Endocrinology Literature Critique (1) I, II. Turgeon
Discussion—1 hour. Prerequisite: consent of instructor. Critical reading and evaluation of current original publications in endocrinology. Selected papers will be presented and discussed in detail by faculty and students. May be repeated for credit. (S/U grading only.)

235. Personal Computing in the Life Sciences (3) III. Matthews
Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Current and near-future uses of "state-of-the-art" personal computers, including the Internet and local area networks. Application in the life sciences. Running programs on Macintosh and PC-compatible computers and on Windows NT local area network in Endocrinology Graduate Group computer laboratory.

240. Biochemical Endocrinology (3) III. Adams
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Examination of recent advances in biochemical endocrinology and molecular and cell biology of endocrine systems with emphasis on processes of hormone and receptor synthesis, second messenger phenomena, and hormonal control of gene expression.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and current trends in research in endocrinology. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
(S/U grading only.)

Endocrinology and Metabolism

See Internal Medicine in Medicine, School of

Engineering

(College of Engineering)

Alan J. Laub, Ph.D., Dean

Benjamin J. McCoy, Ph.D., Associate Dean—Research

Zuhair A. Munir, Ph.D., Associate Dean—Graduate Studies

James F. Shackelford, Ph.D., Associate Dean—Undergraduate Studies

Billy Sanders, Ph.D., Assistant Dean—Academic Affairs

College Office, 1050 Engineering II (916-752-0553)
World Wide Web: http://www.engr.ucdavis.edu/

Undergraduate Study

The four-year undergraduate program is divided into two parts: the **Lower Division Program** and the **Upper Division Program**. If you enter the College of Engineering with *fewer than 90* quarter units of credit, follow the lower division program specified for your major.

If you enter the College with 90 or more quarter units of credit, you must fulfill the requirements outlined in the Undergraduate Education chapter of this catalog, under "College of Engineering, Unit Requirements."

Graduate Study

Graduate degrees are offered in Engineering (M.Engr, M.S., D.Engr., Ph.D.) and Engineering—Applied Science (M.S., Ph.D.). See the Graduate Studies section of this catalog. For additional information refer to the *College of Engineering Bulletin*, obtainable from the UCD Bookstore, or phone the Graduate Study Office (916-752-0592).

The Major Programs

Eleven majors are offered leading to the B.S. degree:

Aeronautical Science and Engineering
Biological Systems Engineering
Chemical Engineering
Chemical/Biochemical Engineering
Civil Engineering
Computer Engineering
Computer Science and Engineering
Electical Engineering
Food Engineering
Materials Science and Engineering
Mechanical Engineering

Four double majors are offered leading to the B.S. degree:

Chemical Engineering/Materials Science and Engineering
Civil Engineering/Materials Science and Engineering
Electrical Engineering/Materials Science and Engineering
Mechanical Engineering/Materials Science and Engineering

The Aeronautical Science and Engineering Major Program

(Mechanical and Aeronautical Engineering)

Aeronautical Science and Engineering is the branch of engineering that applies scientific knowledge to the design, manufacture and operation of aircraft. Our Bachelor of Science degree in Aeronautical Science and Engineering provides a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare you for employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context, aeronautical engineers are in-

volved with automobiles, trains, ships and submarines, aircraft, rockets and missiles, sports equipment, and a variety of energy systems.

Courses in fundamental engineering principles are supplemented with courses in aircraft propulsion, aerodynamics, performance, stability and control, aircraft preliminary design, aeronautical structures, and aeroelasticity.

Aeronautical Science and Engineering Curriculum

The Aeronautical Science and Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Lower Division Program

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C-9D	16	3-4-5-6
General chemistry—Chemistry 2A-2B or 2AH-2BH	10	2-3 or 4-5
Engineering graphics in design—Engineering 4	3	1 or 2
Applications of computers—Engineering 5	3	2 or 5
Circuits—Engineering 17	4	6
Aeronautical engineering fundamentals—Aeronautical Science and Engineering 25	3	2 or 5
Statics—Engineering 35	3	4 or 5
Dynamics—Engineering 36	3	5 or 6
Properties of materials—Engineering 45	4	4 or 6
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	1 or 2
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	4
Humanities–Social Sciences and/or General Education electives	12	
Total Lower Division Units	**91**	

Upper Division Program

A broad range of technical elective courses is available. Some students choose these electives from one area of study in order to begin developing a specialty. Others choose from several areas in order to broaden their background in the sciences and engineering. Typical aeronautical science and engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, aeronautical structures, aeroelasticity, flight testing, or component and mechanism design. While you should consult with your adviser before selecting your technical electives, there are a number of electives that could be recommended to all aeronautical science and engineering students regardless of their chosen area of specialization.

Suggested technical electives:

Aeronautical Science and Engineering 131, 137, 139

Mechanical Engineering 172

Suggested advisers: V.R. Capece, J.J. Chattot, M.M. Hafez, R.A. Hess, L.W. Rehfield, N. Sarigul-Klijn, S.A. Snell, C.P. van Dam, B.R. White.

Upper Division Requirements

	UNITS
Subject Areas and Courses	
Electronic circuits—Engineering 100	3
Applied mechanics—Engineering 102, 104, 104L	8
Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 165	10
Fluid mechanics—Engineering 103A, 103B, 107L	8
Aerodynamics—Aeronautical Science and Engineering 126, 127	8
Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 128, 129, 138	12
Aircraft preliminary design—Aeronautical Science and Engineering 130	4
Aerospace structures—Aeronautical Science and Engineering 133, 135	7
Measurement systems—Mechanical Engineering 176	3
Controls and system analysis—Mechanical Engineering 171	4
Applied mathematics—Select one course from Engineering 180; Applied Science Engineering 115 or Mathematics 128C	3
Professional responsibilities—Engineering 190	3
Technical electives Select 8 units from the following: *Strongly recommended:* Aeronautical Science and Engineering 131, 137, 139; Mechanical Engineering 172. *Recommended:* Engineering 102L, 106, 122, Materials Science and Engineering 140, 142, 148, 155, Mechanical Engineering 150A, 150B, 162, 184A with 184B (both courses must be taken), 186, 187, Applied Science 115, Civil and Environmental Engineering 130.	8
Humanities–Social Sciences electives and/or General Education electives	12
Total Units for Upper Division Program	**93**
Minimum Units Required for Major	**184**

Biological Systems Engineering

(Biological and Agricultural Engineering)

Biological Systems Engineering is the branch of engineering that builds strongly on biology as a scientific base. In the coming age of biology and biotechnology, engineers will be needed to work side by side with life scientists to bring laboratory developments into commercial production. Industries in plant and animal production, tissue culture, bioprocessing, biotechnology, food processing, aquaculture, agriculture, and forest production will all need engineers with strong training in biology. Concern for our environment is opening new engineering opportunities as society strives to maintain a balance within the biosphere.

In the freshman and sophomore years, the Biological Systems Engineering major requires sequences of courses usual in all engineering programs, including math, physics, chemistry, engineering science, and humanities. Unlike other majors, the Biological Systems Engineering major also requires fundamental courses in the biological sciences and the integration of engineering with biology.

Biological Systems Engineering Curriculum

The Biological Systems Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

Lower Division Program

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C	12	3-4-5
General chemistry—Chemistry 2A-2B	10	2-3
Biological Sciences 1A, 1B, 1C	15	4-5-6
Introduction to biological systems and food engineering—Biological Systems Engineering 1	3	1
Applications of computers—Engineering 5	3	2
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	4
Dynamics—Engineering 36	3	6
Properties of biological materials—Biological Systems Engineering 75	4	5
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4	1
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	1-3
Humanities–Social Sciences electives and General Education electives	4	1-3
Total Lower Division Units	**91**	

Upper Division Program

In the junior and senior years, the Biological Systems Engineering major requires courses that focus on the integration of biology and physical sciences with engineering. Depending on your area of interest, you may select elective courses from six specializations:

Agricultural Engineering
Aquacultural Engineering
Biotechnical Engineering
Ecological Systems Engineering
Forest Engineering
Premedical/Biomedical Engineering

You may also develop your own specialization in consultation with your adviser. The upper division requirements are listed following the areas of specialization.

Areas of Specialization

Agricultural Engineering. Students specializing in agricultural engineering integrate engineering analysis and design with applied biology to solve problems in production, transportation and processing of agricultural products. Agricultural engineers design machinery, processes, and systems for managing a productive plant and animal culture, including environment, nutrient, and waste. Suggested courses in the specialization provide students with the fundamental principles of agricultural production and a broad background in engineering. Agricultural engineers are employed as practicing professionals and managers with large and small agricultural producers, equipment manufacturers, food processors, consulting engineering firms, and government agencies.

Recommended biological science electives:

Plant Emphasis
Plant Biology 111
Soil Science 100
Select one course from Agricultural Systems and Environment 110A, Entomology 100, Plant Biology 174, Environmental Horticulture 102

Animal Emphasis
Neurobiology, Physiology and Behavior 101
Soil Science 100
Select one course from Avian Sciences 100, Animal Science 143, 144, 146

Recommended engineering electives:

Biological Systems Engineering 114, 132, 145

*Course not offered this academic year.

Civil and Environmental Engineering 141, 141L
Engineering 180

Aquacultural Engineering. Aquacultural engineers design, build, and manage equipment and systems for the production of aquatic plants and animals. Aquacultural engineers must have a solid understanding of biology, especially processes related to water quality, to be able to work with the wide variety of systems used for aquaculture production. Systems range from sophisticated indoor plants with water treatment and recirculation to low-input earthen ponds. The elective courses recommended for the specialization include fish biology and production as well as water quality and treatment. Employment opportunities for aquacultural engineers include engineering consulting companies and government agencies. The aquaculture industry is expanding rapidly in various areas around the world, creating international employment opportunities for aquacultural engineers.

Recommended biological science electives:

Applied Biological Systems Technology 161
Animal Science 118
Wildlife, Fish and Conservation Biology 121

Recommended engineering electives:

Applied Biological Systems Technology 163
Civil and Environmental Engineering 140, 140L, 141, 141L, 148A, 148B

Biotechnical Engineering. This specialization is for students interested in the developing biotechnology industries. Core engineering courses are combined with training in genetics, biochemistry, microbiology, and molecular biology. Modern laboratory techniques in biochemistry are also included in the specialization to provide hands-on skills. Biotechnology is an emerging area of industrial growth in the U.S. and will increasingly need engineers to transfer laboratory developments to large scale production. Present industrial activities include the production of genetically altered plants, plant materials and food products, production and packaging of biocontrol agents for plant pests and diseases; microbial production of biological products; tissue culture; and bioremediation.

Recommended biological science electives:

Biological Sciences 101, 102, 103
Microbiology 102
Molecular and Cellular Biology 120L

Recommended engineering electives:

Biological Systems Engineering 132, 175
Chemical Engineering 161B, 161L
Engineering 180

Ecological Systems Engineering. Specialists in ecological systems engineering are concerned with the design, development, and management of ecosystems. Typical applications include the rehabilitation of disturbed ecosystems, the design of mitigation areas, the incorporation of ecologically sustainable features into land developments, and the design and management of public and private landscapes. An understanding of ecology and the interaction of ecological communities, coupled with knowledge of engineering design and economics, are stressed in this specialization. Employment opportunities include environmental consulting firms, government regulatory agencies, and agencies involved in wildland resource management.

Recommended biological science electives:

Entomology 100
Environmental Studies 100
Soil Science 100
Select one course from Atmospheric Science 133, Plant Biology 121, Environmental Toxicology 101 or 112A

Recommended engineering electives:

Applied Biological Systems Technology 180
Biological Systems Engineering 115, 145
Civil and Environmental Engineering 148A or 149, 152
Hydrologic Sciences 100

Recommended course:

Landscape Architecture 40 (no technical elective credit will be granted for this course in any engineering major)

Forest Engineering. Forest engineers apply engineering principles to solve problems in managing forest lands. Forestry has evolved from an emphasis on wood production toward multiple use, ecosystem management and consideration of noneconomic objectives such as retaining biodiversity. Forest engineers help to develop the equipment and techniques to plan and carry out forest operations that can meet these changing requirements. Examples include reforestation, harvesting, forest residue management, and development of roads and recreation facilities.

Following the sophomore year, students are strongly encouraged to attend an eight-week field course sequence at the UC Forestry Camp near Quincy. This is followed by a semester at UC Berkeley, as an intercampus visitor, taking suggested forestry courses. This sequence provides a strong background in forest ecology, planning, and operations. Students complete their engineering programs at UC Davis, taking courses in planning methods, equipment development, and road design. Forest engineers are employed by the US Forest Service and other public agencies, the forest industry, consulting firms, and equipment manufacturers.

Recommended biological science electives:

ESPM 129* 3 (Forest and Range Soils) or Soil Science 100
ESPM 182* 4.5 (Forest Harvest Systems)
ESPM 185* 6 (Silviculture)

Recommended engineering electives:

Applied Biological Systems Technology 180
Biological Systems Engineering 114, 115, 116
Civil and Environmental Engineering 141, 141L, 145

Recommended Courses:

ESPM 101* 15 (Forestry Summer Program)
ESPM 172* 4.5 (Forest Photogrammetry and Photo Interpretation) or Geography 106
ESPM 175* 4 (Forest Influences)
Plant Biology 120

*ESPM courses are offered at the UC Berkeley campus.

Pre-Medical/Biomedical Engineering. The pre-medical/biomedical specialization is designed for students planning to attend medical school after graduation, or for students interested in working in the biomedical industries. Course work is offered in biology, chemistry, organic chemistry, biochemistry, microbiology, and physiology to satisfy typical entrance requirements for medical school. Early in their academic programs, pre-medical engineering students are encouraged to consult with an adviser from the School of Medicine to plan for successful admission, including appropriate summer experience. Biomedical engineering is primarily a field of study at the graduate level, and may have a chemical, mechanical, or electrical emphasis. The core Biological Systems Engineering program—plus additional course work in fluid mechanics, rheology, and dynamics—provides a broad foundation for graduate specialization.

Recommended biological science electives—Biomedical:

Biological Sciences 102
Microbiology 102
Neurobiology, Physiology and Behavior 101

Recommended biological science electives—Premedical:

Biological Sciences 101, 102
Microbiology 150, 150L

Recommended engineering electives:

Biological Systems Engineering 175
Engineering 102, 102L, 103B, 103L, 180

Recommended for medical school:

Chemistry 2C, 118C

Upper Division Requirements

UNITS

Subject Areas and Courses

Probabilistic Systems Analysis For Civil Engineers—Civil and Environmental Engineering 114 3

Organic chemistry—Chemistry 8A or 118A...2-4
Organic chemistry—Chemistry 8B or 118B (recommended for Aquacultural, Biotechnical, and Pre-Medical/Biomedical Engineering specializations) **or** Surveying—Civil and Environmental Engineering 10 (recommended for Agricultural, Ecological, and Forest Engineering specializations) .....4 or 3
Electrical Circuits and Systems—Engineering 100 3
Elementary Fluid Mechanics—Engineering 103A 3
Mechanics of Materials—Engineering 104 (recommended for Agricultural, Pre-Medical/Biomedical, Ecological and Forest Engineering specializations) **or** Chemical Engineering 161A (recommended for Aquacultural and Biotechnical Engineering specializations) 3-4
Thermodynamics—Engineering 105A 3
Engineering Economics—Engineering 106 3
Power Sources and Transmission—Biological Systems Engineering 120 4
Psychrometrics, Heat and Mass Transfer—Biological Systems Engineering 125.....3
Dynamic Modeling of Processes In Biological Systems—Biological Systems Engineering 130 3
Bioinstrumentation and Control—Biological Systems Engineering 165 3
Engineering Design and Professional Responsibilities—Biological Systems Engineering 170A 3
Engineering Projects: Design—Biological Systems Engineering 170B 3
Engineering Projects: Design Evaluation—Biological Systems Engineering 170C.....3
Engineering electives†—Select a minimum of 13-15 units (to bring the overall total to at least 180 units) from all upper division College of Engineering courses (exclusive of Applied Science Engineering 137, Engineering 160, and courses numbered 190–197); Applied Biological Systems Technology 163, 180; and Hydrologic Science 100.
Biological Science Electives†—Select a minimum of 9 units from all upper division courses in the Division of Biological Sciences (excluding courses numbered 190–199); Applied Biological Systems Technology 161, Animal Science 118, 143, 144, 146; Agricultural Systems and Environment 110A; Atmospheric Science 133; Avian Sciences 100; Entomology 100; Environmental Horticulture 102; ESPM 129, 182, 185 (ESPM courses are offered at UC Berkeley campus); Environmental Studies 100; Environmental Toxicology 101, 112A; Plant Biology 174; Soil Science 100; Wildlife, Fish and Conservation Biology 121. Students may choose other upper division courses with substantial biological content offered in the College of Agricultural and Environmental Sciences; consultation with a faculty adviser and approval by petition is required.
Humanities–Social Science electives and/or General Education electives.....20

Total Units for Upper Division Program....89-92
Minimum Units Required for Major.....180–184

†Refer to specialization descriptions for course recommendations.

Master Undergraduate Adviser: M. Delwiche.

Chemical Engineering

Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from antibiotics to zirconium. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment, food and pharmaceutical production, and medicine, working in areas as diverse as integrated circuits and integrated waste management. Preparation for a career in chemical engineering requires an under-

standing of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The Chemical Engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future.

Chemical Engineering Curriculum

The Chemical Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

Lower Division Program

Requirements for majors in Chemical Engineering and the double majors, Chemical Engineering/Materials Science and Engineering and Chemical Engineering/Biochemical Engineering.

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C	12	3-4-5
General chemistry—Chemistry 2A, 2B, 2C (Chemistry 2AH, 2BH, 2CH strongly recommended)	15	1-2-3
Organic chemistry—Chemistry 128A, 128B	6	4-5
Organic chemistry laboratory—Chemistry 129A	2	4
Biological Sciences 1A (required only for Chemical/Biochemical majors)	5	6
Engineering—Applications of computers—Engineering 5	3	2 or 5
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	5
Properties of materials—Engineering 45 (required only for Materials Science and Chemical Engineering/Materials Science and Engineering majors)	0 or 4	6
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	2 or 3
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	2 or 3
Humanities–Social Sciences electives and/or General Education electives	16	
Total Lower Division Units	**91-96**	

Upper Division Program

In your junior year, you focus your attention on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In your senior year, you draw these fundamentals together and apply them in a study of mass transfer phenomena, process design, and process dynamics and control. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 12 units of technical electives and 6 units of advanced chemistry electives that allow you to strengthen specific areas in chemical engineering, explore new areas, or pursue areas of specialization. The most popular areas of specialization, together with lists of **suggested** technical electives, are identified and discussed in the following paragraphs. Please talk to the instructors of the courses listed about possible prerequisites before enrolling.

The *premedical* and *prebiomedical engineering* areas of specialization have been specifically designed to prepare the student for graduate work in biomedical engineering or to meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and the application of fluid mechanics, mass transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics to problems in natural science, you are well prepared to understand problems in living systems. Many biological phenomena, such as blood flow, solute transport, and energy exchange, can be dealt with using the theoretical tools you learned as an undergraduate.

Areas of Specialization

Applied Chemistry. The Chemical Engineering curriculum includes an important core of chemistry courses. You can take advantage of this background to build a strong program in chemistry by choosing electives from among advanced undergraduate chemistry courses.

Suggested technical electives:

Chemistry 110B, 111, 115, 121, 128C, 129B, 129C, 130, 131, 150
Fiber and Polymer Science 100, 110

Applied Mathematics. The mathematics specialization is designed both to strengthen your understanding of the foundations of engineering science and to improve your ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:

Applied Science Engineering 115, 116
Mathematics 118A, 118B, 118C, 119A, 119B, 121A, 121B, 128A, 128B, 128C, 131, 132A, 132B, 185A, 185B

Biochemical Engineering. This area of specialization prepares you to do graduate work in biochemical engineering and to find employment in the biotechnology, pharmaceutical, and food industries.

Suggested technical electives:

Strongly recommended

Microbiology 102, 102L
Biological Sciences 1A, 102
Chemical Engineering 161A, 161B, 161L

Also recommended

Biological Sciences 1B, 101, 103, 104
Biological Systems Engineering 175
Chemical Engineering 170
Food Science and Technology 123, 123L
Microbiology 140, 150, 155L, 160
Molecular and Cellular Biology 120L, 123, 160L, 161, 170L
Neurobiology, Physiology and Behavior 100B, 100L
Plant Science 140
Viticulture and Enology 140, 186

Computers and Automation. This specialization offers you the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, you are exposed to the theory and practice of monitoring and operating chemical processes using microprocessor-based control systems. The common ingredient in these studies is the use of computers. Development of expert systems for detecting process failures, using computer-aided design (CAD) packages to optimize product yields, solving large numbers of equations on supercomputers to assess transient behavior of processes, and implementation of plantwide control systems are all examples of chemical engineering endeavors based on the extensive use of computers. The following list of elective courses is suggested to help you obtain the necessary background in these areas.

Suggested technical electives:

Artificial Intelligence and Computer Graphics:
Computer Science Engineering 170, 175
Numerical Analysis and Optimization:
Applied Science Engineering 115, 116
Mathematics 128B-128C, 168
Civil and Environmental Engineering 153
Automatic Control:
Biological Systems Engineering 165
Electrical and Computer Engineering 150B, 157B, 174
Mechanical Engineering 176
Food Science and Technology 156

Advanced Materials Processing. Because the manufacture of semiconductor devices, integrated circuits, magnetic memories, tapes, disks, and other devices involves the application of chemical and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces you to the analysis and design of modern circuits and devices and provides a strong background in the layout and fabrication of such devices.

Suggested technical electives:

Electrical and Computer Engineering 140A, 140B, 145A, 145B, 146A, 146B
Physics 140A, 140B
Materials Science and Engineering 138, 144, 146, 155

Energy Conversion and Fuels Processing. This area of specialization introduces you to energy sources, energy conversion methods, and the manufacture of fuels.

Suggested technical electives:

Biological Systems Engineering 120
Engineering 111
Environmental and Resource Sciences 103
Environmental Studies 167
Mechanical Engineering 161, 162

Environmental Engineering. Many activities of chemical engineers are motivated by environmental protection. This option prepares you to deal with environmental issues by developing knowledge of fundamental chemical and transport phenomena: chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses and courses on environmental topics, prepares you to seek employment with industry or government. For this specialization, select six courses from the following list:

Suggested technical electives:

Air Environment

Strongly recommended

Civil and Environmental Engineering 149

Recommended

Atmospheric Science 121A, 121B, 158
Civil and Environmental Engineering 150
Environmental Studies 110
Environmental Toxicology 101, 112A, 112B, 131

Water Environment

Strongly recommended

Chemical Engineering 161A, 161B, 161L
Civil and Environmental Engineering 140, 140L, 148A, 148B
Microbiology 102

Recommended

Biological Sciences 102, 103
Civil and Environmental Engineering 147
Environmental Studies 110, 150A, 151
Environmental Toxicology 101, 112A, 112B
Hydrologic Science 124
Soil Science 100, 102, 107

Food Process Engineering. This area of specialization prepares you to do graduate work in food science and technology and to work in the food processing industry.

*Course not offered this academic year.

Suggested technical electives:

Strongly recommended

Microbiology 102
Biological Sciences 102, 103, 104
Chemical Engineering 161A, 161B, 161L
Biological Systems Engineering 132
Food Science and Technology 100A, 104, 104L

Recommended

Food Science and Technology 150, 150L, 151

Marketing. Specialty chemical and product manufacturers need chemical engineers who have training in market management, which involves the application of economics, psychology, and statistics in market planning and forecasting and in strategically developing and promoting new products.

Suggested technical electives:

Management 250, 251
Agricultural and Resource Economics 113, 130, 136
Statistics 103

Polymer Science. Polymer materials and their applications are dependent on the use of chemical and engineering principles to process such materials to meet the end-use functional and environmental requirements. The polymer science specialization also prepares you for graduate work in the interdisciplinary field of polymer science and engineering.

Suggested technical electives:

Chemistry 108, 128C, 129B, 129C
Fiber and Polymer Science 100, 150
Chemical Engineering 150C
Materials Science and Engineering 147

Prebiomedical Engineering. This area of specialization prepares you for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Chemical Engineering adviser is important to schedule necessary Biological Sciences courses into your program.

Suggested technical electives:

Four to six courses from
Anatomy, Physiology and Cell Biology 100, Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, Molecular and Cellular Biology 140L, 141, 142, Neurobiology, Physiology and Behavior 101, 111A, 111B, 112, 113, 114

Premedical. Inclusion of both organic and physical chemistry in the curriculum allows you to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. If you elect the premedical (including preveterinary) area of specialization, you should verify the specific preparation requirements with the Health Sciences Advising Office before making a final decision on your electives. To ensure that you have provided room in your program for the necessary biology courses, prepare a course schedule with a Chemical Engineering adviser early in your freshman year.

Suggested technical electives:

Anatomy, Physiology and Cell Biology 100
Chemistry 128C, 129B, 129C
Six biology or biochemistry courses, such as
Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, Microbiology 102, Molecular and Cellular Biology 140L, 141, 142, 150, Neurobiology, Physiology and Behavior 101, 112, 113, 114

Chemical Engineering
Upper Division Requirements

UNITS

Subject Areas and Courses

Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 154B, 155A, 155B, 156A, 156B, 157, 157L, 158A, 158B, 158C, 159 61
Chemistry—Chemistry 110A, 110C 6
Quantum mechanics—Physics 9D or Chemistry 110B ..... 4 or 3
Advanced chemistry electives 6
Select from upper division courses in Chemistry; Biological Sciences 101, 102, 103; Chemical Engineering 150C, 161A, 161B, 161L, 166, 170; Civil and Environmental Engineering 140, 140L; Materials Science Engineering 134, 144, 147; Environmental Toxicology 112A-112B; Food Science and Technology 100A-100B, 104, 119; Molecular and Cellular Biology 120L, 123, 126; Plant Biology 160; Fiber and Polymer Science 150.
Technical electives 12
Humanities–Social Sciences/General Education electives 8

Total Units for Upper Division Program 96-97
Minimum Units Required for Major 187-188

Chemical Engineering/Materials Science and Engineering Upper Division Requirements

UNITS

Subject Areas and Courses

Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 154B, 155A, 155B, 156A, 156B, 157, 157L, 158A, 158B, 158C, 159 61
Chemistry—Chemistry 110A, 110C 6
Quantum mechanics—Physics 9D or Chemistry 110B ..... 4 or 3
Materials science—Materials Science and Engineering 130, 132, 134, 138, and two courses chosen from Materials Science and Engineering 140, 142, 144, 146, 147, 148, 149, 155, and two laboratory courses chosen from Materials Science and Engineering 132L, 134L, and 138L 22
Humanities–Social Sciences and/or General Education electives 8

Total Units for Upper Division Program 100-101
Minimum Units Required for Major 195-196

Chemical Engineering/Biochemical Engineering Upper Division Requirements

UNITS

Subject Areas and Courses

Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 155A, 156A, 157, 157L, 158A, 158B, 158C, 159 50
Biochemical engineering—Biological Sciences 102, Microbiology 102, Chemical Engineering 161A, 161B, 161L 17
Chemistry—Chemistry 110A, 110C 6
Biochemical Engineering electives 10
Choose two laboratory courses from the laboratory electives list and choose additional courses from the lecture elective list to provided at least 10 units total.

Laboratory elective list:
Food Science and Technology 123L, Microbiology 102L, 177L, Molecular and Cellular Biology 120L (this course counts as two laboratory courses and completely satisfies the laboratory requirement), 160L, Neurobiology, Physiology and Behavior 104L, Plant Biology 153, 161A, 161B, 192/199 (Students may replace one laboratory course with a laboratory internship (192) or independent study (199) with approval of the chairperson).

Lecture elective list:
Biological Sciences 1B, 101, 103, 104, Biological Systems Engineering 175, Chemical Engineering 170, Food Science and Technology 123, Microbiology 130A, 177, Molecular and Cellular Biology 123, Neurobiology, Physiology and Behavior 103, Plant Biology 111, 112, 152, Viticulture and Enology 140, 186.

Humanities–Social Sciences electives and/or General Education electives 8

Total Units for Upper Division Program 91
Minimum Units Required for Major.....187

Civil and Environmental Engineering

(Civil and Environmental Engineering)

Civil and environmental engineering is devoted to the improvement of the human environment to make our activities productive, safe, and enjoyable, and our surroundings aesthetically pleasing. The profession contributes directly to humanity's continued health and well-being by the planning and design of systems that provide plentiful supplies of potable water; management and control of waste streams; land-water-air transportation; housing and other structures; flood control; and large recreational facilities.

Civil Engineering Curriculum

The Civil Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

Lower Division Program

Requirements for Civil Engineering and the double major, Civil Engineering/Materials Science and Engineering.

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C-9D (Students majoring in Civil Engineering or Civil Engineering/Materials Science and Engineering are required to complete 12 units of physics including Physics 9A, 9B and 9C. In addition, either Physics 9D, Chemistry 2C or 2CH, Biological Science 1A or Geology 50-50L is required.)	16	3-4-5-6
General chemistry—Chemistry 2A-2B or 2AH-2BH	10	2-3 or 4-5
Introduction to Civil and Enviromental Engineering systems—Civil and Environmental Engineering 3 (Civil and Environmental Engineering 3 is designed for freshman students. More advanced students may petition to substitute 3 units of technical electives for Civil and Environmental Engineering 3.)	3	1 or 2
Engineering graphics in design—Engineering 4	3	1 or 2
Applications of computers—Engineering 5	3	4
Introduction to Surveying—Civil and Environmental Engineering 10	3	3 or 6
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	5
Dynamics—Engineering 36	3	6
Properties of materials—Engineering 45	4	5
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	1 or 2
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	6
Humanities–Social Sciences electives and/or General Education electives	8	
Total Lower Division Units	**90**	

Upper Division Program

Areas of specialization within civil and environmental engineering include *(1)* Civil Engineering Planning; *(2)* Environmental Engineering; *(3)* Structural Engineering, Structural Mechanics, and Geotechnical Engineering; *(4)* Transportation Planning and Engineering; and *(5)* Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives. Such specialization is not required. You are urged to consult a faculty adviser when developing your individual program.

Because of the direct concern of professional civil engineers for the quality of human life, you are encouraged to include among your technical electives courses such as Economics 125, Environmental Studies 160 and 166; Political Science 108. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

Areas of Specialization

Civil Engineering Planning. Specialization in this area is directed toward the planning of resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with the aid of a faculty adviser and to complement the suggested technical electives with course work in the humanities and social sciences.

Suggested technical electives:

Agricultural and Resource Economics 147, 148, 175, 176
Civil and Environmental Engineering 137, 146, 147, 153, 155, 160, 161, 162
Economics 100, 125, 130, 131
Engineering 160 (only one unit of credit towards Technical Elective requirement),
Environmental Studies 160, 161, 166, 167, 168A, 168B, 171, 173, 179
Geography 155, 162
Geology 134
Hydrologic Science 150, 186
Political Science 100, 101, 102, 107, 108

Suggested advisers: J.R. Lund, P. Mokhtarian, D. Sperling.

Environmental Engineering. Specialists in this area are concerned with improving and maintaining the qualities of the air, land, and water environments that affect our health and well-being in the face of increasing population and expanding industrial activity. The program is firmly based on fundamental science and civil engineering and emphasizes the design of waterborne, solid, and airborne waste management systems; the design of potable water-supply systems; and environmental monitoring.

Suggested technical electives:

Applied Science Engineering 116
Atmospheric Science 120, 121A, 121B, 158
Biological Sciences 102, 103
Chemical Engineering 154A, 154B, 156A, 156B, 161A, 161B, 170
Chemistry 107A, 107B, 110A, 128A, 128B
Civil and Environmental Engineering 140, 140L, 142, 143, 144, 145, 146, 147, 148B, 149, 150
Engineering 180
Environmental Studies 150A, 150B, 150C, 151, 166
Mathematics 128A, 128B, 128C
Mechanical Engineering 161
Microbiology 102, 105, 130A
Soil Science 111
Statistics 130A, 130B

Suggested advisers: D.P.Y. Chang, J. Darby, T. Ginn, S.G. Schladow, E.D. Schroeder, G. Tchobanoglous, T.M. Young.

Structural Engineering, Structural Mechanics, and Geotechnical Engineering. This area is concerned with the conception, design, analysis, economics, and construction of structures such as buildings, bridges, highways, and dams. Structural Engineering encompasses structures made from metals, reinforced concrete, or timber. Geotechnical Engineering encompasses natural and man-made structures, such as foundations or slopes that are composed of rock or soil. Structural mechanics emphasizes more theoretical aspects of structures, such as mathematical analysis and characterization of material properties.

Suggested technical electives:

Aeronautical Science and Engineering 135, 137
Civil and Environmental Engineering 131, 132, 136, 137, 138, 173, 174, 176
Engineering 122, 180
Materials Science and Engineering 138
Mathematics 128A, 128B, 128C

Suggested advisers: K. Arulanandan, J. Bolander, R. Boulanger, R. Chai, Y.F. Dafalias, L.R. Herrmann, I.M. Idriss, B. Kutter, G.H. Paulino, M.R. Ramey, M.M. Rashid, K.M. Romstad.

Transportation Planning and Engineering. Specialists in this area are concerned with the development, coordination, and management of transportation systems for the movement of people and goods in a manner compatible with societal demands. Transportation planning blends knowledge of the basic concepts of engineering, economics, and planning in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities in the form of an integral system. Students should also acquire an awareness of the social sciences and environmental sciences through course work in these areas.

Suggested technical electives:

Civil and Environmental Engineering 137, 149, 153, 160, 161, 162
Engineering 160 (only one unit of credit towards Technical Electives requirement)
Environmental Studies 167, 168A, 168B, 171, 173, 178, 179

Suggested advisers: P. Jovanis, P. Mokhtarian, D. Niemeier, D. Sperling.

Water Resources Engineering. This area includes hydrology, hydraulics, and water resources systems planning and design. Hydraulics is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures. Water resources system planning and design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis, and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:

Agricultural and Resource Economics 148, 176
Atmospheric Science 120, 121A, 121B
Civil and Environmental Engineering 142, 144, 145, 146, 148B, 153
Electrical and Computer Engineering 150A, 150B
Environmental Studies 128, 150A, 151
Geography 162
Hydrologic Science 110, 150

Suggested advisers: M.L. Kavvas, I.P. King, B.E. Larock, J.R. Lund, M.A. Mariño, S.G. Schladow.

Civil Engineering Upper Division Requirements

UNITS

Subject Areas and Courses

Fluid Mechanics—Engineering 103A.....3
Structural mechanics—Engineering 104, 104L 5
Applied thermodynamics—Engineering 105A or Chemistry 110A.....3
Soil mechanics—Civil and Environmental Engineering 171,† 171L 5
Hydraulics and water resources—Civil and Environmental Engineering 141, 141L 4
Environmental—Civil and Environmental Engineering 148A.....3
Civil engineering design—Civil and Environmental Engineering 135 4
One course from Civil and Environmental Engineering 134, 136, 145, 148B, 162, or 173; and three or four additional courses from Civil and Environmental Engineering 132, 134, 136, 145, 147, 148B, 150, 155, 162, or 173.....15
Economics—Engineering 106.....3
Engineering mathematical analysis—Applied Science Engineering 115, Civil and Environmental Engineering 114, and one course from Applied Science Engineering 116, Civil and Environmental Engineering 153, Mathematics 118A, 121A, Statistics 108, Engineering 182 9
Transportation electives—select from Civil and Environmental Engineering 160, 161, or 163 3
Technical electives 17
Twelve units must be selected from upper division engineering courses; of these units, six units must be selected from Civil and Environmental Engineering courses other than Civil and Environmental Engineering 192 or 199.
Humanities–Social Sciences electives and/or General Education electives 16

Total Units for Upper Division Program 90
Minimum Units Required for Major.....180

Civil Engineering/Materials Science and Engineering Upper Division Requirements

UNITS

Subject Areas and Courses

Electronic circuits—Engineering 100 3
Fluid Mechanics—Engineering 103A.....3
Structural mechanics—Engineering 104, 104L 5
Applied thermodynamics—Engineering 105A or Chemistry 110A; Materials Science Engineering 130 6
Structural analysis—Civil and Environmental Engineering 130 4
Soil mechanics—Civil and Environmental Engineering 171,† 171L 5
Hydraulics and water resources—Civil and Environmental Engineering 141, 141L 4
Environmental—Civil and Environmental Engineering 148A 3
Civil engineering design—Civil and Environmental Engineering 135; one course from Civil and Environmental Engineering 134, 136, 145, 148B, 162, or 173; and two additional courses chosen from Civil and Environmental Engineering 132, 134, 136, 145, 147, 148B, 150, 155, 162, or 173 13
Economics—Engineering 106.....3
Engineering mathematical analysis—Applied Science Engineering 115, Civil and Environmental Engineering 114, and one course from Applied Science Engineering 116, Civil and Environmental Engineering 153, Mathematics 118A, 121A, Statistics 108, Engineering 182 9
Materials science—Materials Science and Engineering 132, 134, 138, and two courses from Materials Science and Engineering 140, 142, 144, 147 148, 149, 155; and two laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L 19
Humanities–Social Sciences electives and/or General Education electives 16
(Civil and Environmental Engineering 137 recommended.)

Total Units for Upper Division Program 93
Minimum Units Required for Major.....183

†Civil Engineering 10 is a required prerequisite to Civil Engineering 171.

*Course not offered this academic year.

Computer Science and Engineering

(Computer Science and Engineering)

The Department of Computer Science administers two curricula: Computer Science and Engineering in the College of Engineering, and Computer Science in the College of Letters and Science. It also administers a minor in the College of Letters and Science. For information on the Computer Science curriculum and minor, see "Computer Science" in this catalog.

The field of Computer Science and Engineering encompasses the organization, design, analysis, theory, programming, and application of digital computers and computing systems. It develops versatile engineers with backgrounds spanning a broad computer hardware/software spectrum.

The Computer Science and Engineering major provides students with a solid background in mathematics, physics, chemistry, and electronic circuits and systems, all supporting the computer hardware and computer software courses which form the focus of the curriculum.

Computer Science and Engineering Curriculum

The Computer Science and Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology and the Computer Science Accreditation Commission of the Computing Science Accreditation Board.

Lower Division Program

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A, 21B, 21C, 21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A, 9B, 9C, 9D	16	3-4-5-6
General chemistry—Chemistry 2A	5	1 or 2
Introductory programming—Computer Science Engineering 30 or 35	4	1 or 2
Software development—Computer Science Engineering 40	4	2 or 3
Computer structure and assembly language—Computer Science Engineering 50 or Electrical and Computer Engineering 70	4	2 or 3
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	4 or 5
Properties of materials—Engineering 45	4	4 or 5
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	1 or 2
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	4, 5, or 6
Humanities–Social Sciences and/or General Education Electives	12	
Unrestricted Elective	3	2 or 3
Total Lower Division Units	**89**	

Upper Division Program

A key theme of this curriculum is the hardware/software interaction in today's computer systems design, a theme reflected in the balance between computer hardware and computer software aspects in the course requirements. The key theme of hardware/software interaction is also reflected in the orientation of the courses themselves. The Computer Science and Engineering major also requires additional humanities and social science electives, helping to develop the verbal skills and intellectual breadth demanded by today's employers.

The Computer Science and Engineering program prepares students to do further work in hardware, software, or electronics, either in industry or postgraduate study.

Upper Division Requirements

	UNITS
Subject Area and Courses	
Professional responsibilities—Engineering 190	3
Electrical engineering background—Electrical and Computer Engineering 100 and 180A	10
Mathematical methods—Computer Science Engineering 100 and Mathematics 131 or Statistics 131A	7
Data structures and algorithms—Computer Science Engineering 110	4
Computer science theory—Computer Science Engineering 120† or 122A†	3
Computer hardware—Computer Science Engineering 152A, 154A, 154B, and Electrical and Computer Engineering 172	15
Computer software—Computer Science Engineering 140A, 150‡ or 151A‡, and 160	12
Computer electives—at least 16 units chosen from Computer Science Engineering 120†, 122A†, 122B, 140B, 142, 150‡, 151A‡, 151B, 152B, 153, 158, 163, 165A, 165B, 168, 170, 172, 175, 177, 178, or Electrical and Computer Engineering 180B, and a combined maximum of 3 units from approved Computer Science Engineering 192, 199 and Electrical and Computer Engineering 194	16
Humanities–Social Sciences/General Education electives	21
Total Upper Division Units	**91**
Minimum Units Required for Major	**180**

† Completion of both Computer Science Engineering 120 and 122A will satisfy the computer science theory requirement and a computer elective requirement.

‡ Completion of both Computer Science Engineering 150 and 151A will satisfy a portion of the computer software operative system requirement and a computer elective requirement.

Electrical and Computer Engineering

(Electrical and Computer Engineering)

The Department of Electrical and Computer Engineering administers three curricula in the College of Engineering: *(1)* the Electrical Engineering curriculum, *(2)* the Computer Engineering curriculum, and *(3)* the Electrical Engineering/Materials Science curriculum.

The Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science and Engineering curricula are all accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Electrical and Computer Engineering Curriculum

Lower Division Program

Requirements for Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science and Engineering majors.

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A, 21B, 21C, 21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A, 9B, 9C	12	3-4-5
General chemistry—Chemistry 2A	5	1 or 2
General chemistry (required for Electrical Engineering/Materials Science and Engineering majors only)—Chemistry 2B	5	2 or 3
Introductory programming—Computer Science Engineering 30 or 35	4	1 or 2
Software development—Computer Science Engineering 40	4	2 or 3
Computer structure and assembly language—Electrical and Computer Engineering 70 or Computer Science Engineering 50	4	2 or 3
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	4 or 5
Dynamics—Engineering 36	3	5 or 6
Properties of materials—Engineering 45	4	4, 5, or 6
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	1 or 2
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	4, 5, or 6
Humanities–Social Sciences and/or General Education electives	12	
Unrestricted Electives (for Electrical Engineering and Computer Engineering majors only)	5	
Total Lower Division Units	**90**	

Upper Division Programs

Upper division requirements for the degrees in Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science are described below. Information on double majors can be obtained from the Electrical and Computer Engineering Department Advising Office.

Computing Majors

There are three computing majors offered within the College of Engineering: *(1)* Electrical Engineering with a Computers Operation specialty, *(2)* Computer Engineering, and *(3)* Computer Science and Engineering.

All three curricula require that 63 of the approximately 90 upper division units be divided into three areas: electronics, computer hardware, and computer software. The Electrical Engineering with a Computer option and Computer Engineering curricula divide these 63 units almost equally between electronics, computer hardware and computer software (with the most flexibility found in the Computer Engineering curriculum). The Computer Science and Engineering curriculum divides these 63 units primarily between computer hardware and computer software.

Electrical Engineering Curriculum

Electrical Engineering involves the design, analysis, and effective use of electrical systems including electronic computers. Electrical systems and computers play a central role in nearly all aspects of modern life, including communication, medicine, education, environmental protection, space exploration, defense, and home entertainment.

The Electrical Engineering curriculum prepares students for careers in electrical engineering or for graduate studies by providing a solid background in mathematics, physical sciences, and traditional electrical engineering subjects of *(1)* physical electronics, *(2)* signals and systems, *(3)* electromagnetics, and *(4)* active and passive circuits. Through the proper choice of 25 units of flexible design and unrestricted electives, you may focus on any of these four specialty areas or distribute the 25 units of electives among these areas. Students who complete the Elec-

trical Engineering curriculum will obtain a Bachelor of Science in Electrical Engineering, one of the engineering degrees recognized in all fifty states as eligible for registration as a Professional Engineer.

Areas of Specialization

Physical Electronics includes the areas of solid-state circuits and fabrication and the theory courses supporting those subjects.

Recommended elective courses:

Electrical and Computer Engineering 110B, 111A, 111B, 114, 118, 130B, 140B, 145A, 145B, 146A, 146B, 148

Suggested advisors: R.W. Bower, S.B. Haley, C.E. Hunt, R.L. Smith.

Signals and Systems includes digital communications, robotics, classical controls and communications, wireless and cellular digital communications systems, as well as signal and image processing and computer vision.

Recommended elective courses:

Electrical and Computer Engineering 106, 110B, 112, 150B, 157A, 157B, 160, 165, 166, 167, 194A-194B-194C, 195A-195B-195C

Suggested advisors: K.A. Abdel-Ghaffar, T. Chang, K. Feher, G.E. Ford, B. Friedlander, W.A. Gardner, A.N. Gündes, T.C. Hsia, B.C. Levy, D.Q. Mayne, T. R. Reed, M.A. Soderstrand, S. Wang.

Electromagnetics studies microwave circuits and fiber-optical communications.

Recommended elective courses:

Electrical and Computer Engineering 110B, 130B, 131A, 131B, 131C, 132A, 132B, 132C, 135, 140B, 160

Suggested advisors: G.R. Branner, A.J. Dienes, S.B. Haley, J.P. Heritage, A. Knoesen.

Active and Passive Circuits deals with transistor-level circuit design and covers topics such as electronic amplifiers, analog-to-digital converters, filters, logic gates, RAM and ROM, and programmable logic arrays.

Recommended elective courses:

Electrical and Computer Engineering 110B, 111A, 111B, 112, 114, 118, 140B, 146A, 146B, 150B, 194A-194B-194C, 195A-195B-195C

Suggested advisors: K.W. Current, P.J. Hurst, S.H. Lewis, R.R. Spencer.

Electrical Engineering Upper Division Requirements

UNITS

Required Courses

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 130A, 140A, 150A, 180A, plus two courses from 110B†, 130B, 140B, 150B 34

Computer software—Electrical and Computer Engineering 173 4

Thermodynamics—Engineering 105A 3

Probability theory—Statistics 120, 131A, or Mathematics 131 4

Professional responsibilities—Engineering 160, 190 or Applied Science Engineering 137.....3

Design electives 18

Select six courses, at least two with laboratories, from:

Electrical and Computer Engineering 106, 110B†, 111A-111B (both must be taken together to count as one design elective), 112, 114, 118, 132A, 132B, 132C, 135, 146A, 146B, 157A, 157B, 160, 166, 170,‡ 172, 174, 180B, 194A-194B-194C (must be taken together to count as one design elective), 195A-195B-195C (must be taken together to count as one design elective);

Computer Science Engineering 110, 122B, 140A, 140B, 142, 150, 151A, 151B, 153, 158, 160, 163, 165A, 165B, 168, 175, 177.

May also include approved Electrical and Computer Engineering or Computer Science Engineering 192 or 199 courses.

Mathematics/Science elective—select courses from the College of Engineering Physical and Biological Science Elective list plus Statistics 32 or any upper division Mathematics or Statistics course except: Mathematics 128A-128B-128C, 160, 164, 168, or Statistics 102, 103, 104, 105, 108, 110, 141 5

Humanities–Social Sciences/General Education electives 12

Unrestricted electives.....7

Total Upper Division Units 90

Minimum Units Required for Major.....180

† Electrical and Computer Engineering 110B may not be counted toward both the Electrical Engineering Core requirement and the Electrical Engineering Design Electives.

‡ Electrical Engineering students may substitute Computer Science Engineering 154B for Electrical and Computer Engineering 170.

Computer Engineering Curriculum

Computer Engineering involves the design, development, analysis, organization, theory, programming, and application of digital computers. It combines many aspects of electronics, computer hardware, and computer software.

The Computer Engineering curriculum prepares students for careers in computer engineering or graduate studies by providing a solid background in mathematics, physical sciences, and the traditional computer engineering subjects: electronics, computer hardware, and computer software. Here *electronics* refers to the four Electrical Engineering specialty areas *(1)* physical electronics, *(2)* signals and systems, *(3)* electromagnetics, and *(4)* active and passive circuits. The 63 upper division units required in electronics, computer hardware and computer software consist of 13 units in electronics courses, 18 units in computer hardware courses, and 18 units in computer software courses. The remaining 14 units consist of 9 units of design electives and 5 units of unrestricted electives. By carefully selecting these 14 design and unrestricted electives, students can focus on electronics, computer hardware, or computer software, or distribute these units among the three areas. In comparison to the Electrical Engineering curriculum, the Computer Engineering curriculum requires courses in only two of the four Electrical Engineering areas: areas *(1)* physical electronics, and *(2)* active and passive circuits. Students who complete the Computer Engineering curriculum will receive a Bachelor of Science in Computer Engineering.

Areas of Specialization

Computer Systems and Software includes courses in computer architecture, computer design, computer interfacing and computer software.

Recommended elective courses:

Electrical and Computer Engineering 106, 174, 194A-194B-194C, 195A-195B-195C

Computer Science and Engineering 122B, 140A, 140B, 142, 151B, 153, 158, 160, 163, 165A, 165B, 168, 175, 177

Suggested advisors: V. Akella, S. Bakshi, S.L. Hakimi, V.G. Oklobdzija, G.R. Redinbo, M.A. Soderstrand, K.D. Wilken.

Logic Design considers the design of computer circuits at various levels, including the use of CAD systems, VHDL, and the design and fabrication of transitor-level digital circuits.

Recommended elective courses:

Electrical and Computer Engineering 110B, 111A, 111B, 114, 118, 140B, 174, 194A-194B-194C, 195A-195B-195C

Suggested advisors: V. Akella, S. Bakshi, S.L. Hakimi, V.G. Oklobdzija, G.R. Redinbo, M.A. Soderstrand, K.D. Wilken.

Computer Engineering Upper Division Requirements

UNITS

Required Courses

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 140A, 180A, 180B 23

Computer hardware—Electrical and Computer Engineering 170†, 172 8

Computer software—Electrical and Computer Engineering 173 and Computer Science Engineering 150 or 151A.....8

Data structures and algorithms—Computer Science Engineering 110, 122A.....7

Mathematical methods—Computer Science Engineering 100, plus one course from: Statistics 120, 131A, or Mathematics 131 7

Thermodynamics—Engineering 105A 3

Professional responsibilities—Engineering 160, 190 or Applied Science Engineering 137.....3

Design electives 9

Select three courses from:

Electrical and Computer Engineering 106, 110B, 111A-111B (must both be taken to count as one design elective), 112, 114, 118, 132A, 132B, 132C, 135, 146A, 146B, 157A, 157B, 160, 166, 174, 194A-194B-194C (taken together may count as one design elective), 195A-195B-195C (must be taken together to count as one design elective);

Computer Science Engineering 122B, 140A, 140B, 142, 151B, 153, 158, 160, 163, 165A, 165B, 168, 175, 177.

May also include approved Electrical and Computer Engineering or Computer Science Engineering 192 or 199 courses.

Mathematics/Science elective—to be selected from the College of Engineering Physical and Biological Science Elective list plus Statistics 32 or any upper division Mathematics or Statistics course except: Mathematics 128A-128B-128C, 160, 164, 168, or Statistics 102, 103, 104, 105, 108, 110, 141 5

Humanities–Social Sciences/General Education electives 12

Unrestricted electives.....5

Total Upper Division Units 90

Minimum Units Required for Major.....180

† Computer Science Engineering 154B may be substituted for the Electrical and Computer Engineering 170 requirement.

Electrical Engineering/Materials Science and Engineering Curriculum

In addition to the Electrical Engineering curriculum described above, the Department of Electrical and Computer Engineering offers a combined major in Electrical Engineering/Materials Science. In the past decade, the fields of solid-state electronics, optoelectronics, magnetics, and superconductors have developed to the point that demand for new materials now sets the pace for progress in these fields. Materials scientists with an electronics background are key to continued progress in these areas. The Electrical Engineering/Materials Science curriculum provides students with the background necessary to pursue careers in electrical engineering or materials science or to go on to graduate study.

Electrical Engineering/Materials Science and Engineering Upper Division Requirements

UNITS

Required Courses

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 110B, 130A, 130B, 140A, 140B, 150A, 180A 38

Materials science core—Materials Science and Engineering 130, 132, 134, 146, and one laboratory course from Materials Science and Engineering 132L, 134L 14

*Course not offered this academic year.

Engineering science—Engineering 104, 105A.....7
Probability theory—Statistics 120, 131A, or Mathematics 131.....4
Professional responsibilities—Engineering 160, 190 or Applied Science Engineering 137.....3
Design electives.....6
Select two courses, at least one of which must be a Materials Science and Engineering course, from the following:
Electrical and Computer Engineering 106, 111A-111B (must both be taken to count as one design elective), 112, 114, 118, 132A, 132B, 132C, 135, 146B, 157A, 157B, 160, 166, 170, 172, 173, 174, 180B, 194A-194B-194C (taken together may count as one design elective), 195A-195B-195C (must be taken together to count as one design elective); Computer Science Engineering 110, 122B, 140A, 140B, 142, 150, 151A, 151B, 153, 154B, 158, 160, 163, 165A, 165B, 168, 175, 177.
Materials Science and Engineering 140, 142, 148, 155.
May also include approved Electrical and Computer Engineering, Computer Science and Engineering, or Materials Science Engineering 199 courses.
Laboratory courses—Materials Science and Engineering 149, Electrical and Computer Engineering 146A.....6
Advanced science electives—Geology 161, 161N; or Physics 140A and 140B; or Physics 121 and 122A; or Chemistry 110A and 110C.....6
Humanities–Social Sciences and/or General Education electives.....12

Total Upper Division Units.....96
Minimum Units Required for Major.....186

Food Engineering

(Biological and Agricultural Engineering)

There is a strong demand for food engineering graduates in the food industry, which is the largest industrial sector of the U.S. and California economies. Food engineers help develop new food products and conceive, design and operate food processes, equipment and plants for effective production of foods with minimal impact on the environment. Food engineers may work for food companies in process research and development, equipment and facilities design, or management of production operations. Research and regulatory positions are also available with state and federal agencies. Summer internships are usually available, and students are encouraged to make use of these opportunities.

Food engineering involves the application of engineering principles and concepts to the handling, storage, processing, packaging, and distribution of food and related products. In addition to engineering principles, the food engineering degree provides an understanding of the chemical, biochemical, microbiological, and physical characteristics of foods. Concepts of food refrigeration, freezing, extrusion, drying, packaging, handling, and other food operations are studied.

The food engineering curriculum provides a strong foundation in mathematical, physical, biological, and food sciences. Courses are drawn from the biological and food sciences, and from biological systems, chemical, and mechanical engineering. These courses introduce students to methods which account for material and energy uses; methods for analyzing and designing processes, equipment and operations (e.g. fluid flow and heat transfer); and methods for predicting, monitoring and controlling performance of operations in a manner most relevant to food and food systems.

Food engineers are key contributors in optimizing food quality and safety, and in maintaining high nutritional standards. In the development of food products like low-fat foods, food engineers design the processes and equipment to manufacture the new food and assist in the food formulation.

Food Engineering Curriculum

Lower Division Program

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C	12	3-4-5
General chemistry—Chemistry 2A-2B	10	1-2
Organic chemistry—Chemistry 8A-8B	6	4-5
Biological Sciences 1A	5	4
Introduction to biological systems and food engineering—Biological Systems Engineering 1	3	1
Applications of computers—Engineering 5	3	2
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	6
Properties of biological materials—Biological Systems Engineering 75	4	5
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4	1
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	2
Humanities–Social Sciences electives and General Education electives	12	3-6
Total Lower Division Units	**92**	

Upper Division Program

In the junior and senior years, the major requires courses that focus on the integration of biological and food science with engineering. These upper division requirements are listed in the curriculum below.

Upper Division Requirements

	UNITS
Subject Areas and Courses	
Applied Statistics in Agricultural Science—Agricultural Systems and Environment 120	4
Psychrometrics, Heat and Mass Transfer—Biological Systems Engineering 125	3
Bioinstrumentation and Control—Biological Systems Engineering 165	3
Elementary Fluid Mechanics—Engineering 103A	3
Process Dynamics and Control—Chemical Engineering 157	3
Chemical Engineering Analysis—Chemical Engineering 159	3
Dynamics—Engineering 36	3
Electrical Circuits and Systems—Engineering 100	3
Mechanics of Materials—Engineering 104	4
Thermodynamics—Engineering 105A, 105B	6
Engineering Economics—Engineering 106	3
Structure and Function of Biomolecules—Biological Sciences 102	3
Dynamic Modeling of Processes in Biological Systems—Biological Systems Engineering 130	3
Unit Operations in Food Engineering—Biological Systems Engineering 132	4
Engineering Design and Professional Responsibilities—Biological Systems Engineering 170A	3
Engineering Projects: Design—Biological Systems Engineering 170B	3
Engineering Projects: Design Evaluation—Biological Systems Engineering 170C	3
Rheology of Biological Materials—Biological Systems Engineering 175	3
Food Microbiology—Food Science and Technology 104	3
Food Packaging—Food Science and Technology 131	3
Freezing Preservation of Food—Food Science and Technology 151	3
Biological science electives—Select a minimum of 7 units from the following courses: Biological Sciences 101, 103; Environmental Studies 110; Environmental Toxicology 101, 131; Food Science and Technology 100A, 104L, 119, 120, 121, 128; Plant Science 105, 112	7
Humanities–Social Science electives and/or General Education electives	12
Total Units for Upper Division Program	**88**
Minimum Units Required for Major	**180**

Master Undergraduate Adviser: T. Rumsey.

Materials Science and Engineering

(Chemical and Materials Science Engineering)

Materials science and engineering is directed toward an understanding of the structure, properties, and behavior of materials. Society demands new and improved materials with capabilities far superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology.

Both the development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and physical and chemical behavior of engineering materials.

Materials engineers study phenomena found in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames; from corrosion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants; and from fabrication of steel to design of semiconductors. Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes, and will play a central role in the development of new technologies based on composites and high temperature superconductivity.

The undergraduate program in Materials Science and Engineering provides the background for activities in research, processing, and the design of materials. The curriculum is based on a common core of courses basic to engineering. These courses, taken during your first two years, provide a strong foundation in fundamental engineering concepts.

Materials Science Curriculum

The Materials Science and Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

Lower Division Program

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5

Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C-9D	16	3-4-5-6
General chemistry—2A, 2B or 2AH, 2BH	10	2-3 or 5-6
Introduction to civil and environmental engineering systems—Civil and Environmental Engineering 3	3	1 or 2
Engineering graphics in design—Engineering 4	3	1
Engineering—applications of computers—Engineering 5	3	2 or 5
Circuits—Engineering 17	4	6
Statics—Engineering 35	3	5
Dynamics—Engineering 36	3	5 or 6
Properties of materials—Engineering 45	4	6
Expository writing—English 1 or 3 or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	2 or 3
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	2 or 3
Humanties–Social Science electives and/or General Education electives	12	
Total Lower Division Units	**91**	

Upper Division Program

In your third year, you will take "fundamentals" courses (Materials Science and Engineering 130, 132, 134, 138). With this background, you are then ready for the "applications" courses (Materials Science and Engineering 140, 142, 144, 146, 147, 148, 149, 155) during the fourth year.

Technical electives, selected from other engineering or physical and natural science disciplines, give you some degree of specialization at the bachelor's degree level. They also provide preparation for research in a selected area at the graduate level. Twelve technical elective units may be selected to complete the undergraduate Materials Science and Engineering program. By selecting the appropriate technical electives and Humanities and Social Science/General Education electives, you may orient the program to suit your interests and career objectives: production and development, applied research, basic research, teaching, and/or management.

Upper division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives in Materials Science and Engineering.

The following list of suggested areas of specialization is given to assist you and your adviser in the preparation of study lists.

Suggested technical electives:

Aerospace Structures:
Aeronautical Science and Engineering 130, 133, 135, 137, 139

Automatic Control and Systems Analysis:
Mechanical Engineering 171, 172, 185, 187, 188
Electrical and Computer Engineering 157A, 157B, 174

Biomedical Engineering:
Chemistry 107A, 107B
Biological Sciences 1A, 1B
Neurobiology, Physiology and Behavior 111L, 112, 113
Exercise Science 101, 102

Chemical Corrosion:
Chemistry 110A, 110B, 110C or 107A, 107B
Chemical Engineering 151, 152A, 152B

Computers:
Applied Science Engineering 115
Computer Science Engineering 110, 122A, 122B, 142, 151A, 151B
Electrical and Computer Engineering 170, 172, 180A, 180B
Mathematics 128A, 128B, 168
Statistics 130A, 130B

Electronic Materials:
Electrical and Computer Engineering 140A, 140B, 145A, 145B, 146A, 146B, 148
Materials Science and Engineering 146
Physics 121, 140A, 140B

Environmental Engineering:
Engineering 160 (only one unit of credit towards Technical Elective requirement)
Atmospheric Science 120
Biological Sciences 102, 103
Hydrologic Science 21
Chemistry 8A, 8B
Civil and Environmental Engineering 149

Heat Transfer:
Engineering 105B
Mechanical Engineering 165
Chemical Engineering 150A, 153

Materials Design and Processing:
Aeronautical Science and Engineering 137
Engineering 106
Materials Science and Engineering 146, 148, 155
Mechanical Engineering 50, 150, 150A, 150B, 151, 152, 185A, 185B
Civil and Environmental Engineering 135

Physics of Solids:
Physics 115A, 115B, 140A, 140B
Electrical and Computer Engineering 145A, 145B, 148

Suggested advisers: J.C. Gibeling, J.R. Groza, D.G. Howitt, A.K. Mukherjee, Z.A. Munir, A. Navrotsky, S.H. Risbud, J. F. Shackelford.

Upper Division Requirements

	UNITS
Subject Areas and Courses	
Electronic circuits—Engineering 100	3
Applied mechanics—Engineering 103A, 104	7
Applied thermodynamics—Engineering 105A, Materials Science and Engineering 130	6
Engineering design elective—select from Aeronautical Science and Engineering 137, 138A, Civil and Environmental Engineering 132, 135, Mechanical Engineering 150A, 150B	9
Materials in design—Materials Science and Engineering 149, and select two courses from Materials Science and Engineering 140, 148 155	9
Measurements and laboratory—Materials Science and Engineering 132L, 134L, 138L, Mechanical Engineering 176	9
Materials science fundamentals—Materials Science and Engineering 132, 134, 138	9
Materials science applications—Select three courses from Materials Science and Engineering 142, 144, 146, 147 or (if not taken for the Materials in Design requirement) 140, 148, 155	9
Applied mathematics—Select one course from Engineering 180, 182; Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114	3
Basic science—Select from Chemistry 110A, 110C or Physics 140A, 140B, or Chemistry 128A, 128B, or Physics 121, 122A, or Geology 161, 162N, or Neurobiology, Physiology and Behavior 101, 101L	6
Technical electives	10
Humanities–Social Sciences electives and/or General Education electives	12
Total Units for Upper Division Program	**92**
Minimum Units Required for Major	**183**

*Course not offered this academic year.

Mechanical Engineering

(Mechanical and Aeronautical Engineering)

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems requiring the application of physical and mechanical principles to the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Work in this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, and economics.

The Mechanical Engineering curriculum is based on a common core of engineering courses taken in the first two years.

Mechanical and Aeronautical Engineering Curriculum

The Mechanical Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Lower Division Program
Requirements for Mechanical Engineering and the double major Mechanical Engineering/Materials Science.

	UNITS	QUARTER USUALLY TAKEN
Required Courses		
Calculus—Mathematics 21A-21B-21C-21D	16	1-2-3-4
Linear algebra—Mathematics 22A	3	5
Differential equations—Mathematics 22B	3	6
General physics—Physics 9A-9B-9C-9D	16	3-4-5-6
General chemistry—Chemistry 2A-2B or 2AH-2BH	10	2-3 or 4-5
Engineering graphics in design—Engineering 4	3	1 or 2
Applications of computers—Engineering 5	3	2 or 5
Circuits—Engineering 17	4	5 or 6
Statics—Engineering 35	3	4 or 5
Dynamics—Engineering 36	3	5 or 6
Properties of materials—Engineering 45	4	4 or 6
Manufacturing processes—Mechanical Engineering 50 (Required for Mechanical Engineering and Mechanical/Materials Science and Engineering majors)	3	5 or 6
Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5	4	1 or 2
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering)	4	4
Humanities–Social Sciences and/or General Education electives	12	
Total Lower Division Units	**91**	

Upper Division Programs

You spend your third year in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, mechanical design or thermodynamics. You can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor's level.

You are encouraged to select elective courses from among the areas of specialization listed below.

Areas of Specialization

Mechanical Design. The creation and improvement of products, processes, or systems that are mechanical in nature are the primary activities of a professional mechanical engineer. The development of a product from concept generation to detailed design, manufacturing process selection and planning, quality control and assurance, and life cycle considerations are areas of study and specialization in the area of mechanical design.

Solutions to such major social problems as environmental pollution, lack of mass transportation and raw materials, and energy shortages, will depend heavily on the engineer's ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of a design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:

Aeronautical Science and Engineering 130, 133, 137, 139
Biological Systems Engineering 165
Applied Science Engineering 115
Engineering 111, 122, 160 (only one unit of credit towards Technical Electives requirement)
Materials Science and Engineering 140, 142, 155
Mechanical Engineering 134, 150B, 151, 152, 161, 162, 172, 184A with 184B (both courses must be taken), 185A with 185B (both courses must be taken), 187, 188

Suggested advisers: A. Barakat, H.H. Cheng, A.A. Frank, M.L. Hull, B. Ravani, S. Velinsky, K. Yamazaki.

Biomedical and Engineering Fluid Mechanics. This field of study is based on the fundamentals of fluid mechanics and their broad range of applications in the biomedical and engineering areas. Areas of current research include blood circulation and its potential role in the regulation of normal physiological function and in the development of disease; groundwater and atmospheric flows and their implications for pollutant transport and environmental concerns; aerodynamic flow around transportation vehicles and its impact on vehicle performance; and flow in combustion engines and other energy systems with considerations of efficiency and environmental impact. These areas are investigated both experimentally and computationally.

Suggested technical electives:

Aeronautical Science and Engineering 138
Engineering 160 (only one unit of credit towards technical requirements); Engineering 180
Chemical Engineering 161A, 161B
Civil and Environmental Engineering 144, 149
Mechanical Engineering 161, 162, 163, 186

Suggested advisers: R.C. ALdredge, A.I. Barakat, J.W. Baughn, V.R. Capece, J.-J. Chattot, H.A. Dwyer, M.M. Hafez, I.M. Kennedy, W. Kollmann, L.W. Rehfield, B.D. Shaw, C. van Dam, B.R. White.

Combustion and the Environment. Combustion is widely used for energy generation, propulsion, heating, and waste disposal, as well as for many other applications. Mechanical engineers are often heavily involved with the design of combustion systems (internal combustion engines, gas turbines, furnaces, etc.) and deal with aspects of combustion ranging from increasing efficiencies to reducing pollutant emissions. This specialization is for those who would like to work in fields that use combustion, or that deal with pollution related to combustion. With the current increased emphasis on reducing pollutants while maintaining or increasing efficiency, the efforts of mechanical engineers in designing and improving combustion systems are becoming more important.

Suggested technical electives:

Mechanical Engineering 161, 163, 184A with 184B (both courses must be taken)
Civil and Enviornmental Engineering 149, 150

Suggested advisers: R.C. Aldredge, H.A. Dwyer, I.M. Kennedy, W. Kollman, B.D. Shaw.

Heat Transfer, Thermodynamics, and Energy Systems. This specialization emphasizes the fundamentals of heat transfer and thermodynamics and their application to the design of advanced engineering systems. This program of study introduces students to the fundamental processes of heat transfer and thermodynamics in complex engineering systems so that they are able to design more efficient, cost effective, and reliable systems with less environmental pollution and impact. An understanding of heat transfer and thermodynamics is required for the design of efficient, cost-effective systems for power generation (including advanced energy conversion systems), propulsion (including combustion engines and gas turbines), heat exchangers, industrial processes, refining, and chemical processing. This area of specialization is important to many industries—aerospace, defense, automotive, metals, glass, paper, and plastic—as well as to the thermal design of electronic and computer packages.

Suggested technical electives:

Aeronautical Science and Engineering 138
Engineering 111
Mechanical Engineering 161, 162, 163, 165, 186

Suggested advisers: R.C. Aldredge, J.W. Baughn, H.A. Dwyer, H.A. Hoffman, I.M. Kennedy, W. Kollmann, B.D. Shaw.

Manufacturing. Manufacturing is the process of converting raw materials into products. A major activity of mechanical engineers is studying and working with various production methods and techniques, integrating creative design activities into actual fabricated products.

The emphasis in the manufacturing program is to provide hands-on experience with state-of-the-art and computer-integrated manufacturing methods and processes. Laboratories have been established that have state-of-the-art manufacturing equipment for conventional and non-traditional machining, three-dimensional measurement, and plastic injection molding. Computer-oriented manufacturing is also an emphasis of the program. A manufacturing engineer will have a solid background in manufacturing processes and systems as well as in statistics, design, controls and applications of microprocessors.

Suggested technical electives:

Electrical and Computer Engineering 160, 174
Materials Science and Engineering 140, 155
Mechanical Engineering 151, 153, 154, 172

Suggested advisers: H.H. Cheng, B. Ravani, K. Yamazaki.

Systems Dynamics and Control. Engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without considering the overall system.

Systems Dynamics and Control specialists are concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply to social, economic, and other dynamic systems.

Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electromechanical actuator design, design and control of walking machines, electronically controlled steering, mathematical models of motorcycle dynamics, the analysis of fuel management systems, and the design of flight-control systems for the modeling of human pilot and vehicle dynamics.

An Automotive System Dynamics Laboratory is being developed for testing components such as engines, transmissions, brakes, and steering systems as well as testing completed test vehicles. As plans for on-campus laboratories and a test track proceed, 10 experimental vehicles are housed in a rented facility, and research on vehicle components proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:

Aeronautical Science and Engineering 128, 129, 131, 139
Engineering 122
Mechanical Engineering 134, 152, 172, 184A with 184B (both courses must be taken), 187

Suggested advisers: F.O. Eke, A.A. Frank, R.A. Hess, M. Hubbard, D.C. Karnopp, S.A. Snell.

Ground Vehicle Systems. An aspect of mechanical engineering is the design of surface vehicles. The emphasis is on the design of more environmentally benign vehicles that can provide transportation while using fewer resources. Innovations in the field require competence in vehicle dynamics, propulsion and engine concepts, control of power transmission, and construction of lightweight manufacturable structures and systems. Alternatively fueled power systems, including electric drives, are also studied.

Transportation Systems. An important aspect of Mechanical Engineering is the planning, design, and operation of transportation systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. Such innovations will require competence in vehicle dynamics, propulsion and control, and an understanding of the problems caused by present-day modes of transportation.

Suggested technical electives:

Aeronautical Science and Engineering 127, 128, 129
Civil and Environmental Engineering 131A, 149, 160
Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)
Mechanical Engineering 134, 152, 162, 172, 184A with 184B (both courses must be taken), 187

Suggested advisers: A.A. Frank, M. Hubbard, D.C. Karnopp, D.L. Margolis, S. Velinsky.

Mechanical Engineering
Upper Division Requirements

Subject Areas and Courses	UNITS
Electronic circuits—Engineering 100	3
Applied mechanics—Engineering 102, 104	7
Applied thermodynamics—Engineering 105A, 105B; Mechanical Engineering 165	10
Fluid mechanics—Engineering 103A, 103B	6
Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken), 185A with 185B (both courses must be taken in consecutive quarters), 186, 187, 188	12
Controls and systems analysis—Mechanical Engineering 171	4
Measurements and laboratory—Engineering 102L, 107L, Mechanical Engineering 176	7
Professional responsibilities—Engineering 190	3
Applied mathematics—Select one course from: Engineering 180, 182; Applied Science Engineering 115; Mathematics 128C, 131; Statistics 120, 131A; Civil and Environmental Engineering 114	3
Technical electives Eighteen of the 22 units must be selected from upper division courses in engineering; of these units, three courses must be chosen from the following design courses: Aeronautical Science and Engineering 128, 129, 130, 137, 139, Materials Science and Engineering 140, 148, Mechanical Engineering 134, 151, 152, 154, 161, 163, 188.	22

You may also choose from Mechanical Engineering 150B, 172, 184A with 184B (both courses must be taken), 185A with 185B (both courses must be taken in consecutive quarters), 186, 187, if these courses are not used for a core design requirement above.

A combined maximum of 4 units may be selected from project/independent study courses (184–188, 192, 199) not used in satisfaction of core degree requirements.

Humanities–Social Sciences electives and/or General Education electives 12

Total Units for Upper Division Program 89

Minimum Units Required for Major.....180

Mechanical Engineering/Materials Science and Engineering Upper Division Requirements

UNITS

Subject Areas and Courses

Electronic circuits—Engineering 100 3

Applied mechanics—Engineering 102, 104 ...7

Applied thermodynamics—Engineering 105A, 105B; Materials Science and Engineering 130; Mechanical Engineering 165 13

Fluid mechanics—Engineering 103A, 103B ...6

Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken), 185A with 185B (both courses must be taken in consecutive quarters), 186, 187.....12

Controls and systems analysis—Mechanical Engineering 171 4

Materials science—Materials Science and Engineering 132, 134, 138, and two courses chosen from Materials Science and Engineering 140, 142, 144, 146, 147, 148, 155; and two laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L 19

Measurements and laboratory—Engineering 102L, 107L, Mechanical Engineering 176.....7

Applied mathematics—Select one course from: Engineering 180, 182; Applied Science Engineering 115; Mathematics 128C, 131; Statistics 120, 131A; Civil and Environmental Engineering 114.....3

Professional responsibilities—Engineering 190 3

Technical electives 6

In order to satisfy design requirements, two courses must be chosen from Aeronautical Science and Engineering 128, 129, 130, 137, 139, Materials Science and Engineering 140, 148, 149, 155, Mechanical Engineering 134, 151, 152, 154, 161, 162, 163, 188.

You may also choose from Mechanical Engineering 150B, 172, 184A with 184B (both courses must be taken), 185A with 185B (both courses must be taken), 186, 187, if these courses are not used for a core design requirement above.

A maximum of 4 units of courses numbered 184–188 may be applied to the technical elective degree requirement.

Humanities–Social Sciences electives and/or General Education electives 12

Total Units for Upper Division Program 95

Minimum Units Required for Major.....186

Courses in Engineering (ENG)

Lower Division Courses

4. Engineering Graphics in Design (3) I, II. Yamazaki
Lecture—2 hours; laboratory—3 hours. Introduction to engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems.

5. Applications of Computers (3) I, II, III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A. Digital computation and computer programming in FORTRAN. Algorithms and their description. Basic programming; debugging of programs; approximate computing-accuracy and significance; solving simple numerical and nonnumerical problems.

11. Issues in Engineering (1) I. Shackelford
Lecture—1 hour; discussion—1 hour. Prerequisite: participation in the Minority Engineering Program (MEP) or consent of instructor. Designed to broaden students' understanding of the engineering profession: its methods, principles, design, and development process; career opportunities; and professional resources.

17. Circuits I (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 9C. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions.

***25. Introduction to Physical Devices and Systems** (3) II. The Staff
Lecture/discussion—2 hours; laboratory—3 hours. Prerequisite: lower division standing in Engineering and consent of instructor. Introduction to and experience with common hardware and physical devices with the overall goal of enriching the students' understanding of physical devices and systems. (P/NP grading only.)

35. Statics (3) I, II, III. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21D (may be taken concurrently); Physics 9A. Force systems and equilibrium conditions with emphasis on engineering problems.

36. Dynamics (3) I, II, III. Snell, Hess, Ravani, Frank
Lecture—3 hours. Prerequisite: course 35, Mathematics 21D. Open to College of Engineering students only. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

45. Properties of Materials (4) I, II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: open only to students in the College of Engineering. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. GE credit: Wrt.

Upper Division Courses

100. Electronic Circuits and Systems (3) II, III. The Staff
Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 17. Introduction to analog and digital circuit and system design through hands-on laboratory design projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit.

102. Intermediate Dynamics (3) I, II, III. Hess, Hubbard, Karnopp
Lecture—3 hours. Prerequisite: course 36, Mathematics 22B; open to College of Engineering students only. Topics in three-dimensional rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

102L. Solid Mechanics Laboratory (2) II, III. Eke, Schaaf
Lecture—1.5 hours; laboratory—1.5 hours. Prerequisite: courses 102 (may be taken concurrently) and 104. Experimental laboratory to demonstrate fundamental priniciples of solid mechanics and their application to engineering problems. Introduction to instrumentation for dynamic motion measurement.

103A. Elementary Fluid Mechanics (3) I, II, III. Barakat, Chattot, Dwyer, Kollman
Lecture—3 hours. Prerequisite: course 36 (may be taken concurrently). Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis.

103B. Elementary Fluid Mechanics (3) I, II, III. Chattot, Hafez, van Dam
Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow; boundary layer flow; potential flows; compressible flows.

104. Mechanics of Materials (4) I, II, III. The Staff
Lecture—4 hours. Prerequisite: course 35, Mathematics 22B. Open to Engineering majors only. Uniaxial loading and deformation. General concepts of stress-strain-temperature relations and yield criteria. Torsion of shafts. Bending of beams. Deflections due to bending. Introduction to stability and buckling.

104L. Mechanics of Materials Laboratory (1) II, III. Chai
Laboratory—3 hours. Prerequisite: course 104. Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental stress analysis.

105A. Thermodynamics (3) I, II, III. Capece, Dwyer, Kennedy, Shaw
Lecture—3 hours. Prerequisite: Mathematics 21D, 22B; open to College of Engineering students only. Fundamental concepts of thermodynamics: heat energy and work, properties of pure substances, First Law and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales; power cycles: Carnot, Rankine, Brayton; and applications of thermodynamics to engineering systems.

105B. Thermodynamics (3) I, II, III. Aldredge, Hoffman, Kennedy
Lecture—3 hours. Prerequisite: course 105A; open to College of Engineering students only. Irreversibility and availability, thermodynamic relations, gas and vapor mixtures, and chemical reactions.

106. Engineering Economics (3) II, III. Hartsough, Slaughter
Lecture—3 hours. Prerequisite: upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.

107L. Thermal Fluids Laboratory (2) II, III. Shaw, Barakat, Kennedy, van Dam
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 103B and 105B (both may be taken concurrently). Experiments to illustrate the first and second laws of thermodynamics, thermodynamic cycles, combustion, flow measurements and internal and external flows.

111. Electric Power Equipment (3) I. Delwiche, Hartsough
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 17. Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics.

122. Introduction to Mechanical Vibrations (3) I. Hubbard
Lecture—3 hours. Prerequisite: course 102. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles.

130. Introduction to Biomedical Engineering (3) I. Hull
Lecture—3 hours. Prerequisite: courses 36, 45, 100 or consent of instructor. An introduction to the primary fields of specialization in biomedical engineering. Fields include the following: (1) sensors, instrumentation, and signal processing; (2) orthopaedic biomechanics; (3) whole body biomechanics; (4) imaging, and (5) biofluids and transport.

*Course not offered this academic year.

160. Environmental Physics and Society (3) I. Jungerman, Craig
Lecture—3 hours. Prerequisite: Physics 9D, 5C, or 10 or 1B and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) (Same course as Physics 160.) GE credit: SciEng or SocSci.

180. Engineering Analysis (3) I. Hafez
Lecture—3 hours. Prerequisite: Mathematics 22B, course 5. Analysis of steady-state and nonsteady-state problems for discrete and continuous systems; analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

***182. Engineering Analysis in Applied Mechanics** (3) III.
Lecture—3 hours. Prerequisite: course 102 (may be taken concurrently) and Mathematics 22B. Introduction to the mathematics of optimum design. The calculus of variations with applications to dynamics and design. Linearization and the solution of linear dynamic equations. Emphasis on analytical methods and computer aids.

190. Professional Responsibilities of Engineers (3) II, III. Sanders
Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional and ethical issues; oral presentations on the interactions between engineering and society.

Graduate Courses

***254. Manufacturing Engineering** (3) II. Dorf
Lecture—3 hours. Prerequisite: course 160, Statistics 120. Manufacturing and process engineering, productivity, planning, production and operations, inventory and facilities, quality, robots and flexible manufacturing systems.

291. Seminar in Teaching (1) III. The Staff
Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (S/U grading only.)

Engineering: Applied Science

(College of Engineering)

Neville C. Luhmann, Jr., Ph.D., Chairperson of the Department

Rao Vemuri, Ph.D., Vice Chairperson of the Department

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Emeriti Faculty

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John S. De Groot, Ph.D., Professor Emeritus
William G. Hoover, Ph.D., Professor Emeritus
John Killeen, Ph.D., Professor Emeritus
William A. Newcomb, Ph.D., Professor Emeritus
Richard F. Post, Ph.D., Professor Emeritus
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John C. Garrison, Ph.D., Lecturer
J. Brian Grant, Ph.D., Lecturer
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Dennis L. Matthews, Ph.D., Adjunct Professor
Patrick J. Miller, Ph.D., Lecturer
Margarita P. Ryutova, Ph.D., Lecturer
Michael J. Shaw, Ph.D., Lecturer
Bruce W. Shore, Ph.D., Lecturer
Louis J. Terminello, Ph.D., Adjunct Associate Professor

Courses in Engineering: Applied Science—Davis (EAD)

Lower Division Courses

90C. Research Group Conference for Lower Division Students (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: lower division standing; consent of instructor. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

115. Introduction to Numerical Methods for Engineers and Scientists (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Engineering 5, Mathematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and deterministic and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

116. Computer Solution of Physical Problems (3) III. De Groot
Lecture—3 hours. Prerequisite: course 115 or consent of instructor. Application of computers to solution of physical problems. Numerical solution of elliptic, parabolic, and hyperbolic partial differential equations; eigenvalue problems, Monte Carlo methods, linear programming.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungerman (Physics), Craig
Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 1B, 5C, 9D, or 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including the nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) (Same course as Physics 137.) GE credit: SciEng or SocSci.

165A. Quantum Optics I (3) II. Yeh
Lecture—3 hours. Prerequisite: Physics 110A-110B or the equivalent. Quantum nature of light and matter. Statistics of photons in chaotic, coherent and mixed states. Concepts of photon coherence and correlation. Development of a coherent state from a chaotic photon distribution.

165B. Quantum Optics II (3) III. Yeh
Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter: photoelectric counting statistics. Photon distributions in scattering processes and in nonlinear optical processes.

166A. Quantum Optics Laboratory (1) II. Yeh
Laboratory—3 hours. Prerequisite: course 165A concurrently. Hands on experience in working with lasers, photon spectroscopy, electro-optical devices and photoelectric counting statistics.

166B. Quantum Optics Laboratory (1) III. Yeh
Laboratory—3 hours. Prerequisite: course 165B concurrently. Continuation of course 166A.

171. Scanning Probe Microscopy (4) III. Yeh
Lecture—3 hours; laboratory—3 hours. Prerequisite: Electrical and Computer Engineering 130A, Engineering 102, Chemistry 110B or the equivalent. Physics of scanning microprobe techniques, scanning tunneling microscope and atomic force microscope will be studied, as will their applications to surfaces and structural biology. Operational STM and AFM will further students' experience in nano-scale science and technology.

180. Introduction to Plasma Physics and Controlled Fusion (3) I. The Staff
Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma properties, plasma sources, plasma diagnostics, magnetohydrodynamics, kinetic theory, plasma stability, plasma confinement systems and approaches to controlled thermonuclear fusion.

181. Plasma Physics Laboratory (1) I. De Groot
Laboratory—3 hours. Prerequisite: course 180 concurrently. Langmuir probes, plasma sources, Landau damping of ion acoustic waves, ion acoustic shocks, ion-ion two-stream instability.

190C. Research Group Conference for Advanced Undergraduates (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in applied science. May be repeated for credit. (P/NP grading only.)

198. Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

228A-228B-228C. Properties of Matter (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

230A-230B-230C. Structure of Matter (3-3-3) I-II-III. Yeh
Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C (may be taken concurrently). Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules, and solids; quantum theory of cooperative effects.

234A-234B-234C. Electromagnetic Theory (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 131B. Review basic electromagnetic field theory. Special relativity. Charges in fields. Radiation from charges: generation, scattering, diffraction. Electrodynamics of continuous media: conductors, dielectrics, superconductors, magnetic materials, plas-

mas. Transmission of electromagnetic waves through material. Modern applications of theory.

271. Optical Methods in Biophysics (3) I. Yeh
Lecture—3 hours. Prerequisite: Physics 110A-110B-110C, Chemistry 110A, 110B, or the equivalent. Physics of light–matter interactions used in biophysical research. Techniques of absorption, ellipsometry, fluorescence, phosphorescence, elastic and inelastic scattering, diffraction, and nonlinear optics are applied to the studies of proteins, nucleic acids, lipids, and supra-molecular organizations in biological systems. Offered in alternate years.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.

285A. Physics and Technology of Microwave Vacuum Electron Beam Devices I (4) III. Luhmann
Lecture—4 hours. Prerequisite: B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Offered in alternate years.

285B. Physics and Technology of Microwave Vacuum Electron Beam Devices II (4) I. Luhmann
Lecture—4 hours. Prerequisite: 285A. Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Offered in alternate years.

285C. Physics and Technology of Microwave Vacuum Electron Beam Devices III (4) II. Luhmann
Lecture—4 hours. Prerequisite: 285B. Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Offered in alternate years.

285D. Physics and Technology of Microwave Vacuum Electron Beam Devices IV (4) III. Luhmann
Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.

289A-K. Special Topics in Applied Science (1-5) I, II, III. The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: **(A)** Atomic and Molecular Physics; **(B)** Chemical Physics; **(C)** Computational Physics; **(D)** Digital Media; **(E)** Materials Science; **(F)** Imaging Science and Photonics; **(G)** Nonlinear Optics; **(H)** Plasma Physics; **(I)** Quantum Electronics; **(J)** Solid State; **(K)** Microwave and Millimeter Wave Technology. May be repeated for credit when topic differs.

290. Seminar (1-2) I, II, III. The Staff
Seminar—1-2 hours. (S/U grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

Courses in Engineering: Applied Science—Livermore (EAL)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Software Engineering (3) I. The Staff
Lecture—3 hours. Prerequisite: data structures, elementary knowledge of software development methodology; knowledge of an object-oriented language is desirable. First part of course examines the development of large production-quality programs, project management techniques, software design methodologies. The second part covers automated and integrated software tools and object-oriented methods of design. Problems associated with user interface management systems are discussed. (Former course 201A.)

203. Computer Architecture (3) III. The Staff
Lecture—3 hours. Prerequisite: Computer Science Engineering 250A. Topics in computer communication, hardware features to enhance operating systems, advanced architectures, memory hierarchy, parallel architectures, and vector computing.

204. Knowledge Representation (3) III. Blattner
Lecture—3 hours. Prerequisite: Computer Science Engineering 270 and 222A, or the equivalent. Course explores expressive adequacy, computational efficiency, non-deductive and non-monotonic reasoning associated with some knowledge representation schemes. Offered in alternate years.

205A. Mathematical Methods (3) I. The Staff
Lecture—3 hours. Prerequisite: calculus. Complex variables, theory of convergence, evaluation of definite integrals, factorial function (gamma function), asymptotic expansions, fourier analysis.

205B. Mathematical Methods (3) II. The Staff
Lecture—3 hours. Prerequisite: course 205A. Laplace transforms, Sturm-Liouville theory, solution of second order linear ODE, approximate solutions of ODE, calculus of variations, characteristics.

205C. Mathematical Methods (3) III. The Staff
Lecture—3 hours. Prerequisite: course 205B. Spherical harmonics, Bessel functions, conformal mapping, hypergeometric functions, elliptic functions.

207. Compiler Construction (3) I. The Staff
Lecture—3 hours. Prerequisite: Computer Science Engineering 240. Syntax-directed translation techniques are used to implement a compiler for a high-level programming language. Emphasis on semantic analysis and code generation and optimization.

210A. Numerical Methods in Applied Science (3) I. The Staff
Lecture—3 hours. Prerequisite: calculus through differential equations and vector analysis. Numerical techniques used in a wide variety of applications of digital computers to problems in applied science. Emphasis placed on the common mathematical elements of the techniques developed.

210B. Numerical Methods in Applied Science (3) II. The Staff
Lecture—3 hours. Prerequisite: course 210A. Numerical methods applicable to the solution of partial differential equations. Emphasis on finite-difference, finite-element, and spectral methods for linear hyperbolic, parabolic, and elliptic systems and nonlinear hyperbolic systems.

210C. Numerical Methods in Applied Science (3) III. The Staff
Lecture—3 hours. Prerequisite: course 210B. Computational methods in various fields including: fluid mechanics, kinetic theory, solid mechanics, quantum mechanics.

211A. Numerical Solution of Partial Differential Equations I (3) I. Rodrigue
Lecture—3 hours. Prerequisite: course 210A, 210B. Fundamentals of parallel computers, grid generation, domain decomposition, Poisson's equation, elliptic PDEs, Galerkin methods, numerical linear algebra, iterative acceleration.

211B. Numerical Solution of Partial Differential Equations II (3) II. Rodrigue
Lecture—3 hours. Prerequisite: course 211A. Parabolic PDEs, stability, preconditioned time differencing, hyperbolic PDEs, modified differential equation, advection-diffusion equations, wave equation, Burgers' equation, reaction-diffusion equations.

211C. Numerical Solution of Partial Differential Equations III (3) III. Rodrigue
Lecture—3 hours. Prerequisite: course 211B. Conservation laws, fluid equations, turbulence, elasticity equations, electromagnetic equations, transport equations.

213A. Computer Graphics (3) II. Max
Lecture—3 hours. Prerequisite: consent of instructor. Development of algorithms for perspective line drawings of three-dimensional objects, as defined by polygons or bicubic patches.

213B. Computer Graphics (3) III. Max
Lecture—3 hours. Prerequisite: course 213A or Computer Science Engineering 175. Algorithms to produce color raster renderings of three-dimensional models.

214. Scientific Visualization (3) II. Max
Lecture—3 hours. Prerequisite: Computer Science Engineering 175 or consent of instructor. Visualization of 3D data, including scalar fields, vector fields, and molecular structures. Primary emphasis on volume visualization algorithm.

216A-G. Special Topics in Computer Science (1-5) I, II, III.
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: **(A)** Architecture; **(B)** Software Systems; **(C)** Language Translation; **(D)** Language Design; **(E)** Operating Systems; **(F)** Foundations of Computing; **(G)** Computational Mathematics. May be repeated for credit for a total of 5 units per segment if topic differs.

217A-217B. Computational Science (3-3) I, II. The Staff
Lecture—3 hours. Prerequisite: courses 205A and 205B (may be taken concurrently). Designed for physical scientists. Topics in computer science with applications to computational science. Computer organization and architecture, data structures, algorithms and complexity, software environments for scientific visualization, symbolic computation.

218. Signal Processing (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 121A, 121B or the equivalent. Discrete-time and continuous-time signal processing. Fourier transforms, Laplace transforms, sampling and reconstruction. LTI systems: convolution. Discrete-time transforms: DFT, FFT, and Discrete wavelet transforms. Filters and filter designs. Offered in alternate years.

220A. Artificial Neural Nets–I (3) I. Vemuri
Lecture—3 hours. Prerequisite: Mathematics 167; ability to use computers to solve problems using a traditional language or via tools like Matlab or Mathematica. Biological and Computational motivations. Models of neurons. Supervised and unsupervised learning. Correlation matrix memories. Discrete and continuous Hopfield nets. Self organization. Kohonen Net. Counter propagation. Perceptron. LMS methods. Back propagation. Offered in alternate years.

220B. Artificial Neural Nets–II (3) II. Vemuri
Lecture—3 hours. Prerequisite: course 220A. Growing and pruning algorithms for multi-layer perceptrons, acceleration of convergence, conjugate gradient methods. RBF networks. Temporal processing. Modular networks. Reinforcement learning. Neurodynamics. Case studies. Offered in alternate years.

221. Genetic Algorithms and Optimization (3) III. Vemuri
Lecture—3 hours. Prerequisite: Mathematics 145 or the equivalent; graduate standing; ability to program in one of the modern programming languages. Introduction to genetic algorithms. Fundamental theorem; schema processing; genetic operators; applications to function optimization, scheduling, VLSI circuit layout. Implementation on parallel computers; genetic programming; evolutionary algorithms.

222. User Interfaces (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 101, 106. Design and evaluation of the interface between systems and users. Covers user interaction styles and techniques, display formats, user guidance, and

methodologies for designing and evaluating user interfaces. Offered in alternate years.

223. Mixed Media Interfaces (3) I. Blattner
Lecture—3 hours. Prerequisite: course 222. Examines basic paradigms of multimedia interfaces and time-varying systems, navigation through the multimedia systems, hypermedia, and an examination of some commercial systems as well as the study of interaction devices such as audio, gesture, video, pen-based systems, and voice input and output. Virtual reality systems are also studied. Offered in alternate years.

224. Theories of Human-Computer Interaction (3) I. Blattner
Lecture—3 hours. Prerequisite: data structures and basic statistics; a course in user interfaces is desirable. Some basic cognitive science pertaining to computer usage is introduced (such as memory, sensory limits, and problem solving) followed by models of human activity; task analysis; different paradigms for computer use; models of cooperative activity; cultural differences in human-computer interaction; users with disabilities; and adaptive interfaces. Offered in alternate years.

225. Computational Structures for Signal and Image Processing and Graphics (3) III. Vemuri
Lecture—3 hours. Prerequisite: Computer Science Engineering 40; course 210A. Tools for research in digital media. Relevant computer architectures, algorithms and languages for signal processing, image processing and graphics. Hardware and software issues in parallelism. Programming in SISAL. Parallel C and Parallel Fortran. Parallel algorithms using SISAL on parallel computers. Offered in alternate years.

226. Practical Data Communications in Digital Media (3) II. Vemuri
Lecture—3 hours. Prerequisite: Computer Science Engineering 152. Tools for research in digital media. Communication protocols, algorithms and architectures suitable in modern networked environment. Transmission of digital data over voice-grade channels, telecommunications networks for data transport, Broadband multimedia communications, ATM, and Broadband ISDN. Offered in alternate years.

227. Chaos, Fractals and Nonlinear Phenomena (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 205A and 205B. A computational treatment of pervasive instabilities in simulation— "sensitive dependence on initial conditions" —called "Chaos." Connecting the Second Law of Thermodynamics to nonlinear dynamics with "strange attractors;" these are generally "fractal" objects with great aesthetic and intellectual appeal.

228A-228B-228C. Statistical Mechanics (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics: constitutive, electrical, mechanical and thermal properties.

230A-230B-230C. Quantum Mechanics (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: courses 205A-205B-205C (may be taken concurrently). Classical properties of matter; introduction to quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

233A-233B-233C. Theory and Applications of Solid-State Physics (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 230C or the equivalent. Structure and properties of crystals; theory of dielectrics, metals and alloys; magnetism, superconductivity, and semiconductors. Applications to various solid-state devices.

234A-234B-234C. Electromagnetic Theory (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 131B. Review basic electromagnetic field theory. Special relativity. Charges in fields. Radiation from charges: generation, scattering, diffraction. Electrodynamics of continuous media: conductors, dielectrics, superconductors, magnetic materials, plasmas. Transmission of electromagnetic waves through material. Modern applications of theory.

255. Classical Mechanics (3) I. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. General principles of analytical mechanics; variational principles; Lagrange's and Hamilton's equations; kinematics; collisions.

256. Continuum Mechanics (3) II. The Staff
Lecture—3 hours. Prerequisite: course 205C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic instability; viscous hydrodynamics; boundary layer theory.

257. Computational Continuum Mechanics (3) Hoover
Lecture—3 hours. Prerequisite: Mathematics 121A, 121B and 128C. Fundamental conservation and constitutive equations for continua, together with numerical techniques for their solution, including Eulerian, Lagrangian, and particle methods.

262A-262B-262C. Atomic and Molecular Interactions (3-3-3) I-II-III. Orel
Lecture—3 hours. Prerequisite: course 230A-230B-230C or the equivalent. Atomic structure and spectra, molecular structure and spectra, classical and quantum mechanical collision theory of electron and heavy particle scattering.

265A-265B. Laser Physics (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: courses 230A-230B-230C, 234A-234B-234C. Theory of generation of laser radiation and its interaction with matter. Dynamics of laser media, oscillators/amplifiers. Short pulse generation and propagation. Coherence properties of laser radiation. Fourier optics, resonators, and holography. Characteristics of laser devices. Laser spectroscopy.

266A-266B. Laser Physics Laboratory (3-3) I-II. The Staff
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B (may be taken concurrently). Experiments exploring principles of generation and propagation of laser radiation. Laser measurement techniques. Dynamics of laser media. Oscillators and amplifiers. Generation of short pulses. Coherence properties of laser radiation. Holography. Characteristics of laser devices. Laser spectroscopy.

267. Nonlinear Optics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 265A-265B. Theory of the nonlinear interaction of radiation and matter. Nonlinear optical properties of materials. Crystal optics, electro-optics, and acousto-optics. Parametric oscillation and amplification. Harmonic conversion. Stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation and spectroscopy.

267L. Nonlinear Optics Laboratory (3) III. The Staff
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B. Experiments exploring the principles of nonlinear optics. Phenomena studied selected from: crystal-optics, electro-optics, acousto-optics, parametric oscillation and amplification, harmonic conversion, stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation. Laser spectroscopy.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. Hwang
Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.

285A. Physics and Technology of Microwave Vacuum Electron Beam Devices I (4) III. Luhmann
Lecture—4 hours. Prerequisite: B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Offered in alternate years.

285B. Physics and Technology of Microwave Vacuum Electron Beam Devices II (4) I. Luhmann
Lecture—4 hours. Prerequisite: 285A. Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Offered in alternate years.

285C. Physics and Technology of Microwave Vacuum Electron Beam Devices III (4) II. Luhmann
Lecture—4 hours. Prerequisite: 285B. Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Offered in alternate years.

285D. Physics and Technology of Microwave Vacuum Electron Beam Devices IV (4) III. Luhmann
Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.

289A-K. Special Topics in Applied Science (1-5) I, II, III. The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: **(A)** Atomic and Molecular Physics; **(B)** Chemical Physics; **(C)** Computational Physics; **(D)** Digital Media; **(E)** Materials Science; **(F)** Imaging Science and Photonics; **(G)** Nonlinear Optics; **(H)** Plasma Physics; **(I)** Quantum Electronics; **(J)** Solid State; **(K)** Microwave and Millimeter Wave Technology. May be repeated up to a total of 5 units per segment when topic differs.

290. Seminar. (1-2) I, II, III. The Staff (Chair in charge)
Seminar—1-2 hours. (S/U grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chair in charge)
(S/U grading only.)

Engineering: Biological and Agricultural

(College of Engineering)

David J. Hills, Ph.D., Chairperson of the Department

Department Office, 2030 Bainer Hall (916-752-0102)
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Faculty

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D. Ken Giles, Ph.D., Associate Professor
Mark E. Grismer, Ph.D., Professor
Bruce R. Hartsough, Ph.D., Professor
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
John M. Krochta, Ph.D., Professor
Miguel A. Mariño, Ph.D., Professor
Kathryn McCarthy, Ph.D., Associate Professor
Michael J. McCarthy, Ph.D., Professor
John A. Miles, Ph.D., Professor
Ning Pan, Ph.D., Associate Professor
Marc B. Parlange, Ph.D., Professor
Raul H. Piedrahita, Ph.D., Associate Professor
Richard E. Plant, Ph.D., Professor
James W. Rumsey, M.S., Lecturer
Thomas R. Rumsey, Ph.D., Professor
R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Associate Professor
Shrinivasa K. Upadhyaya, Ph.D., Professor
Jean S. VanderGheynst, Ph.D., Assistant Professor

Wesley W. Wallender, Ph.D., Professor
Ruihong Zhang, Ph.D., Assistant Professor

Emeriti Faculty

Norman B. Akesson, M.S., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor Emeritus
Robert B. Fridley, Ph.D., Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
John R. Goss, M.S., Professor Emeritus
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
Robert A. Kepner, B.S., Professor Emeritus
Coby Lorenzen, Jr., M.S., Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor Emeritus
Verne H. Scott, Ph.D., Professor Emeritus
Henry E. Studer, M.S., Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

Affiliated Faculty

James M. Meyers, Ph.D., Extension Specialist
William E. Steinke, Ph.D., Extension Specialist
James F. Thompson, M.S., Extension Specialist

Courses in Engineering: Biological Systems (EBS)

Lower Division Courses

1. Introduction to Biological Systems and Food Engineering (3) I. Giles
Lecture—2 hours; laboratory—3 hours. Introduction to engineering and the engineering design process, with examples drawn from the fields of agriculture, biological and food engineering. Emphasis on the relationship of engineering principles to biological systems. Laboratories include small group design projects and presentations. GE credit: SciEng.

75. Properties of Materials in Biological Systems (4) II. Slaughter
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A; Physics 9C (may be taken concurrently). Properties of typical biological materials; composition and structure with emphasis on the effects of physical and biochemical properties on design of engineered systems; interactions of biological materials with typical engineering materials. GE credit: SciEng.

90C. Research Group Conference in Biological Systems Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: lower division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.)

90X. Lower Division Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

92. Internship in Biological Systems Engineering (1-5) I, II, III. The Staff (Hills in charge)
Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Hills in charge)
Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Hills in charge)
(P/NP grading only.)

Upper Division Courses

114. Principles of Field Machinery Design (3) III. Chen
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 36, 104. Traction and stability of vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design.

115. Forest Engineering (3) III. Hartsough
Lecture—3 hours. Prerequisite: Engineering 104, Biological Sciences 1C. Applications of engineering principles to problems in forestry including those in forest regeneration, harvesting, residue utilization, and transportation.

116. Forest Engineering Field Problems (2) I. Miles
Lecture—1 hour; three weekend field trips to Blodgett Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

120. Power and Energy Conversion (4) II. Jenkins
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 17, 36, 103A, 105A. Fundamentals of energy conversion with applications to biological and agricultural systems. Design and performance characteristics of power devices and systems including combustion engines, electric generators and motors, fluid power systems, fans, pumps, mechanical transmissions, and others. Selection of units for power matching and optimal performance.

125. Heat and Mass Transfer in Biological Systems (3) III. VanderGheynst
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 75, Engineering 105A. Heat and mass transfer and psychrometrics with principal applications to biological and environmental processes. Steady and transient heat and mass transfer. Analysis of heat conduction, convection and radiation, and material diffusion and convection.

130. Dynamic Modeling of Processes in Biological Systems (3) II. Rumsey
Lecture/discussion—3 hours. Prerequisite: Engineering 5 or the equivalent. Introduction to techniques for modeling processes through mass and energy balances, rate equations, and equations of state. Computer solution of models. Example models include package design, evaporation, respiration heating, thermal processing of foods, and plant growth.

132. Unit Operations in Food Engineering (4) III. Singh
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 125, Engineering 103A, 105A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials. Thermal operations related to refrigeration, freezing, evaporation and drying of foods.

143. Analytical Hydrology and Watershed Mangement (3) II. Parlange
Lecture—3 hours. Prerequisite: Engineering 103A or Hydrologic Science 103, and working knowledge of FORTRAN. Introduction to watershed hydrology modeling. Techniques in precipitation, evaporation, infiltration, subsurface and overland flow, non-point source pollution, snowmelt, and their formulation in watershed model design and programming. (Same course as Hydrologic Science 143.)

145. Irrigation and Drainage Systems (4) II. Wallender, Grismer, Hills
Lecture—4 hours. Prerequisite: Engineering 103A or Hydrologic Science 103. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Hydrologic Science 115.)

165. Bio-Instrumentation and Control (3) I. Delwiche
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrumentation and control for biological production systems. Measurement system concepts, instrumentation and transducers for sensing biological parameters, data acquisition, and process control.

170A. Engineering Design and Professional Responsibilities (3) II. Miles
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1, Engineering 36, 104. Introduction to engineering design including professional responsibilities. Emphasis placed on project selection, data sources, specifications, human factors, biological materials, safety systems, and professionalism. Detailed design proposals will be developed for course 170B.

170B. Engineering Projects: Design (3) I, II, III. Miles
Laboratory/discussion—three 2-hour sessions. Prerequisite: course 170A. Individual or group projects involving the design of devices, structures, or systems to solve specific problems in agriculture or forestry. Students may select their projects, subject to approval of instructor.

170C. Engineering Projects: Design Evaluation (3) I, II, III. Miles
Laboratory—three 3-hour sessions. Prerequisite: course 170B strongly recommended. Individual or group projects involving fabrication, assembly and testing of components, devices, structures or systems designed to solve specific problems in agriculture or forestry. Projects selected by the instructor from those designed in course 170B.

175. Rheology of Biological Materials (3) II. K. McCarthy
Lecture—3 hours. Prerequisite: Chemical Engineering 150A or Engineering 103A; and Engineering 105A or Chemical Engineering 152A. Introduction to fluid and solid rheology, viscoelastic behavior of foods and other biological materials, and application of rheological properties to food and biological systems (i.e., pipeline design, extrusion, mixing, coating).

190C. Research Group Conference in Biological Systems Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: upper division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.)

190X. Upper Division Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: consent of instructor. In-depth examination of a special topic in a small group setting.

192. Internship in Biological Systems Engineering (1-5) I, II, III. The Staff (Hills in charge)
Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Biological Systems Engineering (1-5) I, II, III. The Staff
Tutorial—1-5 hours. Prerequisite: upper division standing in engineering; consent of instructor. Tutoring of students in undergraduate biological systems engineering courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Hills in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Hills in charge)
(P/NP grading only.)

Graduate Courses

200. Research Methods in Biological Systems Engineering (2) I. Giles
Lecture—2 hours. Prerequisite: graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Record keeping and patents. Uncertainty analysis in experiments and computations. Graphic analysis. Oral and written presentation of research results, manuscript preparation, submission and review.

*Course not offered this academic year.

215. Soil-Machine Relations in Tillage and Traction (3) II. Upadhyaya
Lecture—3 hours. Prerequisite: course 114. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stress and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems. Offered in alternate years.

***216. Energy Systems** (3) II. Jenkins
Lecture—3 hours. Prerequisite: Engineering 105A. Theory and application of energy systems. System analysis including input-output analysis, energy balances, thermodynamic availability, economics, environmental considerations. Energy conversion systems and devices including cogeneration, heat pump, fuel cell, hydroelectric, wind, photovoltaic, and biomass conversion processes. Offered in alternate years.

218. Solar Thermal Engineering (3) I. T. Rumsey
Lecture—3 hours. Prerequisite: course in heat transfer. Familiarity with FORTRAN language. Analysis and design of solar energy collection systems. Sun-earth geometry and estimation of solar radiation. Steady state and dynamic models of solar collectors. Modeling of thermal energy storage devices. Computer simulation. Offered in alternate years.

220. Pilot Plant Operations in Aquacultural Engineering (3) III. Piedrahita
Lecture—1 hour; laboratory—6 hours. Prerequisite: Civil Engineering 243A-243B or Applied Biological Systems Technology 161, 163. Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Offered in alternate years.

***231. Mass Transfer in Food and Biological Systems** (3) I. Krochta
Lecture/discussion—3 hours. Prerequisite: graduate standing. Application of mass transfer principles to food and biological systems. Study of mass transfer affecting food quality and shelf life. Analysis of mass transfer in polymer films used for coating and packaging foods and controlling release of biologically active compounds. Offered in alternate years.

***233. Analysis of Processing Operations: Drying and Evaporation** (3) II. T. Rumsey
Lecture—3 hours. Prerequisite: course in food or process engineering, familiarity with FORTRAN. Diffusion theory in drying of solids. Analysis of fixed-bed and continuous-flow dryers. Steady-state and dynamic models to predict performance evaporators: multiple effects, mechanical and thermal recompression, control systems. Offered in alternate years.

235. Advanced Analysis of Unit Operations in Food and Biological Engineering (3) III. Singh
Lecture—3 hours. Prerequisite: course 132. Analysis and design of food processing operations. Steady state and dynamic heat and mass transfer models for operations involving phase change such as freezing and frying. Separation processes including membrane applications in food and fermentation systems.

237. Thermal Process Design (3) III. T. Rumsey
Lecture—2 hours; discussion—1 hour. Prerequisite: course in heat transfer. Heat transfer and biological basis for design of heat sterilization of foods and other biological materials in containers or in bulk. Offered in alternate years.

239. Magnetic Resonance Imaging in Biological Systems (3) I. M. McCarthy
Lecture—3 hours. Prerequisite: graduate standing. Theory and applications of magnetic resonance imaging to biological systems. Classical Bloch model of magnetic resonance. Applications to be studied are drying of fruits, flow of food suspensions, diffusion of moisture, and structure of foods. Offered in alternate years.

***240. Infiltration and Drainage** (3) II. Grismer
Lecture—3 hours. Prerequisite: Soil Science 107; Engineering 103A. Aspects of multi-phase flow in soils and their application to infiltration and immiscible displacement problems. Gas phase transport and entrapment during infiltration, and oil-water-gas displacement will be considered. Offered in alternate years.

***241. Sprinkle and Trickle Irrigation Systems** (3) III. Hills
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145. Computerized design of sprinkle and trickle irrigation systems. Consideration of emitter mechanics, distribution functions and water yield functions. Offered in alternate years.

242. Hydraulics of Surface Irrigation (3) III. Wallender
Lecture—3 hours. Prerequisite: course 145/Hydrologic Science 115. Mathematical models of surface-irrigation systems for prediction of the ultimate disposition of water flowing onto a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and inflow rates. Offered in alternate years.

243. Water Resource Planning and Management (3) I. Marino
Lecture—3 hours. Prerequisite: Hydrologic Science 141 or Civil and Environmental Engineering 142. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design, and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Same course as Hydrologic Science 243.) Offered in alternate years.

245. Waste Management for Biological Production Systems (3) II. Zhang
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Characterization of solid and liquid wastes from animal, crop, and food production systems. Study of methods and system design for handling, treatment, and disposal/utilization of these materials. Offered in alternate years.

***260. Analog Instrumentation** (4) II. Delwiche
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrument characteristics: generalized instrument models, calibration, and frequency response. Signal conditioning: operational amplifier circuits, filtering, and noise. Transducers: motion, force, pressure, flow, temperature, and photoelectric. Offered in alternate years.

265. Design and Analysis of Engineering Experiments (4) III. Upadhyaya, Plant
Lecture—3 hours; laboratory—3 hours. Prerequisite: at least one undergraduate course in statistics or consent of instructor. Design, management, and analysis of engineering experiments with emphasis on criteria for the selection and utilization of statistical methods. Problems necessitating the use of campus and departmental computing facilities will be assigned.

***270. Modeling and Analysis of Biological and Physical Systems** (4) III. Upadhyaya, T. Rumsey
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: Civil and Environmental Engineering 212A. Mathematical modeling of biological systems: model development; analytical and numerical (finite difference and finite elements) solutions. Case studies from various specializations within Biological and Agricultural Engineering. Offered in alternate years.

275. Physical Properties of Biological Materials (3) I. Chen
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties, such as mechanical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of biological materials.

289A-K. Selected Topics in Biological Systems Engineering (1-5) I. The Staff
Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in: **(A)** Animal Systems Engineering; **(B)** Aquacultural Engineering; **(C)** Biological Engineering; **(D)** Energy Systems; **(E)** Environmental Quality; **(F)** Food Engineering; **(G)** Forest Engineering; **(H)** Irrigation and Drainage; **(I)** Plant Production and Harvest; **(J)** Postharvest Engineering; **(K)** Sensors and Actuators. May be repeated for credit when topic differs.

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Weekly seminars on recent advances and selected topics in biological systems engineering. Course theme will change from quarter to quarter. May be repeated for credit. (S/U grading only.)

290C. Graduate Research Conference (1) I, II, III. The Staff (Hills in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in biological systems engineering. May be repeated for credit. (S/U grading only.)

297. Advances in Food Engineering (1) I, II, III. Singh
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in food engineering. Presentations by individual students. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Hills in charge)

299. Research (1-12) I, II, III. The Staff (Hills in charge)
(S/U grading only.)

Professional Course

390. Supervised Teaching in Biological and Agricultural Engineering (1-3) I, II, III. The Staff
Laboratory—3 hours; tutorial—3-9 hours. Prerequisite: graduate standing; consent of instructor. Tutoring and teaching students in undergraduate courses offered in the Department of Biological and Agricultural Engineering. Weekly conferences with instructor; evaluation of teaching. Preparing for and conducting demonstrations, laboratories and discussions. Preparing and grading exams. May be repeated for a total of 6 units. (S/U grading only.)

Engineering: Chemical Engineering and Materials Science

(College of Engineering)

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Faculty

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Roger B. Boulton, Ph.D., Professor *(Chemical Engineering, Viticulture and Enology)*
Stephanie R. Dungan, Ph.D., Assistant Professor *(Chemical Engineering, Food Science and Technology)*
Bruce C. Gates, Ph.D., Professor
Jeffery C. Gibeling, Ph.D., Professor
Joanna R. Groza, Ph.D., Associate Professor
Brian G. Higgins, Ph.D., Professor
David G. Howitt, Ph.D., Professor
Alan P. Jackman, Ph.D., Professor
Marjorie L. Longo, Ph.D., Assistant Professor
Benjamin J. McCoy, Ph.D., Professor
Karen A. McDonald, Ph.D., Associate Professor
Amiya K. Mukherjee, D.Phil., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*
Zuhair A. Munir, Ph.D., Professor
Alexandra Navrotsky, Ph.D., Professor *(Materials Science and Engineering; Chemistry; Land, Air, and Water Resources)*
Ahmet N. Palazoglu, Ph.D., Professor
Ronald J. Phillips, Ph.D., Assistant Professor
Robert L. Powell, Ph.D., Professor

Subhash H. Risbud, Ph.D., Professor
Dewey D.Y. Ryu, Ph.D., Professor
James F. Shackelford, Ph.D., Professor
Pieter Stroeve, Sc.D., Professor, *Academic Senate Distinguished Teaching Award*
Stephen Whitaker, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

Emeriti Faculty

Richard L. Bell, Ph.D., Professor Emeritus
Howard L. Needles, Ph.D., Professor Emeritus
J. M. Smith, Sc.D., Professor Emeritus
S. Haig Zeronian, Ph.D., D.Sc., Professor Emeritus

Courses in Engineering: Chemical (ECH)

(Courses in Chemical Engineering (ECH) are listed below; courses in Materials Science and Engineering (EMS) are listed immediately following.)

Lower Division Courses

1. The Scope of Chemical Engineering (1) II. The Staff (Chairperson in charge)
Lecture—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, with clarification of what chemical engineers actually do in various jobs. (P/NP grading only.)

90X. Lower Division Seminar (1) I, II, III. The Staff
Seminar—1 hour. Examination of a special topic in a small group setting.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

150A. Chemical Engineering Fluid Mechanics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, 22B, 21D, Engineering 35. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. The stress vector-stress tensor relation. Newton's law of viscosity and application of the Navier-Stokes equations to laminar flow and dimensional analysis. Flow of non-Newtonian fluids. Not open for credit to students who have completed Engineering 103A.

150B. Chemical Engineering Fluid Mechanics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Turbulent flows and time averaging. Application of Bernoulli's equation and the macroscopic mass, momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and choke flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

150C. Rheology and Polymer Processing (4) III. The Staff
Lecture—4 hours. Prerequisite: course 150A. Fundamentals of rheology. Introduction to polymer processing unit operations.

***150L. Polymer Engineering Laboratory** (4) II. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150C, Chemistry 2C or 2CH, or consent of instructor. Introduction to specialized equipment to learn about principles governing preparation of macromolecules and their properties. Principles and properties relevant to processing polymers. Environmental effects in polymer applications. Molecular engineering design.

151. Material Balances (3) I. The Staff
Lecture—3 hours. Prerequisite: Chemistry 110A, Chemistry 128B (may be taken concurrently), Engineering 5. Application of the principles of conservation of mass to single and multi-component systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, change of phase, and chemical reaction.

152A. Chemical Engineering Thermodynamics (3) II. The Staff
Lecture—3 hours. Prerequisite: course 151, Chemistry 110A. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105A.

152B. Chemical Engineering Thermodynamics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineering 105B.

153. Chemical Engineering Heat Transfer (4) III. The Staff
Lecture—4 hours. Prerequisite: course 150A. Steady and transient heat conduction. The thermal energy equation, analysis of forced and free convective heat transfer. Turbulence, macroscopic balances, and heat transfer coefficients. The photon transport equation and radiant energy exchange. The design of heat exchangers.

154A. Mass Transfer (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 153, Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

154B. Applications of Mass Transfer (3) II. The Staff
Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation, and other separation processes.

155A. Chemical Engineering Laboratory (4) I, II. The Staff
Laboratory—12 hours. Prerequisite: course 154A (may be taken concurrently). Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, Food Engineering, Biosystems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: Wrt.

155B. Chemical Engineering Laboratory (4) II, III. The Staff
Laboratory—12 hours. Prerequisite: courses 154B (may be taken concurrently) and 155A. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, Food Engineering, Biological Systems Engineering. Continuation of 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: Wrt.

156A. Chemical Engineering Kinetics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 152B, 154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

156B. Chemical Engineering Kinetics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 156A. Continuation of course 156A.

157. Process Dynamics and Control (3) I. McDonald
Lecture—3 hours. Prerequisite: course 159. Fundamentals of dynamic modelling of chemical processes. Design and analysis of classical feedback control of chemical processes.

157L. Process Control Laboratory (1) II, III. The Staff
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 157. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, and Food Engineering. Laboratory experiments in control system design and analysis.

158A. Economics and Optimization of Chemical Processes (3) I. Palazoglu
Lecture—3 hours. Prerequisite: senior standing. Fundamentals of economics, interest calculations, depreciation, taxes. Economic analysis of chemical plant designs. Optimization methods. Linear and non linear programming.

158B. Process Equipment Design (3) II. Palazoglu
Lecture—3 hours. Prerequisite: course 158A. Design of chemical process equipment. Equipment cost estimation techniques.

158C. Chemical Plant Design (3) III. Palazoglu
Lecture—3 hours. Prerequisite: course 158B. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, Food Engineering, Biolsystems Engineering. Conceptual design of chemical processes. Design, costing and profitability analysis of complete chemical plants. Use of computer-aided design techniques.

159. Chemical Engineering Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.

161A. Biochemical Engineering Fundamentals (3) II. The Staff
Lecture—3 hours. Prerequisite: Chemistry 128A, Mathematics 22B, Microbiology 102 (or consent of instructor). Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures. Not open for credit to students who have completed course 161.

161B. Bioseparations (3) II. The Staff
Lecture—3 hours. Prerequisite: course 154A. Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation processes.

161L. Bioprocess Engineering Laboratory (4) III. The Staff
Laboratory—9 hours; discussion—1 hour. Prerequisite: courses 161A and 161B; or Viticulture and Enology 186; or Biological Sciences 103 and Molecular and Cellular Biology 120L. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography.

166. Catalysis (3) II. Gates
Lecture—3 hours. Prerequisite: course 156A (may be taken concurrently) or consent of instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces.

170. Introduction to Colloid and Surface Phenomena (3) III. Stroeve
Lecture—3 hours. Prerequisite: Chemistry 110A. Introduction to the behavior of surfaces and disperse systems. The fundamentals will be applied to the solution of practical problems in colloid science. The course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines.

190C. Research Group Conferences (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in Chemical Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)

190X. Upper Division Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: upper division standing. In-depth examination of a special topic in a small group setting.

198. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

*Course not offered this academic year.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

206. Biochemical Engineering (3) II. Ryu
Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 101, 102, 103, Molecular and Cellular Biology 120L, 200A; Food Science and Technology 205 recommended; or consent of instructor. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Offered in alternate years.

***226. Enzyme Engineering** (3) II. Ryu
Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 102, 103, Molecular and Cellular Biology 122, 120L, 200A; or consent of instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme reactor design and optimization, and new application of enzymes in genetic engineering related biotechnology. Offered in alternate years.

246. Advanced Biochemical Engineering (2) II. Ryu
Lecture—2 hours. Prerequisite: course 206 or consent of instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application.

252. Statistical Thermodynamics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B, Engineering 105B, or the equivalent. A treatment of the statistical basis of thermodynamics; introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations.

253A. Advanced Fluid Mechanics (4) I. The Staff
Lecture—4 hours. Prerequisite: courses 150A, 150B and 259. Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey or rectilinear creeping flow, lubrication flow, and boundary layer theory.

253B. Advanced Heat Transport (4) II. The Staff
Lecture—4 hours. Prerequisite: courses 153 and 259 or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Green's functions and perturbation theory. Photon transport, black and gray body radiation, radiant exchange. Free and forced convection.

253C. Advanced Mass Transfer (4) I. The Staff
Lecture—4 hours. Prerequisite: courses 154A, 154B, and 259 (may be taken concurrently) or the equivalents. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer. Applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.

254. Colloid and Surface Phenomena (4) I. Stroeve
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in science or engineering or consent of instructor. Thermodynamics, structure and rate processes at interfaces. These fundamental processes will then be applied to determine the collective properties of disperse colloidal systems. Some emphasis on the behavior of macromolecules in solution.

256. Chemical Kinetics and Reaction Engineering (4) II. The Staff
Lecture—4 hours. Prerequisite: courses 156A and 156B or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic and catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors.

259. Advanced Engineering Mathematics (4) I. The Staff
Lecture—4 hours. Prerequisite: Mathematics 22A, 22B, 21D. Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena.

***260. Separation Processes: Particulate Systems** (3) I. The Staff
Lecture—3 hours. Prerequisite: course 154A. Analysis of particle systems in pollution abatement and chemical process equipment. Microorganisms, crystallization, aerosols, hydrosols, colloids. Distribution functions, population balances, rarefied gas phenomena, concentration polarization in reverse osmosis and filtration. Offered in alternate years.

262. Transport Phenomena in Multiphase Systems (3) III. Whitaker
Lecture—3 hours. Prerequisite: course 253C. Heat, mass, and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems.

***263. Rheology and Mechanics of Non-Newtonian Fluids** (3) II. Powell
Lecture—3 hours. Prerequisite: courses 253A and 259 or consent of instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Offered in alternate years.

265. Emulsions, Microemulsions and Bilayers (3) II. Dungan
Lecture—3 hours. Prerequisite: an undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles.

267. Advanced Process Control (3) III. The Staff
Lecture—3 hours. Prerequisite: course 157 or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Offered in alternate years.

289A-L. Special Topics in Chemical Engineering (1-5) I, II, III. The Staff
Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in **(A)** Fluid Mechanics; **(B)** Nonlinear Analysis and Numerical Methods; **(C)** Process Control; **(D)** Chemistry of Catalytic Processes; **(E)** Biotechnology; **(F)** Interfacial Engineering; **(G)** Molecular Thermodynamics; **(H)** Membrane Separations; **(I)** Advanced Materials Processing; **(J)** Novel Experimental Methods; **(K)** Advanced Transport Phenomena; **(L)** Biomolecular Engineering.

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. (S/U grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.)

291. Seminar in Multiphase Transport Phenomena (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate or senior standing. Seminar devoted to the theoretical and practical applications of multiphase transport phenomena. Subjects will include flow in porous media, dispersion with adsorption and reaction, and heat transfer in multiphase systems with chemical reaction. (S/U grading only.)

292. Seminars in Process Dynamics and Control (1) II. Palazoglu
Seminar—1 hour. Prerequisite: graduate or senior standing. Theoretical and practical aspects of process control will be addressed. Topics will cover controller analysis and synthesis of linear and nonlinear systems including bioreactors, distillation columns and others as well as dynamic modeling of such processes. (S/U grading only.)

293. Graduate Student Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing. Presentation by graduate students of research in progress. May be repeated for credit. (S/U grading only.)

294. Current Progress in Biotechnology (1) I, II, III. Ryu, Doi
Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Molecular and Cellular Biology 294.) (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

390. Teaching of Chemical Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated twice for credit. (S/U grading only.)

Courses in Materials Science and Engineering (EMS)

Upper Division Courses

130. Thermodynamics of Materials Processes (3) I. Risbud
Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, semiconduction, thermoelectric power and thermionic energy conversion. GE credit: Wrt.

132. Structure of Engineering Materials (3) I. Howitt
Lecture—3 hours. Prerequisite: Engineering 45; upper division standing. Structure of engineering materials on the atomic scale will be described by exploring the fundamentals of crystallography. The importance of this structure to materials' properties will be emphasized. Experimental determination of structure will be described using x-ray diffraction techniques. GE credit: Wrt.

132L. Structure and Testing of Materials Laboratory (2) I. Shackelford, Howitt
Laboratory—6 hours. Prerequisite: course 132 (concurrent enrollment recommended). Experimental investigations of structure of solids are combined with techniques for testing and evaluation. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels.

Methods focus on optical, x-ray, electron, and ultrasonic techniques.

134. Rate Processes in Materials Science (3) II. Groza
Lecture—3 hours. Prerequisite: Engineering 45 and 105A or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Applications in diffusion, nucleation, solidification, evaporation, and sintering processes.

134L. Rate Processes in Materials Laboratory (2) II. Groza
Laboratory—6 hours. Prerequisite: course 134 (concurrent enrollment recommended). Laboratory experiments to illustrate the fundamental principles of diffusion, solidification, recrystallization, precipitation, evaporation, sintering and phase transformations in materials. Materials behavior in high-temperature and corrosive environments will be emphasized.

138. Mechanical Behavior of Materials (3) III. Mukherjee
Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Microscopic aspects of the mechanical behavior of engineering materials are discussed with emphasis on recent developments in materials science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined. GE credit: Wrt.

138L. Mechanical Properties Laboratory (2) III. Mukherjee
Laboratory—6 hours. Prerequisite: course 138 (concurrent enrollment recommended). Experimental investigations of the mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationships between microstructure and mechanical properties.

140. Materials in Engineering Design (3) III. The Staff
Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Quantitative treatment of materials selection for engineering applications. Discussion of the relationship of design parameters and materials properties. Emphasis on the processing and fabrication of metals, ceramics, polymers, and composites as related to the overall design process. GE credit: Wrt.

142. Principles of Nondestructive Testing (3) II. Shackelford
Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing using radiological, ultrasonic, electrical, magnetic, penetrant methods, etc., are discussed. Typical results expected from these tests and their application in material characterization, flaw detection, crystallographic information, chemical inhomogeneity, residual stress analysis, etc., are emphasized. GE credit: Wrt.

144. Corrosion and Oxidation of Engineering Materials (3) II. The Staff
Lecture—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and selection criteria for the prevention and control of corrosion.

146. Electronic and Optical Materials Processing (3) III. Groza
Lecture—3 hours. Prerequisite: upper division standing in Engineering, Physics, Chemistry, or Geology. Principles of phase equilibria, thermodynamics and reaction kinetics applied to the processing of electronic and optical materials in polycrystalline, single crystal, and amorphous forms. GE credit: Wrt.

147. Principles of Polymer Materials Science (3) II. The Staff
Lecture—3 hours. Prerequisite: chemistry through organic or Engineering 45; introductory physics sequence. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Fiber and Polymer Science 100.)

148. Failure Analysis (4) III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 45, 104A; course 138 and Mechanical Engineering 150A recommended. Fracture mechanics and failure mechanisms in metals, ceramics, and composites. Effects of fatigue, corrosion and wear. Methodology for investigating failure including optical microscopy, scanning electron microscopy and destructive testing. GE credit: Wrt.

149. Materials Engineering Design Project (3) I, II, III. The Staff
Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing in Engineering and consent of instructor. A capstone engineering design experience involving analysis of real materials processes or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

155. Manufacturing Process Design (3) I. Groza
Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 45 or Mechanical Engineering 50. Principles of materials processing and manufacturing properties, effects of processing variables on structure-property relationships, and the fundamentals of manufacturing process selection are described. Case histories are used to explore recent developments in manufacturing process design.

190C. Research Group Conferences (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor; upper division standing. Individual and/or group conference on problems, progress and techniques in materials research. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Lecture—1-5 hours. Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

230. Fundamentals of Electron Microscopy (3) II. Howitt
Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 132. Principles and techniques of scanning and transmission of electron microscopy used in the study of materials. Emphasis upon practical applications. Offered in alternate years.

230L. Laboratory for Electron Microscopy (2) II. Jones
Laboratory—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Offered in alternate years.

***232. Advanced Topics in Transmission Electron Microscopy** (3) II. Howitt
Lecture—1 hour; discussion—2 hours. Prerequisite: course 230. Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Offered in alternate years.

***232L. Laboratory for Advanced Transmission Electron Microscopy** (2) II. The Staff
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 232 concurrently. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered in alternate years.

***240. Transport Phenomena in Materials Processes** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering. Phenomenological and atomistic mechanisms in transport processes in condensed and noncondensed phases. Application to heat treatment, chemical and physical vapor deposition, crystal growth, bonding, sintering and joining of metals. Offered in alternate years.

241. Principles and Applications of Dislocation Mechanics (4) II. Mukherjee
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering; consent of instructor. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered in alternate years.

***242. Advanced Mechanical Properties of Materials** (4) II. Mukherjee
Lecture—3 hours; discussion—1 hour. Prerequisite: course 138. Strength and structure of engineering materials. The dependence of their mechanical properties on time, stress, and temperature, Generalized concepts of dislocation theory in plastic deformation, including creep, superplasticity, and cavitation. Influence of microstructure in optimizing the mechanical strength properties. Offered in alternate years.

243. Kinetics of Phase Transformation in Engineering Materials (3) III. Groza
Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 130 recommended. Theory of alloying, kinetics of phase changes, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in alternate years.

***244. Interaction of Materials and their Environment** (3) I. Munir
Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Offered in alternate years.

***245. Advanced Topics in Structure of Materials** (4) III. Shackelford
Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 and graduate standing in Engineering or consent of instructor; courses 138 and 142 recommended. Nature of microstructure in engineering materials will be explored. Crystalline and non-crystalline structures will be studied with special emphasis on grain boundary segregation in development of polycrystalline microstructure and the radial distribution function of amorphous materials. Offered in alternate years.

246. Current Topics in Electronic Materials Processing (3) III. Navrotsky
Lecture—3 hours. Prerequisite: course 146; graduate standing in physical sciences or engineering. Discussion of current literature and topical areas related to the processing of electronic and optical materials in polycrystalline, single crystal, and amorphous forms. Offered in alternate years.

247. Advanced Thermodynamics of Solids (3) I. Munir
Lecture—3 hours. Prerequisite: course 130 or the equivalent. Thermodynamics of gas-solid reactions and solutions; criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EMF cells and application to solid-state electrolytes. Offered in alternate years.

248. Fracture of Engineering Materials (3) I. Gibeling
Lecture—3 hours. Prerequisite: course 138. Description of failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered in alternate years.

***249. Mechanisms of Fatigue** (3) I. The Staff
Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of mechanisms of fatigue in metals.

*Course not offered this academic year.

Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, stage I crack growth, threshold effects and high temperature cyclic deformation. Offered in alternate years.

250A-F. Special Topics in Polymer and Fiber Science (3) II. The Staff
Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Textiles and Clothing 250A-F.)

251. Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3) III. Risbud
Lecture—3 hours. Prerequisite: graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials.

290C. Graduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in materials science and engineering research. May be repeated for credit. (S/U grading only.)

294. Materials Science Seminar (1) I, II, III. Shackelford, Mukherjee, Munir, Howitt, Gibeling, Groza, Risbud
Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I,II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

390. The Teaching of Materials Science (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated twice for credit. (S/U grading only.)

Engineering: Civil and Environmental

(College of Engineering)

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Yannis F. Dafalias, Ph.D., Professor
Jeannie L. Darby, Ph.D., Associate Professor
Johannes J. DeVries, Ph.D., Lecturer
Timonthy R. Ginn, Ph.D., Acting Associate Professor
Leonard R. Herrmann, Ph.D., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*
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Ian P. King, Ph.D., Professor
Bruce L. Kutter, Ph.D., Professor
Bruce E. Larock, Ph.D., Professor
Jay R. Lund, Ph.D., Associate Professor
Miguel A. Mariño, Ph.D., Professor *(Civil and Environmental Engineering; Land, Air and Water Resources)*
Patricia L. Mokhtarian, Ph.D., Associate Professor
Debbie Niemeier, Ph.D., Assistant Professor
Glaucio Paulino, Ph.D., Assistant Professor
Melvin R. Ramey, Ph.D., Professor
Mark M. Rashid, Ph.D., Assistant Professor
Karl M. Romstad, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Edward D. Schroeder, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
S. Geoffrey Schladow, Ph.D., Associate Professor
Robert Smith, Ph.D., Lecturer
Daniel Sperling, Ph.D., Professor *(Civil and Environmental Engineering; Environmental Studies)*
Fred Stephenson, M.S., Lecturer
Thomas M. Young, Ph.D., Assistant Professor

Emeriti Faculty

Don O. Brush, Ph.D., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
James A. Cheney, Ph.D., Professor Emeritus
James R. Hutchinson, Ph.D., Professor Emeritus
Ray B. Krone, Ph.D., Professor Emeritus
Gerald T. Orlob, Ph.D., Professor Emeritus
Otto G. Raabe, Ph.D., Professor Emeritus
Verne H. Scott, Ph.D., Professor Emeritus
Chih-Kang Shen, Ph.D., Professor Emeritus
Michael A. Taylor, Ph.D., Professor Emeritus
George Tchobanoglous, Ph.D., Professor Emeritus

Courses in Engineering: Civil and Environmental (ECI)

Lower Division Courses

1. The Civil Engineer in Society (1) I. The Staff (Chairperson in charge)
Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

3. Introduction to Civil and Environmental Engineering Systems (3) I. Ramey
Lecture—2 hours; laboratory—3 hours. Prerequisite: trigonometry. Introduction to civil engineering systems. General view of the engineering process as obtained by participation in laboratory experiments illustrative of the solution of representative, but greatly simplified, engineering problems. GE credit: SciEng.

10. Introduction to Surveying (3) III. Smith
Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, horizontal and vertical curves; calculations for latitude, longitude, azimuth; earthwork computations.

30. Engineering a Better Environment (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: intermediate algebra, and Physics 10 or Engineering 20. Introduction to fundamental concepts and methodologies of environmental engineering. Topics presented include water and air quality, environmental radiation and radioactivity, waste management. Students will evaluate environmental issues in written essays and oral discussion. Intended for non-physical science majors.

90X. Lower Division Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting. May be repeated for credit.

92. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

114. Probabilistic Systems Analysis for Civil Engineers (3) I, II. Mokhtarian
Lecture—3 hours. Prerequisite: Mathematics 21C. Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed Statistics 120.

130. Structural Analysis (4) I, III. Romstad
Lecture—4 hours. Prerequisite: Mathematics 22A, Engineering 104. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis.

131. Matrix Structural Analysis and Introduction to Finite Element (3) I. Ramey
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 5 (or the equivalent) and 104. Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Introduction to finite element methods for elasticity and bending problems. (Former course 131B.)

132. Structural Design: Metallic Elements (3) I, II. Ramey
Lecture—3 hours. Prerequisite: Engineering 104 (may be taken concurrently). Metallic beams, columns, other members; analysis and design of bolted and welded joints; design of simple beam connections, moment resistant connections, and column base plates. (Former course 132A.)

133. Cement Composites (3) III. Bolander
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104. Survey of applications; materials selection and proportioning; component and composite properties; basic cement chemistry and hydration reactions; microstructure evolution; experimental methods; fiber reinforcement; performance under severe loading/environmental conditions; structural design considerations.

134. Analysis and Design of Bridges (4) II. Imbsen
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 130 and 135. Bridge design and analysis utilizing current state-of-the-art computer programs. Overview of Caltrans and American Association of State Highway and Transportation Officials (AASHTO) codes and principles. Seismic analysis and retrofitting of bridges. Bridge design details and final plans, specifications and estimate.

135. Structural Design: Concrete Elements (4) I, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104 (may be taken concurrently). Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete.

136. Building Design: Wood, Steel, and Concrete Applications (4) III. Ramey
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 130 and 135; course 132 recommended.

Horizontal and lateral load paths; dead and live loading; earthquake and wind forces. Approximate analyses of building frames; wood engineering for buildings. Steel, concrete and wood building design.

137. Construction Principles (3) III. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in Engineering. A study of the construction industry; its form, evolution, and methods of operation; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

138. Earthquake Loads on Structures (3) I. Romstad
Lecture—3 hours. Prerequisite: course 130, Engineering 36. Determination of loads on structures due to base motions. Methods of static lateral forces, approximate dynamic analysis (response spectrum), and time history. Concepts of mass, damping, and stiffness for typical structures. Design for inelastic behavior. Consideration of wind and blast loading.

139. Advanced Structural Mechanics (3) I. Rashid
Lecture—3 hours. Prerequisite: Engineering 104 or the equivalent. Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity theory; stress function. Theories for straight, tapered, composite, and curved beams. Beams on elastic foundations. Introduction to plates, curved membranes, and cables.

140. Environmental Analysis of Aqueous Systems (3) I. Darby
Lecture—3 hours. Prerequisite: Chemistry 2B or the equivalent. Introduction to chemical principles underlying current practices in sampling and analysis of water and wastewater.

140L. Environmental Analysis of Aqueous Systems Laboratory (1) I. Darby
Laboratory—3 hours. Prerequisite: Chemistry 2B or the equivalent; course 140 (may be taken concurrently). Restricted to Civil Engineering students. Introduction to the "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis.

141. Engineering Hydraulics (3) I, III. Larock
Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag.

141L. Engineering Hydraulics Laboratory (1) I, III. Larock
Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Open to Engineering students only. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.

142. Engineering Hydrology (3) I. Kavvas
Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently); course 114 recommended. Study of the hydrologic cycle. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis. Flood routing through channels and reservoirs.

143. Bioremediation Principles (3) III. Schroeder
Lecture—3 hours. Prerequisite: course 148A or the equivalent. Introduction to bioremediation of contaminated soils and groundwater. Site characterization, microbial processes, in situ and on-site treatment methods. Introduction to bioremediation systems design.

144. Groundwater Systems Design (3) I. Darby
Lecture—3 hours. Prerequisite: course 142 (may be taken concurrently); Applied Science Engineering 115 recommended. Groundwater occurrence, distribution, and movement; well-flow systems; design of wells; groundwater quality and contamination; aquifer management. Introduction to groundwater modeling.

145. Hydraulic Structure Design (3) III. DeVries
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 141 and 141L; course 142 recommended. Principles of project design. Methods of analysis and hydraulic design of storage systems, conveyance and regulation systems, and hydraulic structures. Emphasis is on application of principles of open channel hydraulics in these systems.

146. Water Resources Simulation (3) II. Schladow
Lecture—3 hours. Prerequisite: courses 141; 114 and 142 recommended. Simulation techniques in the analysis, design and operation of surface water systems; introduction to modeling concepts with particular application to surface runoff; water quality in rivers and streams; and management of reservoirs. GE credit: Wrt.

147. Solid Waste Management (3) I. Tchobanoglous
Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment.

148A. Water Quality Management (3) II, III. Schroeder
Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Introduction to basic concepts of water quality. Fundamentals of water and wastewater treatment processes. Analysis of treatment process flowsheets. Analysis of water quality management alternatives.

148B. Water Quality Management Systems Design (3) III. Tchobanoglous
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introduction to the design of water and wastewater treatment processes.

149. Introduction to Air Pollution (3) I. Carroll (Land, Air and Water Resources), Chang, Raabe
Lecture—3 hours. Prerequisite: Mathematics 22B, 21D, Chemistry 2B; Atmospheric Science 121A or Engineering 103A. Examination of physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Atmospheric Science 149.)

150. Air Pollution Control System Design (4) II. Chang
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Engineering 103A, 105A and 106 or the equivalents; course 149 or the equivalent recommended. Introduction to the design and evaluation of air pollution control devices and systems.

153. Deterministic Optimization and Design (4) II. Lund
Lecture—4 hours. Prerequisite: Mathematics 21C and 22A, Engineering 5 or the equivalent; Applied Science Engineering 115 recommended. Introduction to operations research. Optimization techniques such as linear programming, dynamic programming, and nonlinear programming. Applications in water resources planning, transportation planning, systems engineering, and other civil engineering disciplines through computer-based design projects.

155. Water Resources Engineering Planning (4) III. Lund
Lecture—4 hours. Prerequisite: Engineering 106 or Economics 1A, course 114 or the equivalent, course 142; course 153 recommended. Basic water resources engineering planning concepts; role of engineering, economic, environmental and social information; institutional, political and legal aspects. Case studies will illustrate the planning of water resource systems. GE credit: Wrt.

160. Introduction to Transportation Planning (4) I. Sperling
Lecture—3 hours; discussion—1 hour. Prerequisite: any two of Geography 5, Economics 1A, or Engineering 106, recommended. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science, and environmental studies. GE credit: SocSci, Wrt.

161. Transportation System Operations (3) II. Jovanis
Lecture—3 hours. Prerequisite: Engineering 36. Principles of transportation system operations; traffic characteristics and methods of measurement; safety and operations; models of transportation operations and congestion applied to urban streets and freeways.

162. Transportation System Design (3) III. Jovanis
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 160 or 161 or 163. Human vehicle and guideway factors and their relationship to transportation system design. Generalized design paradigm; application to large scale group problem solving.

163. Energy and Environmental Aspects of Transportation (3) II. Sperling
Lecture—3 hours. Prerequisite: course 160. Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (Same course as Environmental Studies 163.) GE credit: Wrt.

171. Soil Mechanics (4) II, III. Kutter
Lecture—4 hours. Prerequisite: Engineering 103A, 104 (may be taken concurrently), course 10, course 171L concurrently. Restricted to Civil Engineering majors. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability.

171L. Soil Mechanics Laboratory (1) II, III. Kutter
Laboratory—3 hours. Prerequisite: course 171 must be taken concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior.

173. Foundation Design (4) I. Idriss
Lecture—4 hours. Prerequisite: courses 135 (may be taken concurrently) and 171. Soil exploration and determination of soil properties for design; consolidation and elastic settlements of foundations; bearing capacity of soils and footing design; lateral earth pressures and retaining wall design; pile foundations; excavations and de-watering.

174. Environmental Geotechnology (3) III. Arulanandan
Lecture—3 hours. Prerequisite: courses 148A and 171. Soil and site characterization in relation to natural and man-made hazards, waste containment, and waste site remediation techniques.

176. Geotechnical Modeling (3) I. Kutter
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A and course 171. Dimensional analysis similarity and the theory of models. Applications to soil mechanics and solid mechanics. Instrumentation, calibration, computer-aided data reduction and recording. Experiments demonstrating basic principles including vibration of beams, centrifuge modeling of building foundations and seepage.

189A-J. Selected Topics in Civil Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Directed group study of selected topics with separate sections in **(A)** Environmental Engineering; **(B)** Hydraulics and Hydrologic Engineering; **(C)** Engineering Planning; **(D)** Geotechnical Engineering; **(E)** Analysis and Design of Bridges; **(F)** Building Design: Wood, Steel and Concrete Applications; **(G)** Transportation Engineering; **(H)** Transportation Planning; **(I)** Water Resources Engineering; **(J)** Water Resources Planning. May be repeated for credit when the topic is different.

190C. Research Group Conferences in Civil and Environmental Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: upper division standing in Civil and Environmental Engineering; con-

sent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)

192. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

Graduate Courses

201. Introduction to Theory of Elasticity (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods.

203. Inelastic Behavior of Solids (3) III. Dafalias
Lecture—3 hours. Prerequisite: course 201. Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Offered in alternate years.

***205. Continuum Mechanics** (3) II. Dafalias
Lecture—3 hours. Prerequisite: course 201. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Offered in alternate years.

206. Fracture Mechanics (3) II. Paulino
Lecture—3 hours. Prerequisite: Engineering 104; course 201 recommended. Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics.

211. Advanced Matrix Structural Analysis (3) II. Romstad
Lecture—3 hours. Prerequisite: course 131A, 131B, or consent of instructor. Computer analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; nonlinear and stability analysis; introduction to structural optimization.

212A. Finite Element Procedures in Applied Mechanics (3) II. Rashid
Lecture—3 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128A-128B (128B may be taken concurrently), or consent of instructor. Approximate analysis procedures; Galerkin and stationary principle methods. Construction of approximate solutions by the finite element method. Applications to one- and two-dimensional problems in engineering. Introduction to time dependent, non-linear and three-dimensional problems, and other approximation procedures.

212B. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems (3) III. Herrmann
Lecture—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and nonlinear, one-, two-, and three-dimensional problems in continuum mechanics, soil mechanics, and plate and shell theories.

***212C. Finite Elements: Application to Fluid Problems** (3) III. Larock
Lecture—3 hours. Prerequisite: courses 141, 212A. Application of the finite element method to two- and three-dimensional fluid flow problems, including inviscid and viscous flow, convection-diffusion problems, the shallow water equations, and flow through porous media. Class lectures and independent study and projects. Offered in alternate years.

213. Analysis of Structures Subjected to Dynamic Loads (3) III. Romstad
Lecture—3 hours. Prerequisite: courses 138, 211. Analysis of structures subjected to earthquake, wind, and blast loading; distributed, consistent and lumped mass techniques; development of a computer program for complex structures; nonlinear response spectrum analysis; frequency and time domain analysis.

221. Theory of Plates and Introduction to Shells (3) I. Herrmann
Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular and circular plates. Membrane theory for axisymmetric shells and bending of circular shells.

232. Advanced Topics in Concrete Structures (3) I. Ramey
Lecture—3 hours. Prerequisite: course 132B. Ductility of reinforced concrete; design for torsion of structural concrete; seismic requirements; two-way slabs.

233. Advanced Design of Steel Structures (3) II. Ramey
Lecture—3 hours. Prerequisite: courses 132A and 131A. Design considerations for steel column and frame buckling; steel-plate girder design; steel-concrete composite design; design of connections. Design basis follows the AISC's, LRFD, and ASD specifications.

240. Water Quality (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 141 and 142. Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and ground-waters; transport and fate of waterborne pollutants. Predictive methods, introduction to water quality modeling.

242. Air Quality (3) III. Chang
Lecture—3 hours. Prerequisite: Engineering 105A; courses 141 and 149, or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Offered in alternate years.

243A. Water and Waste Treatment (3) I. Schroeder
Lecture—3 hours. Prerequisite: course 148A. Characteristics of waterborne and airborne wastes; treatment processes and process kinetics; treatment system design.

243B. Water and Waste Treatment (3) II. Schroeder
Lecture—3 hours. Prerequisite: course 243A; consent of instructor. Continuation of course 243A.

***244. Environmental Quality Modeling** (3) I. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 240 or 242A. Mathematical modeling of environmental water quality, with emphasis on mathematical models of water quality, their structure, capabilities and limitations, sensitivity and reliability as analytical and/or predictive tools. Offered in alternate years.

245A. Applied Environmental Chemistry: Inorganic (4) III. Young
Lecture—4 hours. Prerequisite: Engineering 105A, course 140 and 140L, Chemistry 2A, 2B or the equivalent; Chemistry 2C or 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Offered in alternate years.

245B. Applied Environmental Chemistry: Organic (3) III. Young
Lecture—3 hours. Prerequisite: Chemistry 128A, 128B, 128C or the equivalent. Transport and transformation of organic chemicals in the environment. Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Offered in alternate years.

246. Pilot Plant Laboratory (3) II. Darby
Lecture—1 hour; laboratory—6 hours. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.

***247. Airborne Particles and Scavenging Mechanisms** (3) I. The Staff
Lecture—3 hours. Prerequisite: Engineering 105A and 103A, and courses 141, 149. Generation, characterization and behavior of small particles and droplets suspended in gas, including deposition and scavenging of airborne particles in the earth's atmosphere. Offered in alternate years. (Former course 242B.)

***247L. Airborne Particles Laboratory** (1) I. The Staff
Laboratory—3 hours. Prerequisite: course 247 (may be taken concurrently). Laboratory exercises designed to familiarize the student with methods generation and characterization of airborne particles. Offered in alternate years. (Former course 242BL.)

***248A. Design of Natural Systems for Wastewater Treatment** (3) III. Smith
Lecture—3 hours. Prerequisite: courses 243A, 243B. Procedures are presented for the design of natural aquatic and soil-based systems for treatment of municipal and industrial wastewaters. Emphasis is placed on the practical application of principles developed in core courses 243A and 243B plus new information related to natural systems. Offered in alternate years.

248B. Wastewater Reclamation and Reuse: Theory and Practice (3) III. Asano
Lecture—3 hours. Prerequisite: course 243A, 243B. Wastewater reuse in water resources planning. Wastewater reuse practices in agricultural and landscape irrigation, industry, groundwater recharge, recreational and environmental uses, and potable water reuse. Selection of reclamation technologies. Assessment of health risks and health risk mitigation. Offered in alternate years.

249. Probabilistic Design and Optimization (3) III. Lund
Lecture—3 hours. Prerequisite: Engineering 106; courses 114 and 153 or the equivalent. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Offered in alternate years.

250. Urban Transportation and Land Use Policy and Planning (3) I. Mokhtarian
Lecture—3 hours. Prerequisite: course 251. Historical and current relationships between transportation and land use. Traditional land use models. Role of land use in urban transportation modeling. Relationship between energy consumption and urban form. Impact of telecommunications on urban form. Policies involving transportation/land use relationships. Offered in alternate years.

251. Transportation Demand Analysis (3) II. The Staff
Lecture—3 hours. Prerequisite: course 114 or the equivalent. Detailed discussions of a standard procedure used in urban passenger travel demand forecasting. Principles and assumptions of the model components (trip generation, trip distribution, and modal split). Computer exercises using empirical data to calibrate models and forecast travel demand.

***252. Sustainable Transportation Technology and Policy** (3) III. Sperling
Lecture—2 hours; discussion—1 hour. Prerequisite: course 160 or the equivalent. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and pol-

itics. Offered in alternate years. (Same course as Environmental Studies 252.)

253. Transportation Safety Analysis (3) III. Jovanis
Lecture—3 hours. Prerequisite: courses 114, 254. Human and vehicle factors in accident occurrence. Evaluation of safety investments; regression to the mean. Development of statistical models of accident occurrence.

254. Discrete Choice Analysis of Travel Demand (3) III. Mokhtarian
Lecture—3 hours. Prerequisite: course 114 or the equivalent. Behavioral and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterization of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises using large-scale data sets obtained from home interview surveys.

255. Transportation Survey Methods (3) II. Mokhtarian
Lecture—3 hours. Prerequisite: course 251 or consent of instructor. Description of types of surveys commonly used in transportation demand modeling, including home-interview, travel diary, panel, attitudinal, conjoint, and stated-preference surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant, cluster, conjoint, and stated-preference analysis.

256. Urban Traffic Management and Control I (3) II. Jovanis
Lecture—3 hours. Prerequisite: graduate standing. Nature of urban vehicular traffic congestion; roadway capacity; intersection design and traffic signal operations; freeway operations and management; corridor control.

258. Transportation Planning in Developing Countries (3) III. Sperling
Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation investments and policies play in the development of regions and countries. Emphasis is on identifying appropriate technologies, policies, and planning methods for designing transportation systems in regions of differing socioeconomic, geographic, and institutional settings. Offered in alternate years.

259. Advanced Highway Technology and Automation (3) I. Jovanis
Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle navigation and guidance, telecommunications and information systems, and highway electrification. Analysis and evaluation of policy implementation issues, driver response and pricing strategies and costs, and formulation of control theory.

260. Noncohesive Sediment Transportation (3) II. The Staff
Lecture—3 hours. Prerequisite: course 141. Sediment materials. Particle suspension by currents, waves, and winds. Modes of transport. Bed load relations and suspended load relations. Calculation of total loads in streams. Similarity criteria for movable bed models. Stable channel design. Offered in alternate years.

261. Cohesive Particle Transportation (3) III. The Staff
Lecture—3 hours. Prerequisite: course 141. Cohesion; cohesive particulate materials; processes of aggregation and dispersion; aggregate properties; deposition and scour, channel and harbor design and maintenance. Offered in alternate years.

***262. Transit Systems Analysis** (3) I. Niemeier
Lecture—3 hours. Prerequisite: course 251. Theoretical presentation of transit planning and analysis techniques. Five modules: policy and funding; management and operations; design standard and issues; planning and forecasting methods for performance evaluation. Review of transit studies from other regions. Offered in alternate years.

263. Transportation Economics (3) I. Niemeier
Lecture—3 hours. Prerequisite: Engineering 106. Benefit cost theory and application. Introduction to price theory and application in transportation. Discussion of measures of welfare loss and applications in transportation. Includes local, regional, and World Bank studies.

***264A. Transport, Mixing and Water Quality in Rivers and Lakes** (3) III. Schladow
Lecture—3 hours. Prerequisite: courses 141 and 240. Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of California lakes and rivers. Offered in alternate years.

264B. Transport, Mixing and Water Quality in Estuaries and Wetlands (3) III. Schladow
Lecture—3 hours. Prerequisite: courses 141 and 240. Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion, tides, transverse mixing, longitudinal dispersion, sediment transport, nutrient cycling, computer modeling of estuaries. San Francisco Bay case study. Offered in alternate years.

***265. Stochastic Contaminant Transport** (3) II. Kavvas
Lecture—3 hours. Prerequisite: course 266A. The stochastic theory of molecular diffusion will be covered by means of Taylor-Chandrasekhar theory. Turbulence diffusion will be covered in the Langrangian-Eulerian frameworks. The theory will be applied to contaminant transport in groundwater aquifers, atmosphere, river and oceanic environments. Offered in alternate years.

266A. Applied Stochastic Methods in Engineering (3) I. Kavvas
Lecture—3 hours. Markov processes and their applications to modeling of engineering systems. Review of differential Smolukowski-Chapman-Kolmogorov equations, Brownian motion and Ornstein-Uhlenbeck processes within the framework of statistical diffusion theory and their engineering applications to pollution transport problems.

266B. Applied Stochastic Methods in Engineering (3) II. Kavvas
Lecture—3 hours. Stochastic differential equations and their applications to the solution of engineering problems. Offered in alternate years.

267. Water Resources Management (3) I. Lund
Lecture—3 hours. Prerequisite: basic probability (course 114 or the equivalent) and courses 141 and 142; course 153 recommended. Operation, maintenance, and modification of existing water resource systems; engineering, economic, financial, legal, and institutional considerations; decision, optimization, and multi-objective analysis.

***268. Public Works Economics** (3) II. Lund
Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural and Resource Economics 148; Economics 1A. Engineering economics applied to public works planning, operations, and maintenance problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Offered in alternate years.

***270. Advanced Water Resources Management** (3) III. Lund
Lecture—3 hours. Prerequisite: courses 153 and 267 or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Offered in alternate years.

271. Water Resources Planning Laboratory (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, economics and principles of plan formulation and plan evaluation in conducting a water resources planning study. Lectures provide instruction on principles and methodology used in the laboratory study. Offered in alternate years.

272A. Advanced Groundwater Hydrology (3) II. Mariño
Lecture—3 hours. Prerequisite: course 144 or the equivalent; Mathematics 118A recommended. Flow in confined, unconfined, and leaky aquifers. Hydraulics of pumping and recharging wells. Identification of aquifer parameters. Groundwater quality problems.

272B. Advanced Groundwater Hydrology (3) III. King
Lecture—3 hours. Prerequisite: courses 272A and 212A or the equivalent. Numerical methods of fluid flow systems. Flow in the unsaturated zone. Hydrodynamic dispersion. Fresh-water and salt-water interface in coastal aquifers. Identification of regional aquifer parameters. Modeling of aquifer systems. Offered in alternate years.

***273. Water Resource Systems Engineering** (3) I. Mariño
Lecture—3 hours. Prerequisite: courses 114 and 153 or the equivalent. Planning, design, and management of water resource systems. Application of deterministic and stochastic optimization techniques. Water allocation, capacity expansion, and design and operation of reservoir systems. Surface water and groundwater management. Offered in alternate years.

274. Hydraulics of Pipe Lines (3) II. Larock
Lecture—3 hours. Prerequisite: course 141; Engineering 5. Mechanics of liquid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Manifold flow. Offered in alternate years.

***275. Hydrologic Time-Series Analysis** (3) III. Kavvas
Lecture—3 hours. Prerequisite: Engineering 118 and course 142 or the equivalent. Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Offered in alternate years.

276. Watershed Hydrology (4) II. Kavvas
Lecture—4 hours. Prerequisite: course 142 or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation. Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope.

277. Unsteady Flow in Surface Waters (3) I. King
Lecture—3 hours. Prerequisite: course 141; Applied Science Engineering 115 (may be taken concurrently). Long waves in surface flow. Shallow water equations. Saint Venant equations. Method of characteristics. Explicit and implicit finite element methods; stability of numerical schemes. Flood routing. Bores. Dam break.

***278. Hydrodynamics** (3) II. Larock
Lecture—3 hours. Prerequisite: course 141. Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Offered in alternate years.

***279. Advanced Mechanics of Fluids** (4) I. Larock
Lecture—4 hours. Prerequisite: course 141. Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Offered in alternate years.

281A. Advanced Soil Mechanics (3) I. Idriss
Lecture—3 hours. Prerequisite: course 171. Consolidation and secondary compression. Seepage and seepage pressures. Shear strength: friction, cohesion, dilatancy, and critical states.

281B. Advanced Soil Mechanics (3) II. Kutter
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 281A. Site investigation methods: CPT, SPT, pressuremeter, vane, seismic investigation, electrical properties. Slope stability, including seepage pressures and earthquake effects. Centrifuge modeling.

283. Physico-Chemical Influences and In Situ Evaluation of Soil Behavior (3) I. Arulanandan
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange. Soil-water-electrolyte characteristics and soil structure. Laboratory includes methods of characterization of soils, quantification of soil structure, and rotating cylinder tests to evaluate soil erosion.

284. Theoretical Soil Mechanics (3) II. Kutter
Lecture—3 hours. Prerequisite: courses 171, 281A. Elasticity, plasticity, and critical state soil mechanics. Prediction of stress-strain-volume change behavior of soils. Monotonic and cyclic loading, anisotropy, and strain-rate effects. Numerical implementation of constitutive models.

***285A. Soil Modification** (3) I. Idriss
Lecture—3 hours. Prerequisite: course 171. Purposes, principles, and methods of soil modification for various geotechnical applications. Offered in alternate years.

285B. Pavement Systems Design (2) I. Arulanandan
Lecture—2 hours. Prerequisite: course 171. Principles and methods of pavement design for highways and airfields. Offered in alternate years.

286. Advanced Foundation Design (3) III. Idriss
Lecture—3 hours. Prerequisite: course 173. Design and analysis of bulkheads; deep excavation; tie-back systems; coffer dams; loads on buried conduits; lateral pile loading capacity; pier foundations; and other related topics.

287. Geotechnical Earthquake Engineering (3) III. Idriss
Lecture—3 hours. Prerequisite: course 138; course 281A or consent of instructor. Characteristics of earthquake ground motions; empirical and simulation procedures for estimating these motions; local site response; liquefaction potential; residual strength and stability considerations; generation and dissipation of pore water pressures; settlement.

288. Earth and Rockfill Dams (3) II. Idriss
Lecture—3 hours. Prerequisite: courses 281A, 281B. Site selection; preliminary design considerations; layout; seismic effects including considerations of fault movements; construction; instrumentation; maintenance.

289A-I. Selected Topics in Civil Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of special topics with separate sections in **(A)** Environmental Engineering; **(B)** Hydraulics and Hydrologic Engineering; **(C)** Engineering Planning; **(D)** Geotechnical Engineering; **(E)** Structural Engineering; **(F)** Structural Mechanics; **(G)** Transportation Engineering; **(H)** Transportation Planning; **(I)** Water Resources Engineering. May be repeated for credit.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.)

290C. Graduate Research Group Conference (1) I, II, III. Chairperson in charge
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

390. The Teaching of Civil Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (S/U grading only.)

Engineering: Computer Science

(College of Engineering)

Charles U. Martel, Ph.D., Chairperson of the Department

Ronald A. Olsson, Ph.D., Vice Chairperson of the Department

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Faculty

Matthew Bishop, Ph.D., Assistant Professor
Frederic T. Chong, Ph.D., Assistant Professor
Matthew K. Farrens, Ph.D., Associate Professor
Dipak Ghosal, Ph.D., Assistant Professor
Daniel Gusfield, Ph.D., Professor
Bernd Hamann, Ph.D., Acting Associate Professor
Kenneth I. Joy, Ph.D., Associate Professor
Alan L. Laub, Ph.D., Professor
Karl Levitt, Ph.D., Professor
Charles U. Martel, Ph.D., Professor
Norman S. Matloff, Ph.D., Professor
Biswanath Mukherjee, Ph.D., Professor
Ronald A. Olsson, Ph.D., Associate Professor, *Academic Senate Distinguished Teaching Award*
Raju Pandey, Ph.D., Assistant Professor
Armand E. Prieditis, Ph.D., Assistant Professor
Phillip Rogaway, Assistant Professor
Manfred G. Ruschitzka, Ph.D., Professor
Richard F. Walters, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

Emeriti Faculty

Lawrence T. Kou, Ph.D., Professor Emeritus
Peter Linz, Ph.D., Professor Emeritus

Courses in Engineering: Computer Science (ECS)

Lower Division Courses

10. Basic Concepts of Computing (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Not intended for students in physical sciences, engineering, or mathematics. Not open for credit to students who have completed course 30 or 35, Engineering 5, or former course 30H.

15. Introduction to Computers (4) I,II,III. Walters
Lecture—3 hours; laboratory—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, other applications, elementary programming concepts, overview of current/projected computer uses. Intended for students in the College of Letters and Science and other non-computer science majors. Not open for credit to students who have completed course 30, 35, Engineering 5 or former course 30H. GE credit: SciEng, Wrt.

15AT. Introduction to Computers (4) I. Walters
Independent study—3 hours. Prerequisite: consent of instructor. Computer uses in modern society. Includes word processing, spreadsheet, DOS, networks and programming concepts. Independent study course paralleling course 15 lectures. Not open to students who have completed course 15, 30, 35, or Engineering 5. GE credit: SciEng, Wrt.

30. Introduction to Programming and Problem Solving (4) I, II, III. Ruschitzka
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to computers and computer programming, algorithm design, running, debugging and testing of well-structured programs. Programming language Pascal will be used to solve problems. (Not open to students who have completed course 10, 35 or former course 30H. Only two units of credit allowed for students who have completed Engineering 5.)

***35. Structure and Interpretation of Computer Programs** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science or Electrical Engineering major, Mathematics 16A or 21A (may be taken concurrently), knowledge of Pascal or C. Mathematical foundations of computer science. Procedural and data abstraction. Design and analysis of algorithms. The Scheme programming language is used. Not open for credit to students who have completed course 10, 30, Engineering 5, or former course 30H. Intended for students who have been introduced to a high-level programming language in high school.

40. Introduction to Software Development (4) I, II, III. Bishop
Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or 35. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Application of dynamic data structures. Introduction to programming language C.

50. Computer Organization and Machine-Dependent Programming (4) II, III. Farrens, Matloff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Comparative study of different hardware architectures via programming in the assembly languages of various machines. Role of system software in producing an abstract machine. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 70.

89A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in **(A)** Computer Science Theory; **(B)** Architecture; **(C)** Programming Languages and Compilers; **(D)** Operating Systems; **(E)** Software Engineering; **(F)** Data Bases; **(G)** Artificial Intelligence; **(H)** Computer Graphics; **(I)** Networks; **(J)** Computer-Aided Design; **(K)** Scientific Computing; **(L)** Computer Science. May be repeated for credit when the topic is different.

90X. Lower Division Seminar (2) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: lower division standing. Examination of a special topic in a small group setting.

92. Internship in Computer Science (1-5) I, II, III. The Staff
Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100. Discrete Structures and Application (4) I, II, III. Gusfield, Martel, Rogaway, Levitt
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21C. Discrete structures and applications in computer science; mathematical reasoning proofs, particularly through mathematical induction. Introduction to propositional logic, logic circuit design, combinatorics, recursion and solution of recurrence relations, analysis of algorithms, graph theory and trees, finite state machines.

110. Data Structures and Programming (4) I, II, III. Martel, Joy, Rogaway
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Design and analysis of data structures for a variety of applications. Concept of abstract datatypes, their representation. File structures. Dynamic information structures, linear lists, tree structures. Hash techniques. Recursive algorithms. Sorting and searching. Object-oriented techniques for data representation, implementation.

120. Introduction to the Theory of Computation (4) I, II. Rogaway, Gusfield, Martel
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; Mathematics 108 recommended. Fundamental ideas in the theory of computation, including formal languages, computability and complexity. Reducibility among computational problems.

122A. Algorithm Design and Analysis (4) II, III. Gusfield, Martel, Rogaway
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 110. Complexity of algorithms, bounds on complexity, algorithms for searching, sorting, pattern matching, graph manipulation, combinatorial problems, introduction to NP-complete problems. Not open for credit to students who have taken course 122.

***122B. Algorithm Design and Analysis** (4) I. Gusfield, Martel, Rogaway
Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A. Theory and practice of hard problems, and problems with complex algorithm solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Students do theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms.

140A. Programming Languages (4) I, II. Olsson, Pandey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70; course 110. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, scoping, parameter disciplines, exception handling. Comparative study of several high-level programming languages. Not open for credit to students who have taken course 140.

140B. Programming Languages (4) II. Olsson, Levitt, Pandey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel), dataflow, and constraint; key implementation issues for those paradigms; and programming language semantics.

142. Compilers (4) III. Pandey
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 140A; course 120 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of compilers.

150. Operating Systems and System Programming (4) I, III. Levitt, Matloff, Olsson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40; course 154A or Electrical and Computer Engineering 70; course 154B or Electrical and Computer Engineering 170 strongly recommended. Basic concepts of operating systems and system programming. Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system.

151A. Operating System Design (4) II. Ruschitzka
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 154A or Electrical and Computer Engineering 170. Architectural support of operating system concepts. Systems programming. Major components of an operating system, their functions, and their interactions. Lecture material is closely coupled with a project that involves a machine simulator and the implementation of a matching multi-programming system. Not open to students who have taken Electrical and Computer Engineering 182A.

151B. Operating System Design (3) III. Ruschitzka
Lecture—3 hours. Prerequisite: course 151A and an introductory probability course. Contemporary architectures: virtual memory and operating system support functions. Concurrent processes and the problems of determinacy, mutual exclusion, deadlocks, and synchronization. Management of physical and virtual resources. Protection mechanisms. User interface and ease-of-use considerations. Not open to students who have taken Electrical and Computer Engineering 182B.

152A. Computer Networks (3) I, II, III. Mukherjee, Matloff, Ghosal
Lecture—3 hours. Prerequisite: course 154A or Electrical and Computer Engineering 170; course 110 or Electrical and Computer Engineering 173; Mathematics 131 or Statistics 131A or 120 or 32. Overview of local and wide-area networks. ISO seven-layer model. Physical aspects of data transmission. Data-link protocols multiplexing. Switched networks; broadcast networks. Internetworking. Not open for credit to students who have taken course 152.

152B. Computer Networks (3) II, III. Mukherjee, Ghosal
Lecture—3 hours. Prerequisite: course 152A; course 150 or 151A. Upper-layer protocols. Communications software. UNIX network programming. Transport layer interfaces. Sockets. TCP/IP. Applications. Remote procedure calls. Network management.

153. Introduction to Computer Security (4) III. Bishop
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150 or 151A-151B. Study of the principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. An existing operating system will be studied.

154A. Computer Architecture (4) I, II. Farrens, Matloff, Mukherjee
Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70, and course 110. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for operating systems software. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 170.

154B. Computer Architecture (4) II, III. Farrens, Matloff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 154A or Electrical and Computer Engineering 170, and course 110. Hardwired and microprogrammed CPU design. Memory hierarchies. Uniprocessor performance analysis under varying program mixes. Introduction to pipelining and multiprocessors.

158. Programming on Parallel Architectures (3) III. Farrens, Matloff
Lecture—3 hours. Prerequisite: course 154B or Electrical and Computer Engineering 170; and course 150 or 151A. Techniques for software development on shared-memory and message-passing architectures. Overview of interconnect architectures, and hardware for memory-access atomicity. Spin locks and barriers. Load balancing. Efficient use of interconnects and memory.

160. Introduction to Software Engineering (4) II, III. Levitt, Prieditis
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110, 140A. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming.

163. User/Computer Interfaces (4) III. Joy, Prieditis
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 110. Study of the principles of user/computer interaction. User interface management system architectures; semantics of input devices; transition network and event-based systems, models of interaction, graphical interfaces; implementations; and performance issues and tradeoffs.

165A. Database Systems (4) II. Walters
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Database hardware; input techniques; file types; database models; reliability, integrity and security; operating system interfaces with databases.

165B. Database Systems (4) III. Walters
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 165A. Continuation of basic principles of databases. Distributed systems; transaction processing; knowledge representation; new database models, including object-oriented; performance evaluation; optimization.

167. Databases in Humanities and Sciences (4) III. Walters
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15 or the equivalent. Introduction for nonmajors to basic principles of database management systems; overview of typical commercial database packages; use of database systems in various fields in humanities and sciences; design and implementation of individual database applications. Not open for credit to College of Engineering students. GE credit: SciEng, Wrt.

***168. Information Systems** (3) I. Walters
Lecture—3 hours. Prerequisite: course 40 or the equivalent; upper division standing. Design, creation, implementation, and case study evaluation of information systems. Project-oriented, self-paced implementation of actual information including survey collection of data, input design, and development of components to edit, sort, and retrieve data. Case study of typical information systems problems. Offered in alternate years.

170. Introduction to Artificial Intelligence (4) II. Levitt, Prieditis
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110, 140A. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing.

***172. Natural Language Processing** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 140A recommended. Introduction to cognitive modeling. Study of knowledge structures and processes required for computer comprehension of human languages. Conceptual analysis based on Conceptual Dependency Theory, scripts, goals, and plans. Techniques for designing and implementing natural language parsers and generators.

175. Introduction to Computer Graphics (4) I, II. Joy, Hamann
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or Electrical and Computer Engineering 173; Mathematics 22A. Principles of computer graphics. Current graphics hardware, elementary operations in two- and three-dimensional space, transformational geometry, clipping, graphics system design, standard graphics systems. Individual projects.

177. Introduction to Visualization (4) II. Hamann, Joy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Graphics techniques for generating images of various types of measured or computer-simulated data. Typical applications for these graphics techniques include study of air flows around car bodies, medical data, and molecular structures.

178. Introduction to Geometric Modeling (4) III. Hamann, Joy, Max
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Interactive graphics techniques for defining and manipulating geometrical shapes used in computer animation, car body design, aircraft design, and architectural design.

*Course not offered this academic year.

188. Ethics and the Information Age (3) II. The Staff
Seminar— 2 hours; term paper. Prerequisite: senior standing. Ethics and professional responsibility issues as they are influenced by the growth of computer usage and networks in today's society.

189A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in **(A)** Computer Science Theory; **(B)** Architecture; **(C)** Programming Languages and Compilers; **(D)** Operating Systems; **(E)** Software Engineering; **(F)** Data Bases; **(G)** Artificial Intelligence; **(H)** Computer Graphics; **(I)** Networks, **(J)** Computer-Aided Design; **(K)** Scientific Computing; **(L)** Computer Science. May be repeated for credit when topic differs.

190C. Research Group Conferences in Computer Science (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in Computer Science and Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)

190X. Senior Seminar (2) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: senior standing. Examination of a special topic in a small group setting.

192. Internship in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Computer Science (2-3) I, II, III. Walters
Discussion—1 hour; laboratory—3-6 hours. Prerequisite: upper division standing and consent of instructor. Tutoring in computer science courses, especially introductory computing. For upper division undergraduate students who will provide tutorial assistance. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

220. Theory of Computation (3) III. Rogaway
Lecture—3 hours. Prerequisite: courses 120 and 122A. Theory of computation: the notion of effective procedures, computability, Turing machines, Post symbol manipulation system, models similar to digital computers, computational complexity and intractable problems.

222A. Design and Analysis of Algorithms (3) I. Gusfield, Martel, Rogaway
Lecture—3 hours. Prerequisite: course 122A; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting and estimating. Search techniques. Graph algorithms.

222B. Advanced Design and Analysis of Algorithms (3) II. Gusfield, Martel, Rogaway
Lecture—3 hours. Prerequisite: course 222A. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms.

223. Parallel Algorithms (3) II. Martel
Lecture—3 hours. Prerequisite: course 222A. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems are studied as well as general techniques for their design and analysis. Lower bounds on parallel computation are proved in several settings.

225. Graph Theory (3) II. Hakimi
Lecture—3 hours. Prerequisite: graduate standing in electrical engineering or computer science or consent of instructor. Fundamental concepts. Vector spaces and graphs. Planar graphs: Whitney's and Kuratowski's theorems. Topological parameters: packings and coverings. Connectivity: Menger's theorem. Hamilton graphs: Posa's and Chvatal's theorems. Graph factorization: Tutte's theorem. Graph coloring: Brooks; and Vizing's theorem.

227. Modern Cryptography (3) II. Rogaway
Lecture—3 hours. Prerequisite: course 220 or 222A. Modern cryptography, as a discipline emphasizing formal definitions and proofs of security. One-way functions, pseudo-randomness, encryption, digital signatures, zero-knowledge, secure protocols.

240. Programming Languages (4) II. Pandey
Lecture—3 hours; discussion—1 hour. Prerequisites: courses 140A, 142. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, an introduction to the lambda calculus. Additional topics will include language design principles, alternative programming languages, in-depth semantic theory and models of language implementation.

242. Translation of Programming Languages (4) III. Pandey
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 240. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compiler-compilers.

243. Code Generation and Optimization (3) I. Pandey, Wilken
Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code movement, loop optimization, common subexpression elimination, and peephole optimization. Optimization by program transformation.

244. Principles of Concurrent Programming (4) I. Olsson, Pandey
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; and course 150 or 151B. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

247. Concurrent Programming Languages (4) I. Pandey, Olsson
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 140A, 150. Language design parameters. Models of parallel machines. Load balancing. Scalability. Portability. Efficiency measures. Design and implementation techniques for several classes of concurrent programming languages (such as object-oriented, functional, logic, and constraint programming languages).

250A. Advanced Computer Architecture (4) I. Matloff
Lecture—3 hours; term paper. Prerequisite: course 154B or Electrical and Computer Engineering 170; course 150 or 151A. Introduction to modern research topics and methods in computer architecture. Design implications of memory latency and bandwidth limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extensions/modifications of work in the research literature.

250B. High-Performance Uniprocessing (3) II. Farrens
Lecture—3 hours. Prerequisite: course 250A. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs.

250C. Parallel Processing (3) III. Chong
Lecture—3 hours. Prerequisite: course 250A. Parallel architectures have evolved from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Readings of current research papers. Final paper and presentation critiquing three related readings and extending their area with a small project.

251. Operating System Models (4) III. Ruschitzka
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 151B; introductory probability theory course. A survey of formal models for the study of operating systems. Modeling of parallel processes and their synchronization in terms of partial orderings and procedure relations. Deterministic and probabilistic models for the evaluation of system performance. Pertinent programming project.

252. Local and Metropolitan Area Networks (4) II. Mukherjee
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152A. Local and metropolitan area networks, technologies, functions, structures, access protocols. Performance modeling and analysis of multi-access techniques in polling, ring, and random access networks. Standards, example products, high-speed LANs (FDDI), MANs (IEEE 802.6 DQDB), local lightwave networks.

253. Cryptography and Data Security (3) I. Levitt, Bishop
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150; consent of instructor. Methods of protecting data in computer and communication systems from unauthorized disclosure and modification. Introduction to mathematical principles of security with applications to operating systems, database systems, and computer networks.

256A. Analytic Methods for Computer Systems Design (3) I. Matloff, Ghosal
Lecture—3 hours. Prerequisite: course 100, 154A-154B or Electrical and Computer Engineering 170, and Statistics 131A or the equivalent; course 150 or 151A-151B recommended. Use of simulation and queueing theory in computer design. Applications to memory hierarchies; file storage; computer networks; fault-tolerance; scheduling.

256B. High Speed Networks (4) III. Ghosal, Mukherjee
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152A. Various issues in emerging high speed networks. Topics include network modeling, analysis, and optimization; routing; design of high speed switching fabrics; congestion control; traffic characterization; and broadband ISDN and ATM networks.

260. Software Engineering (4) I. Levitt
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 140A and 160. Advanced techniques for program specification, design, rapid prototyping, optimized implementation, testing, validation, documentation, maintenance through the lifecycle. Each student will produce informal requirements, formal design specifications, a rapid prototype, test plan, optimized implementation, plan for maintaining the system over the lifecycle.

261. Program Verification (4) I. Levitt
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic; knowledge of an iterative and functional programming language. Methods of proving correctness of programs with respect to formal specifications, with attention to those suited for employing automated deduction. Logic background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs.

***262. Formal Specification** (3) II. Levitt
Lecture—3 hours. Prerequisite: course 261. Formal specification of modules, and its relationship to top-down programming development and verification. Abstract data types, together with methods for specifying them. Implementations and proofs of implementation. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Offered in alternate years.

265. Database Systems (3) III. Walters
Lecture—3 hours. Prerequisite: course 165A. Data models (especially relational and entity relation), performance measures, query languages and optimizers, data base security and integrity, and distributed systems.

269. Evolution of a Computer Language (3) I. Walters
Lecture—3 hours. Prerequisite: course 140A. Review of a specific language: history, features, implementation techniques, validation procedures, performance evaluation and applications. Projects in programming, meta language implementation, validation and performance measures.

270. Artificial Intelligence (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 140A, 172. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving.

271. Machine Learning and Discovery (3) III. Prieditis
Lecture—3 hours. Prerequisite: course 170 or the equivalent. Artificial intelligence techniques for knowledge acquisition by computers. Fundamental problems in machine learning and discovery. Systems that learn from examples, analogies, and solved problems. Systems that discover numerical laws and qualitative relationships. Projects centering on implementation and evaluation.

***272. Cognitive Modeling** (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 172 and 270. Current issues in artificial intelligence emphasizing the modeling and simulation of human performance. Discussion and implementation of current methods in knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

***274. Automated Deduction** (4) III. Levitt
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Techniques of mechanical theorem proving. Methods based on resolution and term-rewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Applications to program verification, question/answering and plan generation. Study existing mechanical theorem provers. Offered in alternate years.

275A. Advanced Computer Graphics (4) II. Joy, Hamann
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques.

275B. Advanced Computer Graphics (4) II. Joy, Hamann
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Advanced topics in computer graphics and geometric modeling. Topics taken from advanced research papers in computer graphics, image synthesis, visualization and geometric modeling. Discussion of current research in the field. Offered in alternate years.

277. Advanced Visualization (4) II. Hamann
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Visualization of 3-D data, including scalar fields, vector fields, and medical data. Primary emphasis on volume visualization.

***278. Computer-Aided Geometric Design** (4) III. Joy, Hamann
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Mathematical techniques for the definition and manipulation of curves and surfaces. Coon's patches, Bezier curves and surfaces. B-spline curves and surfaces, beta-splines, box-splines. Integration into various computer graphics rendering models, and computer-aided design systems. Offered in alternate years.

279. Computer Animation (4) III. Max, Hamann, Joy
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Control of camera and object motion necessary to produce computer animation, modeling of articulated objects made from jointed segments, and of deformable objects. Students will complete a final animation project.

289A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in **(A)** Computer Science Theory; **(B)** Architecture; **(C)** Programming Languages and Compilers; **(D)** Operating Systems; **(E)** Software Engineering; **(F)** Data Bases; **(G)** Artificial Intelligence; **(H)** Computer Graphics; **(I)** Networks; **(J)** Computer-Aided Design; **(K)** Scientific Computing; **(L)** Computer Science. May be repeated for credit when topic differs.

290. Seminar in Computer Science (1) I, II, III. The Staff
Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

Professional Courses

315. Teaching Computer Science (3) II. Walters
Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: course 110. Fundamentals of instructional methodology applied to teaching computer science, especially at the introductory level. Behavioral objectives, testing methods, course design, evaluation, technology in instruction.

390. The Teaching of Computer Science (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Computer Science. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)

Engineering: Electrical and Computer Engineering

(College of Engineering)

Bernard C. Levy, Ph.D., Chairperson of the Department

Gary E. Ford, Ph.D., Vice Chairperson of the Undergraduate Studies

Andre Knoesen, Ph.D., Vice Chairperson of the Graduate Matters

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Faculty

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G. R. Branner, Ph.D., Associate Professor
Tsu-Shuan Chang, Ph.D., Associate Professor
K. Wayne Current, Ph.D., Professor
Andrew J. Dienes, Ph.D., Professor
Kamilo Feher, Ph.D., Professor
Gary E. Ford, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Benjamin Friedlander, Ph.D., Professor
William A. Gardner, Ph.D., Professor
A. Nazli Gündes, Ph.D., Associate Professor
S. Louis Hakimi, Ph.D., Professor
Stephen B. Haley, Ph.D., Professor
Jonathan P. Heritage, Ph.D., Professor
T.C. Steve Hsia, Ph.D., Professor
Charles E. Hunt, Ph.D., Associate Professor
Paul J. Hurst, Ph.D., Professor
Andre Knoesen, Ph.D., Professor
Bernard C. Levy, Ph.D., Professor
Stephen H. Lewis, Ph.D., Associate Professor
Neville C. Luhmann, Jr., Ph.D., Professor *(Electrical and Computer Engineering and Applied Science Engineering)*
Vojin G. Oklobdzija, Ph.D., Associate Professor
G.R. Redinbo, Ph.D., Professor
Todd R. Reed, Ph.D., Associate Professor
Rosemary Smith, Ph.D., Professor
Michael A. Soderstrand, Ph.D., Professor
Olav Solgaard, Ph.D., Assistant Professor
Richard R. Spencer, Ph.D., Associate Professor
Shih-Ho Wang, Ph.D., Professor
Kent D. Wilken, Ph.D., Assistant Professor

Emeriti Faculty

V. Ralph Algazi, Ph.D., Professor Emeritus
John N. Churchill, Ph.D., Professor Emeritus
Richard C. Dorf, Ph.D., Professor Emeritus
Herman J. Fink, Ph.D., Professor Emeritus
Mohammed S. Ghausi, Ph.D., Professor Emeritus/Dean Emeritus
I. Horowitz, Ph.D., Professor Emeritus
Wen C. Lin, Ph.D., Professor Emeritus
David Q. Mayne, Ph.D., Professor
Ronald F. Soohoo, Ph.D., Professor Emeritus
Jerome J. Suran, Ph.D. (hon.), Senior Lecturer Emeritus

Affiliated Faculty

Scott D. Collins, Ph.D., Associate Adjunct Professor
Sharon N. Farrens, Ph.D., Assistant Adjunct Professor

Courses in Engineering: Electrical and Computer Engineering (EEC)

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (1) III. The Staff (Chairperson in charge)
Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. Presentation of basic ideas and their applications. Examination of some case studies. (P/NP grading only.)

70. Computer Structure and Assembly Language (4) I, III. Redinbo, Soderstrand, Wilken
Lecture—3 hours; workshop—3 hours. Prerequisite: Computer Science Engineering 30 or 35. Restricted during RSVP Pass 1 registration to Electrical Engineering, Computer Engineering and Computer Science and Engineering majors. Introduction to computer architecture; machine language; assembly language; macros and conditional macros; subroutine/parameter passing; input-output programming, interrupt and trap; direct-memory-access; absolute and relocatable codes; re-entrant code; program development in an operative system.

89A-U. Special Topics in Electrical and Computer Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in **(A)** Computer Science, **(B)** Programming Systems, **(C)** Digital Systems, **(D)** Communications, **(E)** Signal Transmission, **(F)** Digital Communication, **(G)** Control Systems, **(H)** Robotics, **(I)** Signal Processing, **(J)** Image Processing, **(K)** High-Frequency Phenomena and Devices, **(L)** Solid-State Devices and Physical Electronics, **(M)** Systems Theory, **(N)** Active and Passive Circuits, **(O)** Integrated Circuits, **(P)** Computer Software, **(Q)** Computer Engineering, **(R)** Microprocessing, **(S)** Electron-

*Course not offered this academic year.

ics, **(T)** Electromagnetics, **(U)** Opto-Electronics. May be repeated for credit when topic differs.

90C. Research Group Conference in Electrical and Computer Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor; lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.)

90X. Lower Division Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting. May be repeated for credit.

92. Internship in Electrical and Computer Engineering (1-5) I, II, II. The Staff (Chairperson in charge)
Internship—3-15 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

100. Circuits II (5) I, II. The Staff
Laboratory—3 hours; lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17. Introduction to the theory and application of analog circuits. Students who have completed Engineering 100 may receive only 3.5 units of credit.

106. Introduction to Image Processing and Computer Vision (4) I. Reed, Ford, Levy
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Imaging geometry; transforms and sampling; enhancement, restoration, and conversion; image compression; time-varying image analysis; elementary pattern recognition; segmentation; multi-resolution analysis.

110A. Electronic Circuits I (4) II, III. Spencer, Lewis, Current, Hurst
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100 and 140A; course 180A (may be taken concurrently). Operation of bipolar and field-effect transistors. Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates.

110B. Electronic Circuits II (4) I, III. Spencer, Haley, Hurst, Lewis
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110A. Analysis and design of amplifier output stages, analysis of frequency response of amplifiers, analysis and design of multi-stage and feedback amplifiers, stability and compensation of feedback systems, oscillators, introduction to analog-to-digital and digital-to-analog converters.

111A. Electronic Circuits Laboratory (2) II. Spencer, Hurst, Lewis
Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: courses 100, 140A; course 110A (concurrent enrollment recommended); course 140B recommended (may be taken concurrently). Laboratory measurement techniques. Spectral analysis. Transistor model parameter value extraction. Transistor amplifier design.

111B. Electronic Circuits Laboratory (2) III. Spencer, Hurst, Lewis
Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: course 111A; course 110B (concurrent enrollment recommended); course 140B recommended. Design, analysis, and evaluation of logic circuits, multi-stage and feedback amps, and oscillators.

112. Communication Electronics (3) II. Lewis
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110B, 111B, and 150A. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized.

114. Analog Integrated Circuits (3) I. Hurst, Spencer, Current, Lewis
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110B, 111B, 140B. Analysis and design of analog integrated circuits. Emphasis is on bipolar transistor circuits. Single-stage amplifiers, cascaded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers.

118. Digital Integrated Circuits (3) III. Hurst, Current, Oklobdzija
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110A, 140B. Analysis and design of digital integrated circuits. Emphasis is on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs.

130A. Introductory Electromagnetics I (4) I, II. Dienes, Heritage, Knoesen
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, 22B, Physics 9C, Engineering 17. Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plane waves in lossless media. Lossless transmission lines.

130B. Introductory Electromagnetics II (4) II, III. Dienes, Fink, Heritage, Knoesen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas.

131A. Electromagnetic Fields and Waves (3) I. Dienes, Fink, Knoesen
Lecture—3 hours. Prerequisite: course 130B or the equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular wave guides.

***131B. Electromagnetic Fields and Waves** (3) II. Dienes
Lecture—3 hours. Prerequisite: course 131A or the equivalent. Fiber optics. Helix and slow-wave structures. Wave propagation in media with anisotropic permittivity and permeability, and on plasmas. Travelling wave amplifier.

***131C. Electromagnetic Fields and Waves** (3) III. Dienes
Lecture—3 hours. Prerequisite: course 131B or the equivalent. Resonant cavities; microwave networks and components; antennas.

132A. High-Frequency Systems, Circuits and Devices (4) I. Branner
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130B. Application of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

132B. High-Frequency Systems, Circuits and Devices (5) II. Branner
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132A. Passive high frequency device analysis, design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistor and tunnel diode amplifiers.

132C. RF Amplifiers, Oscillators, Mixers and Antennas (5) III. Branner
Lecture—3 hours; laboratory—3 hours; discussion—1 hours. Prerequisite: course 132B. Microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Analysis and design of linear, loop, waveguide and horn radiators.

***135. Optical Communications I: Fibers** (3) III. Dienes, Knoesen
Lecture—3 hours. Prerequisite: course 130B. Principles of optical communication systems. Dispersion broadening of pulses. Planar dielectric guides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion limitations. Design of zero dispersion fibers. Offered in alternate years.

140A. Principles of Device Physics I (4) I, II. Bower, Haley, Hunt, Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9C. Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, density of states, electrons and holes, p-n junctions, Schottky junctions, and junction field effect transistors.

140B. Principles of Device Physics II (4) II, III. Bower, Haley, Hunt, Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Electrical properties, design, and models for Bipolar and MOS devices.

145A. Solid-State Electronics (3) III. Bower, Haley, Hunt
Lecture—3 hours. Prerequisite: course 140B. Semiconductor device physics, the principal techniques employed in creating device structures, materials for thin film devices, and heterostructure devices.

145B. Solid-State Electronics (3) I. Haley
Lecture—3 hours. Prerequisite: course 140A. Magnetism and superconductivity. Design of devices and their associated circuits utilizing the magnetic and superconducting properties of solids. Magnetic devices studied include masers and magnetic media: disk, tape and bubbles. Superconducting devices studied include Josephson junctions, SQUIDS, and SC microcircuits.

146A. Integrated Circuits Fabrication (3) I. Hunt, Bower, Smith
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students. Non-majors accomodated when space available. Basic fabrication processes for metal oxide semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization work together in producing metal-gate PMOS test chips which will undergo parametric and functional testing.

146B. Advanced Integrated Circuits Fabrication (3) II. Hunt, Bower, Smith
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146A. Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students. Non-majors accomodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing.

***148. Superconductivity** (3) III. Haley
Lecture—3 hours. Prerequisite: courses 130A and 140A. Fundamental properties of superconductors of the first and second kind, London and Ginzburg-Landau theories, Josephson effects, applications and devices.

150A. Introduction to Signals and Systems I (4) II, III. Abdel-Ghaffar, Chang, Ford, Levy
Lecture—4 hours. Prerequisite: course 100. Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems.

150B. Introduction to Signals and Systems II (4) II, III. Hsia, Ford, Friedlander, Mayne, Wang
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Characterization and analysis of discrete time systems. Difference equation models. Z-transform analysis methods. Discrete and fast Fourier transforms. Introduction to digital filter design.

157A. Control Systems (4) I, III. Gündes, Wang, Chang, Hsia
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150A. Analysis and design of feedback con-

trol systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods.

157B. Control Systems (4) II. Chang, Gündes, Hsia, Wang
Lecture—3 hours; laboratory—3 hours. Prequisite: course 157A. Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies.

160. Signal Analysis and Communications (4) III. Feher, Ford, Friedlander, Gardner, Levy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude.

165. Modulation, Coding, and Noise (3) II. Gardner, Levy
Lecture—3 hours. Prerequisite: course 160; Statistics 120. Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog, carrier, and digital pulse modulation. Signal-to-noise ratio, probability of error, matched filters, and Wiener filters. Introduction to information theory and coding.

166. Digital Communication Design Techniques (4) I. Feher
Lecture—3 hours; discussion—1 hour. Prerequisite: course 160. Baseband digital signal processing for digital MODEMS (modulators-demodulators). Digital modulation techniques including BPSK, QPSK, MSK and QAM. Spread spectrum, TDMA and FDMA access methods. Satellite, cellular-mobile, microwave and personal communications systems (PCS) applications. Computer-aided and hardware design projects.

***167. Telecommunications Measurements and Instrumentation** (3) II. Feher
Lecture—3 hours. Prerequisite: course 160. Measurement techniques; instrumentation. Analysis of bit error rate, eye and constellation diagrams; noise and jitter measurement in digital communication and signal processing systems. Spectral and time measurements in digitized PCM voice and video, cellular digital mobile systems. Expert (artificial intelligence) applications. In-class experiments/ demonstrations.

170. Introduction to Computer Architecture (4) I, III. Oklobdzija, Redinbo, Wilken, Akella
Lecture—3 hours; discussion—1 hour. Prerequisite: course 180A; course 70 or Computer Science Engineering 50. Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. Not open for credit to students who have taken course 171.

172. Microcomputer-Based System Design (4) I, II. Chang, Oklobdzija, Akella, Redinbo, Wilken
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A; course 180B concurrently recommended. Review of 8086/8088 microprocessor architecture; bus-based system architecture; peripheral chips architecture; I/O interface design; software I/O device drivers; interrupt driven system design; MS-DOS operating system based system design; real-time embedded system design.

173. Applications of Object-Oriented Programming (4) I, II. Akela, Wang
Lecture—3 hours; discussion—1 hour. Prerequisite: course 70 or Computer Science Engineering 50; Computer Science Engineering 40. Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students. Non-majors accomodated when space available. Introduction to the modern programming paradigms of data abstraction and object-oriented programming for engineering applications. Introduction to object-oriented programming in C++/Java language. The technique of modeling an application by defining new types that match the concepts in the application.

174. Microprocessor-Based Instrumentation Systems (4) III. Soderstrand
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A or Engineering 100. Typical uses of microprocessors and microprocessor development systems in instrumentation applications. Analytical and design methods common to modern instrumentation systems, including: transducers, dynamic response, signal conditioning, A/D conversion, data transmission, hardware interfacing, software development, noise and safety.

180A. Digital Systems I (5) I, II, III. Oklobdzija, Redinbo, Wilken, Akella, Hakimi
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 70 or Computer Science Engineering 50; course 100 or Engineering 100. Restricted to Electrical Engineering, Computer Engineering, Computer Science and Engineering, Computer Science, and Electrical Engineering/Materials Science majors and Electrical Engineering graduate students. Non-majors accommodated when space available. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer-aided design (CAD) methodologies and tools.

180B. Digital Systems II (5) I, III. Oklobdzija, Redinbo, Wilken, Akella
Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 110A and 180A. Restricted to Electrical Engineering, Computer Engineering, Computer Science and Engineering, Electrical Engineering/Materials Science and Engineering majors, Electrical Engineering graduates, and Computer Science. Non-majors accommodated when space available. Computer-aided digital system design, FPGA-based design, programmable logic, clocking schemes, memory systems, arithmetic, optimizing combinational and sequential digital logic. Not open for credit to students who have taken course 177.

189A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in **(A)** Computer Science; **(B)** Programming Systems; **(C)** Digital Systems; **(D)** Communications; **(E)** Signal Transmission; **(F)** Digital Communication; **(G)** Control Systems; **(H)** Robotics; **(I)** Signal Processing; **(J)** Image Processing; **(K)** High-Frequency Phenomena and Devices; **(L)** Solid-State Devices and Physical Electronics; **(M)** Systems Theory; **(N)** Active and Passive Circuits; **(O)** Integrated Circuits; **(P)** Computer Software; **(Q)** Computer Engineering; **(R)** Microprocessing; **(S)** Electronics; **(T)** Electromagnetics; **(U)** Opto-Electronics. May be repeated for credit when topic differs.

190C. Research Group Conferences in Electrical and Computer Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in Electrical and Computer Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)

192. Internship in Electrical and Computer Engineering (1- 5) I, II, III. The Staff (Chairperson in charge)
Internship—3-15 hours. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit. (P/NP grading only.)

194A-194B-194C. Micromouse Design Project (2-2-1) I-II-III. Soderstrand
Workshop—3 hours (194A and 194B only); laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50; Engineering 17 (may be taken concurrently); course 100 or Engineering 100 recommended (may be taken concurrently); course 180A recommended (may be taken concurrently). Enrollment in course 194A automatically enrolls student in 194B and 194C. Design of a robotic mouse for the IEEE Micromouse competition. Limited enrollment. May be repeated for credit. (Deferred grading only, pending completion of three-course sequence.)

195A-195B-195C. Student Design Project (2-2-1) I-II-III. The Staff
Laboratory and discussion. Prerequisite: consent of instructor. Enrollment in course 195A automatically enrolls student in 195B and 195C. Design projects and/or contests sponsored by industry. Topics vary; check with department for availability. Course offering subject to student demand/availability of resources. May be repeated for credit. Limited enrollment. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

201. Digital Processing of Signals (4) II. Friedlander, Ford
Lecture—4 hours. Prerequisite: course 150B. Theory and applications of digital processing of signals. Z-transform analysis of discrete-time systems, filter design techniques, structures for discrete-time systems, discrete Fourier transform, and Hilbert transforms.

205. Introduction to Optical Information Processing (3) II. Knoesen
Lecture—3 hours. Prerequisite: courses 230 and 250 recommended. Review of the scalar theory of diffraction and of two-dimensional Fourier transforms, from which the foundations of the frequency analysis of imaging systems will be developed. Image processing techniques will be examined, including the theory and applications of holography. Introduction to optical computing. Offered in alternate years.

206. Digital Image Processing (4) II. Levy, Reed
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering and restoration, image analysis, and image processing systems.

207. Pattern Recognition and Classification (3) III. Ford, Reed
Lecture—3 hours. Prerequisite: Statistics 120. Topics in statistical pattern recognition and classification: linear decision functions and minimum distance classification, Bayes decision theory, clustering algorithms, the generalized perceptron, multi-layer neural networks, and feature extraction.

***208. Image Analysis and Computer Vision** (3) III. Levy, Reed
Lecture—3 hours. Prerequisite: course 150B. Geometry of two-dimensional objects. Edge detection and image segmentation. Image formation and fundamental principles of computer vision. Recovery of three-dimensional structure from shading or stereo information. Analysis of motion and estimation of motion parameters. Geometry and representation of three-dimensional objects.

***209. Image Sequence Processing** (3) III. Reed
Lecture—3 hours. Prerequisite: course 106. Basic video concepts and image sequences as spatio-temporal data; three-dimensional linear systems; perception of visual motion; enhancement of image sequences; image sequence representation; resolution issues; the computation of motion; image sequence compression. Offered in alternate years.

210. Analog Circuit Design (3) I. Spencer, Current, Hurst, Lewis
Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B, and 140B. Analysis and design of amplifiers, bias circuits, voltage references and other ana-

log circuits. Feedback and compensation of linear amplifiers. Computer-aided analysis is used extensively.

211. Advanced Analog Circuit Design (3) II. Spencer, Current, Hurst
Lecture—3 hours. Prerequisite: course 210; Statistics 131A or the equivalent recommended. Noise in electronic circuits and systems. Distortion analysis; the translinear principle and its application to circuit analysis and synthesis; phase-locked loops and their applications.

212. Analog MOS IC Design (3) II. Hurst, Lewis
Lecture—3 hours. Prerequisite: course 210. Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters.

213. Data-Conversion Techniques and Circuits (3) III. Lewis, Current, Hurst, Spencer
Lecture—3 hours. Prerequisite: course 210. Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits.

***214. Computer-Aided Circuit Analysis and Design** (3) II. Current
Lecture—3 hours. Prerequisites: course 110B, 111A, 111B, knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, time-domain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project. Offered in alternate years.

218A. Introduction to VLSI Circuits (3) I. Current, Hurst, Oklobdzija, Spencer
Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design aids allows students to undertake a VLSI design example.

218B. Multiproject Chip Design (1) II. Current, Hurst, Oklobdzija, Spencer
Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS multiproject chip layouts of projects begun in courses 218A, 212, and 219 are assembled and submitted to the DARPA/NSF MOSIS program for fabrication.

218C. IC Testing and Evaluation (1) III. Current, Hurst, Oklobdzija, Spencer
Laboratory—3 hours. Prerequisite: courses 218A and 218B. Chips submitted in course 218B are tested and evaluated. Issues involving design of ICs for testibility are discussed.

***219. Advanced Digital Circuit Design** (3) III. Hurst, Current, Spencer
Lecture—3 hours. Prerequisite: course 118 or 218A. Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic.

221. Analog Filter Design (3) I. Soderstrand
Lecture—3 hours. Prerequisite: courses 100 and 150A. Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Offered in alternate years.

***226A. Lasers** (3) I. Dienes, Heritage
Lecture—3 hours. Prerequisite: course 130B or the equivalent, and course 231. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser systems. Offered in alternate years.

226B. Advanced Lasers (3) II. Dienes, Heritage
Lecture—3 hours. Prerequisite: course 226A. Quantum mechanical description of lasers and interactions of materials with laser light. Relationship to rate equation approach. Optical Bloch equations and coherent effects. Theory and practice of active and passive mode-locking of lasers. Injection locking. Offered in alternate years.

***228. Advanced Microwave and Antenna Design Techniques** (3) III. Branner
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 132B or 131B, and 221. Design, fabrication, analysis of advanced microwave devices, antennas. Includes FET amplifiers, broadband microstrip and stripline filters, hybrids, beamformers, tapered networks. Youla's broadband matching theory applied to microwave devices. Antenna design, analysis of horns, microstrip, log periodic, arrays, spirals and reflectors. Offered in alternate years.

230. Electromagnetics (3) I. Dienes
Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, waveguides, waves in anisotropic media, propagation in dispersive media, laser beams and resonators.

***231. Photonics** (3) I. Dienes, Knoesen
Lecture—3 hours. Prerequisite: course 130B or the equivalent; course 230 recommended. Introduction to opto-electronics, including ray optics, wave optics, beam optics, resonators, couplers, pulse propagation in dispersive media, electro-optical modulation and detection. Offered in alternate years.

232A. Advanced Applied Electromagnetics I (3) II. Branner
Lecture—3 hours. Prerequisite: course 131B or 132B. The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Offered in alternate years.

232B. Advanced Applied Electromagnetics II (4) III. Branner
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 131B or 132B. Advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Offered in alternate years.

233. Nonlinear Optical Applications (3) I. Knoesen, Dienes, Heritage
Lecture—3 hours. Prerequisite: course 130B or the equivalent; course 230 recommended. Nonlinear optical interactions have important applications in optical information processing, telecommunications and integrated optics. The basic concepts underlying optical nonlinear interactions in materials and in guided media are presented. Offered in alternate years.

240. Semiconductor Devices (3) II. Bower, Hunt
Lecture—3 hours. Prerequisite: course 140B. Physical principles, characteristics and models of various semiconductor devices including: P–N junction and metal-insulator semiconductor diodes, junction and insulated gated field effect transistors. Not open for credit to students who have completed former course 220.

245A. Applied Solid-State Physics (3) II. Haley, Hunt
Lecture—3 hours. Prerequisite: course 140A, Physics 115A. Physics of solids relevant to solid-state applications. Topics include atomic structure of solids, quantum theory of electronic and vibrational states in crystals, electron dynamics, and transport theory.

245B. Applied Solid-State Physics (3) III. Haley
Lecture—3 hours. Prerequisite: course 245A. Theory and application of semiconductor heterostructures (SH), magnetism and superconductivity (SC). Topics include quantum wells, wires, and dots; quantum transport in electric and magnetic fields; paramagnetism, ferromagnetism, magnetic resonance; basic superconducting phenomena, Josephson junctions, SQUIDS, and SC microcircuits. Offered in alternate years.

***245C. Applied Solid-State Physics** (3) III. Haley, Heritage
Lecture—3 hours. Prerequisite: course 245A. The physics of solids and quantum-confined systems relevant to applications of fundamental optical processes. Topics include elementary excitations, radiative and non-radiative recombination, high-density excitation, stimulated emission, and excitonic effects in bulk material as well as quantum wells, wires, and boxes. Offered in alternate years.

246. Advanced Projects in IC Fabrication (3) III. Hunt, Spencer, Smith
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits.

247. Advanced Semiconductor Devices (3) I. Bower, Hunt
Lecture—3 hours. Prerequisite: course 240. Physics of various semiconductor devices, including metal-oxide-semiconductor field-effect transistors (MOSFETs), IMPATT and related transit-time diodes, transferred-electron devices, light-emitting diodes, semiconductor lasers, photodetectors, and solar cells. Offered in alternate years.

***248. Microsensor Design and Fabrication** (3) III. Smith, Bower
Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and fabrication of sensors using microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microsensors, and design of microsensor systems, including packaging. Offered in alternate years.

***249. Microfabrication** (3) III. Hunt
Lecture—3 hours. Prerequisite: graduate standing in Engineering. Theory and practices of several major technologies of microfabrication, used for producing integrated circuits, sensors, and microstructures. Major topics include sputtering, chemical vapor deposition, plasma processing, micromachining, and ion implantation. Offered in alternate years.

250. Linear Systems and Signals (4) I. Wang, Chang, Levy, Gundes
Lecture—4 hours. Prerequisite: course 150A. Review of linear algebra. Mathematical description of systems. Solution of the state equations and an analysis of controllability, observability, realizations, state feedback and state estimation. Introduction to discrete-time signals and system, and the Z-transform.

251. Nonlinear Systems (3) II. Gundes
Lecture—3 hours. Prerequisite: course 250. Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Offered in alternate years.

***252. Multivariable Control System Design** (3) III. Wang
Lecture—3 hours. Prerequisite: course 250. Review of single-loop feedback design. Stability, performance and robustness of multivariable control systems. LQG design. H design. Frequency response methods. Optimization-based design.

253. Adaptive Systems (3) I. Hsia
Lecture—3 hours. Prerequisite: course 150B; course 250 (may be taken concurrently.) Theory and practice of adaptive systems. Concepts of learning and adaptation. Structure of adaptive filters and the related parameter adaptive algorithms. Applications to system identification, adaptive signal processing and adaptive control.

255. Robotic Systems (3) I. Hsia, Wang
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design.

256. Multivariable Feedback Systems (3) III. Gundes
Lecture—3 hours. Prerequisite: course 250. Analysis and synthesis of feedback control systems using a factorization approach. Q-parametrization, all stabilizing controllers, all achievable input-output maps. Robustness, asymptotic tracking and disturbance rejection. Offered alternate years.

***257. Topics in Optimization** (3) III. Chang
Lecture—3 hours. Prerequisite: graduate standing. Advanced topics in the theoretical foundations of optimization and its applications, such as semi-infinite and nondifferentiable optimization in engineering design, optimal control, stochastic programming/optimal control, global optimization, convex analysis and

optimization, linear and integer programming, VLSI physical design automation. May be repeated for credit when topic differs. Offered in alternate years.

258A. Optimization I (3) II. Chang, Mayne
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimality conditions, linear programming and unconstrained optimization (gradient, Newton, conjugate directions and minimax algorithms), convergence and rate of convergence, selected topics. (Same course as Mathematics 258A.)

***258B. Optimization II** (3) III. Chang, Mayne
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, linearly and nonlinearly constrained optimization problems, projection, feasible directions and reduced gradient algorithms, interior point methods, Lagrangian theory, duality, augmented Lagrangians, sequential quadratic programming, selected topics. (Same course as Mathematics 258B.)

260. Random Signals and Noise (4) II. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 120, course 150A; course 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications.

***262. Spectral Analysis** (4) III. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A; course 150B recommended. Theory and methodology of empirical spectral analysis of random signals. Fundamentals of resolution, leakage, and reliability. Analog and digital methods. Parametric modeling and non-parametric methods. Cross-spectral analysis. Applications to detection and estimation. Offered in alternate years.

263. Optimal and Adaptive Filtering (3) III. Friedlander, Gardner, Levy
Lecture—3 hours. Prerequisite: course 260. Geometric foundation for mean-square estimation problems. Theory and applications of optimum Wiener filtering, optimum Kalman filtering, and adaptive estimation.

***264. Estimation and Detection of Signals in Noise** (4) I. Friedlander, Gardner, Levy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detection of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing.

265. Principles of Digital Communications (4) I. Abdel-Ghaffar, Friedlander, Gardner, Levy
Lecture—4 hours. Prerequisite: courses 165 and 260, or consent of instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals.

266. Information Theory and Coding (3) II. Abdel-Ghaffar
Lecture—3 hours. Prerequisite: Statistics 120. Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, error-free communications. Offered in alternate years.

267. Cellular Digital Mobile Communications (3) I. Feher
Lecture—3 hours. Prerequisite: courses 150A, 160, and Statistics 120 (or the equivalent). Wireless cellular, digital mobile and personal communication systems (PCS). Radio propagation, digital modulation and error control. Access methods: spread spectrum, FDMA and TDMA. Antenna diversity. Computer-aided system and hardware design.

***268. Digital Modulation Techniques** (3) III. Feher
Lecture—3 hours. Prerequisite: course 267. MODEM (modulator–demodulator) signal processing and complete radio transmitter/receiver analysis, design and application for digital cellular mobile radio satellite, microwave, and cable systems. Study of advanced /4-QPSK, GMSK, coded QAM and of correlative/coded modems. Computer-aided and hardware design of advanced communications and synchronization systems. Offered in alternate years.

***269. Error Correcting Codes** (3) II. Abdel-Ghaffar
Lecture—3 hours. Prerequisite: Mathematics 22A. Introduction to coding theory, finite fields, linear codes, Hamming codes, cyclic codes, BCH and RS codes and their decoding algorithms, convolutional codes. Offered in alternate years.

270. Computer Architecture (3) II. Redinbo, Oklobdzija, Wilken
Lecture—3 hours. Prerequisite: courses 170, 180A. Emphasis on quantitative analysis of design tradeoffs, optimization of resource usage, formal descriptive models, and interactions between architecture and software.

***274. Parallel Computer Architectures** (3) II. Oklobdzija, Redinbo
Lecture—3 hours. Prerequisite: course 270. Use of parallelism to achieve high performance levels. Within-CPU parallelism, through pipelining. Multiple-CPU parallelism, through array processors and multiprocessors, and through novel structures such as dataflow machines. Current research. Offered in alternate years.

275. Advanced Object-Oriented Programming (3) III. Wang
Lecture—3 hours. Prerequisite: course 173. Object-oriented analysis, design and implementation of complex software systems. Topics include fundamental concepts of object models, the notation and process of object-oriented analysis and design, creating graphical user interface, application of object-oriented development across different application domains.

276. Fault-Tolerant Computer Systems: Design and Analysis (3) II. Redinbo, Wilken
Lecture—3 hours. Prerequisite: courses 170, 180A. Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have taken course 276A. Offered in alternate years.

***278. Computer Arithmetic for Digital Implementation** (3) III. Oklobdzija, Redinbo
Lecture—3 hours. Prerequisite: courses 170, 180A. The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Offered in alternate years.

***280. Advanced Logic Design** (3) III. Oklobdzija
Lecture—3 hours. Prerequisite: course 180B. Logic design of complex and high-performance systems. Timing, clock generation and distribution. High performance latch design. Pipelining, pipeline conflicts and hazard resolution. Complex control unit design. Use of FPGAs. Design methodology and CAD tools.

282. Synthesis Approach to System Design (3) I. Akella
Lecture—3 hours. Prerequisite: courses 180B, Computer Science Engineering 122 and 142, or the equivalents, or consent of instructor. VHDL, logic synthesis, field-programmable gate arrays, controller synthesis, algorithms underlying computer-aided design tools, high-level synthesis, hardware/software co-design.

286. Introduction to Digital System Testing (3) III. Redinbo
Lecture—3 hours. Prerequisite: course 180A; Statistics 120 or 131A. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have taken course 276A. Offered in alternate years.

289A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in **(A)** Computer Science, **(B)** Programming Systems, **(C)** Digital Systems, **(D)** Communications, **(E)** Signal Transmission, **(F)** Digital Communication, **(G)** Control Systems, **(H)** Robotics, **(I)** Signal Processing, **(J)** Image Processing, **(K)** High Frequency Phenomena and Devices, **(L)** Solid-State Devices and Physical Electronics, **(M)** Systems Theory, **(N)** Active and Passive Circuits, **(O)** Integrated Circuits, **(P)** Computer Software, **(Q)** Computer Engineering, **(R)** Microprocessing, **(S)** Electronics, **(T)** Electromagnetics, **(U)** Opto-Electronics. May be repeated for credit when topic differs.

290. Seminar in Electrical and Computer Engineering (1) I. The Staff
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.)

290C. Graduate Research Group Conference in Electrical and Computer Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. (S/U grading only.)

291. Solid-State Circuit Research Laboratory Seminar (1) III. The Staff (Spencer in charge)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. (S/U grading only.)

292. Seminar in Solid-State Technology (1) III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.)

293. Computer Engineering Research Seminar (1) II, III. The Staff
Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Lectures, tutorials, and seminars on topics in computer engineering. May be repeated for credit. (S/U grading only.)

294. Image, Video, and Computer Vision Research Seminar (1) II, III.
Seminar—1 hour. Prerequisite: graduate standing. Lectures, tutorials, and seminars on image processing, video engineering, and computer vision. May be repeated for credit. (S/U grading only.)

295. Systems, Control and Robotics Seminar (1) II. Hsia, Gündes, Chang, Wang
Seminar—1 hour. Prerequisite: graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

390. The Teaching of Electrical Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course.

Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)

Engineering: Mechanical and Aeronautical

(College of Engineering)

Bahram Ravani, Ph.D., Chairperson of the Department

Ian M. Kennedy, Ph.D., Vice Chairperson of the Department

Department Office, 2132 Bainer Hall (916-752-0580; Fax: 916-752-4158); World Wide Web: http://www-mae.engr.ucdavis.edu/

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Bruce R. White, Ph.D., Professor *(Aeronautical Science and Engineering)*
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Cornelis P. van Dam, Ph.D., Professor
Bruce R. White, Ph.D, Professor *(Mechanical Engineering)*

Courses in Engineering: Mechanical (EME)

(Courses in Mechanical Engineering (EME) are listed below; courses in Aeronautical Science and Engineering (EAE) are listed immediately following.)

Lower Division Courses

1. Mechanical Engineering (1) I. The Staff (Chairperson in charge)
Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics and responsibilities. (P/NP grading only.)

50. Manufacturing Processes (3) I, II, III. Schaaf
Discussion—2 hours; laboratory—3 hours. Prerequisite: Engineering 4, consent of instructor. Restricted to Mechanical, Aeronautical, and Materials Science Engineering majors. Introduction to and experience with modern manufacturing methods, manufacturing instructions and computer-aided manufacturing and their role in the engineering design and development process.

92. Internship in Mechanical Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in engineering. May be repeated for credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

134. Vehicle Stability (4) III. Karnopp
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171. Introduction to the static and dynamic stability characteristics of transportation vehicles with examples drawn from aircraft, high-performance automobiles, rail cars and boats. Laboratory experiments illustrate the dynamic behavior of automobiles, race cars, bicycles, etc.

150A. Mechanical Design (4) I, III. Hull, Hill
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45 and 104, course 50 (may be taken concurrently). Principles of engineering mechanics applied to the fundamentals of mechanical design. Theories of static and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware.

150B. Mechanical Design (4) I, II. Schaaf, Velinsky
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Principles of engineering mechanics, failure theories and fatigue theory applied to the design and selection of mechanical components. Design projects which concentrate on design, engineering analysis, methods of manufacture, material selection and cost. Introduction to computer-aided design.

151. Statistical Methods in Design and Manufacturing (3) II. Hull
Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing quality control. Applications include product evaluation and decision making, probabilistic design, methods of sampling inspections and control charts.

152. Computer-Aided Mechanism Design (3) I. Cheng
Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5 or the equivalent; Engineering 36. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms.

153. Introduction to Machining of Material (3) III. The Staff
Lecture—3 hours. Prerequisite: Engineering 36, 45, 104, and course 50. Material removal characteristics, kinematics and dynamics of material removal processes such as metal cutting, grinding, non-traditional machining such as EDM and laser cutting, and quality in machining. The lecture is accompanied by live demonstrations of the technology.

154. Introduction to Mechatronics (3) II. Yamazaki
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 36; Engineering 100 or Electrical and Computer Engineering 100; course 50 or consent of instructor. Mechatronics system concept, academic subjects related to mechatronics, mechatronics system overview, control system design overview, control software architecture, control hardware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator control technology, power electronics for actuator drives.

161. Combustion and the Environment (4) III. Shaw
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Introduction to combustion kinetics; the theory of premixed flames and diffusion flames; turbulent combustion; formation of air pollutants in combustion systems; examples of combustion devices which include internal combustion engines, gas turbines, furnaces and waste incinerators; alternative fuel sources.

162. Modern Power Systems (4) II. Hoffman
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different powerplant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific powerplants.

163. Internal Combustion Engines (3) I. Dwyer
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A, 105A; Engineering 103B and 105B recommended. Fundamentals of internal combustion engine design and performance, and the need to adapt the IC engine to increased environmental concerns. Emphasis on thermal processes in the engine, but other subsystems will be discussed.

165. Fundamentals of Heat Transfer (4) I, II. Baughn, Dwyer
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science majors and Biological Systems and Food Engineering majors. Fundamentals of conduction, convection and radiation heat transfer; applications to engineering equipment with use of digital computers.

171. Analysis, Simulation and Design of Dynamic Systems (4) I, II. Karnopp, Margolis, Snell
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102. Modeling of dynamic engineering systems in various energy domains. Analysis of response of linear system models. Digital computer simulation.

172. Automatic Control of Engineering Systems (4) II, III. Eke, Hubbard, Snell
Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control system design using time and frequency domain methods. State space techniques.

176. Measurement Systems (3) II, III. Hill, Snell
Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 36; restricted

to Aeronautical and Mechanical Engineering and Materials Science students. Theory of measurements; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

184A. Senior Design Project (2) I, II, III. The Staff
Laboratory—6 hours. Prerequisite: course 150B, 165, 172 or Aeronautical Engineering 25 (may be taken concurrently); senior standing in Mechanical Engineering, consent of instructor. Performance of practical mechanical engineering projects which include one or more of the following: analysis, design, development and evaluation of mechanical engineering system. (Deferred grading only, pending completion of sequence.)

184B. Senior Design Project (2) I, II, III. The Staff
Laboratory—6 hours. Prerequisite: course 184A in a previous quarter from the same instructor; consent of instructor. Performance of practical mechanical engineering projects which include one or more of the following: analysis, design, development, and evaluation of a mechanical engineering system.

185A. Mechanical Systems Design Project (2) II. Velinsky
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 150B (may be taken concurrently); senior standing in Mechanical Engineering. Capstone mechanical engineering design course; the mechanical engineering design process and its use in the design of engineering systems. (Deferred grading only, pending completion of sequence.)

185B. Mechanical Systems Design Project (2) III. Velinsky
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 185A; senior standing in Mechanical Engineering (enrollment preference to students who have not taken course 186 or 187). Capstone mechanical engineering design course; the mechanical engineering design process and its use in the design of engineering systems.

186. Thermal Systems Design Project (4) III. Baughn
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165; senior standing in Mechanical Engineering or Physics (enrollment preference to students who have not taken any of course series, 184-188). Design of a thermal system such as a power plant or engine, including consideration of engineering and economic factors. Grading based on individual contributions to project. Limited enrollment.

187. Control Systems Design Project (4) I. Frank
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 172, consent of instructor, senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184–188). Design of dynamic engineering systems. Formulation of goals, mathematical modeling of plant, consideration of passive, open loop, and closed loop active solutions. Hardware and cost/performance considerations. Grading based on individual contributions to projects.

188. Vehicle Systems Design Project (4) II. Frank
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of vehicle systems, including components, and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

***189A-B. Selected Topics in Mechanical Engineering** (1) II, III.
Lecture/discussion—1 hour biweekly; laboratory—3 hours biweekly. Prerequisite: consent of instructor. Directed group study of selected topics with separate sections in **(A)** Fluid Mechanics Laboratory; **(B)** Thermodynamics Laboratory.

192. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

205. Thermal Radiation (3) II. Baughn
Lecture—3 hours. Prerequisite: course 165 or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems. Offered in alternate years.

207. Mechanical Engineering Experimentation and Uncertainty Analysis (3) II. Baughn
Lecture—3 hours. Prerequisite: course 176. Design and analysis of mechanical engineering experiments with an emphasis on general and detailed uncertainly analysis, propagation of bias and precision errors, jitter programs and data analysis.

208. Experimental Methods in Fluid Mechanics and Combustion (3) III. Kennedy
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 165 and Engineering 103B. Application of shadow, schlieren and other flow visualization methods. Introduction to optics and lasers. Measurement of velocity and concentrations in reacting and nonreacting flows with laser diagnostic techniques including LDV, Rayleigh, Raman and fluorescence scattering and CARS. Offered in alternate years. Not open for credit to students who have taken course 208B.

210A. Advanced Fluid Mechanics and Heat Transfer (4) I. Dwyer
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, course 165. Development of differential equations governing continuity, momentum, and energy transfer. Solutions in laminar flow for exact cases, low and high Reynolds numbers and lubrication theory. Dynamics of inviscid flow.

210B. Advanced Fluid Mechanics and Heat Transfer (4) II. Kennedy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A. Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer.

211. Fluid Flow and Heat Transfer Design (4) I. Hoffman
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A (may be taken concurrently) or consent of instructor. Design aspects of selected topics such as heat conduction, thermal stresses, fins; heat transport in ducts, boundary layers and separated flows; impingement and film cooling; heat exchangers; flow in diffusers, flow over airfoils and blades. Offered in alternate years.

213. Advanced Turbulence Modeling (4) III. Aldredge
Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbulence; kinematics and dynamics of homogeneous turbulence; Reynolds stress and heat-flux equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Offered in alternate years.

***214. Numerical Calculation of Flows with Heat Transfer, Mass Transfer, and Chemical Reactions** (4) III. Dwyer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A and Aeronautical Science Engineering 233, or consent of instructor. Application of numerical approximation methods of fluid flows involving heat and mass transfer for mechanical and aeronautical applications. Applications to pipe flows; high Peclet number heat transfer; laminar and turbulent combustion; and solution of the Navier-Stokes equations. Offered in alternate years.

215. Biomedical Fluid Mechanics and Transport Phenomena (4) I. Barakat
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B or Chemical Engineering 150B or Civil and Environmental Engineering 141. Application of fluid mechanics and transport to biomedical systems. Flow in normal physiological function and pathological conditions. Topics include circulatory and respiratory flows, effect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Biomedical Engineering 215.)

216. Advanced Thermodynamics (4) III. Kollmann
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105B. Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics and quantum statistical mechanics of nonreacting and chemically reacting gases, gas mixtures, and other substances. Offered in alternate years.

217. Combustion (4) II. Aldredge
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Review of chemical thermodynamics and chemical kinetics. Discussions of reacting flows, their governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion. Offered in alternate years.

***218. Advanced Energy Systems** (4) I. Hoffman
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, or the equivalent. Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall powerplant performance for one advanced concept such as a fusion, magnetohydrodynamic, or solar electric powerplant. Offered in alternate years.

220A-220B. Mechanical Vibrations (3-3) II-III. The Staff
Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

222. Advanced Dynamics (3) I. Margolis
Lecture—3 hours. Prerequisite: Engineering 102. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

***223A. Multibody Dynamics I** (3) II.
Lecture—3 hours. Prerequisite: Engineering 102 or the equivalent; graduate standing. Dynamics of coupled rigid bodies. Reference frames. Differentiation of vector functions. Multibody kinematics; configuration and motion constraints; holonomicity; nonholonomicity; generalized speeds; partial velocities. Mass and inertia properties; inertia tensor, inertia theorems. Angular momentum; angular momentum theorems. Force systems; generalized forces. (Same course as Biomedical Engineering 223A.)

***223B. Multibody Dynamics II** (3) III.
Lecture—3 hours. Prerequisite: course 223A. Kinematics and dynamics of coupled rigid bodies. Comparison of various methods for obtaining rigid mutibody dynamical equations. Newton/Euler formalism. Energy functions; Lagrange's Equations; Kane's method. Computer-aided dynamics of multibody systems. Rigid body orientation; Euler angles; Euler parameters; Rodriques parameters. (Same course as Biomedical Engineering 223B.)

***224. Kinematic Design of Mechanisms** (3) II. Cheng
Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Bermester theory of the rational design of link mechanisms. Geometric concept of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order

path curvature analysis, circle- and center-point curves. Graphic and computer methods for kinematic design. Offered in alternate years.

***225. Spatial Kinematics and Robotics** (3) II. The Staff
Lecture—3 hours. Prerequisite: course 222. Spatial kinematics: point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: solving for kinematic equations; differential relationships; motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years. (Same course as Biomedical Engineering 225.)

***226. Acoustics and Noise Control** (3) I. Margolis
Lecture—3 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design of mufflers, acoustic enclosures, room acoustics, design of quiet machinery. Offered in alternate years.

227. Research Techniques in Biomechanics (4) II. Williams, Hawkins
Lecture—2 hours; laboratory—4 hours; term paper or discussion—1 hour. Prerequisite: consent of instructor; Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modelling. (Same course as Biomedical Engineering 227/Exercise Science 227.)

231. Musculo-Skeletal System Biomechanics (3) III. Hull
Lecture—3 hours. Prerequisite: course 176 and Engineering 102. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years. (Same course as Biomedical Engineering 231.)

***232. Skeletal Tissue Mechanics** (3) III. Martin
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disease. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Biomedical Engineering 232.)

***234. Design and Dynamics of Road Vehicles** (3) I. Velinsky
Lecture—3 hours. Prerequisite: course 134. Analysis and numerical simulation of road vehicles with emphasis on design applications. Offered in alternate years.

250A. Advanced Methods in Mechanical Design (3) II. Ravani
Lecture—3 hours. Prerequisite: courses 150A and 150B or the equivalents; Engineering 182 or consent of instructor. Applications of advanced techniques of solid mechanics to mechanical design problems. Coverage of advanced topics in stress analysis and static failure theories with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools for life cycle evaluation.

250B. Advanced Methods in Mechanical Design (3) III. Velinsky
Lecture—3 hours. Prerequisite: course 250A. Applications of advanced techniques of solid mechanics to mechanical design problems. Coverage of advanced topics in variational methods of mechanics with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools.

251. Mechatronics (4) III. Yamazaki
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 50, 154, 172 and Engineering 100. Studies of techniques required for designing the electro-mechanical system which consists of the mechanism and the electronics-based sophisticated control. Methodologies for designing the microprocessor applied control hardware and dedicated software and applying electric actuator and sensors with its theoretical background.

254. Engineering Software Design (3) I. Cheng
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 180 or Applied Science Engineering 115. Principle and design of engineering software in C and its extensions, advanced topics in enginering software design, including real-time computing and sensor fusion, shell programming, symbolic computing, and multimedia.

***255. Computer-Aided Design and Manufacturing** (3) III. Ravani
Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 180 and course 150B. Proficiency in a high-level programming language such as FORTRAN, Pascal, or C. Studies of computational and computer graphic techniques in design and manufacturing. Use of numeric and non-numeric computations and geometric tools in design and manufacturing. Offered in alternate years.

271. Modeling and Simulation of Engineering Systems (3) I. Karnopp
Lecture—3 hours. Prerequisite: course 171. Multiport models of mechanical, electrical, hydraulic and thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; modeling of multiple energy domain systems; 3-dimensional mechanics; formulation for digital simulation; identification; instrumentation; approximate models of distributed systems.

272. Theory and Design of SISO Control Systems (3) I. The Staff
Lecture—3 hours. Prerequisite: course 172. Mathematical representations of linear dynamical systems. Benefits and costs of feedback for single input, single output (SISO) systems. Analysis and design of control systems based on classical and modern approaches with emphasis on applications to mechanical and aeronautical systems.

273. Theory and Design of MIMO Control Systems (3) II. The Staff
Lecture—3 hours. Prerequisite: course 272. Mathematical representations of linear dynamical systems. Benefits and costs of feedback for multiple input, multiple output (MIMO) systems. Analysis of state-space, loop-shaping, and classical control design strategies with emphasis on applications to mechanical and aeronautical systems.

274. Analysis and Design of Digital Control Systems (3) III. Hess
Lecture—3 hours. Prerequisite: course 172. Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effects.

***276A. Digital Data Acquisition and Analysis** (3) I. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Application of microcomputers and minicomputers to data acquisition and control. Topics include computer organization, hardware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, and basic data analysis.

***276B. Digital Data Acquisition and Analysis** (3) III. Hull
Lecture—3 hours. Prerequisite: basic course in probability and statistics, Engineering 180 or the equivalent, and either course 176 or 172. Theory and application of modern techniques in digital data analysis. Topics include statistical description of data, convolution and correlation, and frequency analysis using the discrete Fourier transform. Emphasis on applying these techniques in the experimental characterization of linear dynamic systems. Offered in alternate years.

277. Computer-Aided Design of Nonlinear Dynamic Systems (3) III. Margolis
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 270, 271. Application of bond graph modeling and control system design principles. The bond graph processor programs ENPORT and CAMP are used with advanced continuous system modeling programs to simulate the dynamic response of engineering systems. Offered in alternate years.

278. Theory and Design of Nonlinear Control Systems (3) III. The Staff
Lecture—3 hours. Prerequisite: course 172. Mathematical modeling of nonlinear dynamical systems. Stability analysis and Lyapunov theory. Design approaches, describing functions, feedback linearization, dynamic inversion, sliding mode control, robust control. Applications to mechanical and aeronautical systems.

280. Advanced Engineering Analysis (3) II. Shaw
Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering of advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

290C. Graduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

295. Dynamic Systems, Controls, Design Seminar (1) I, II, III. The Staff
Seminar—1 hour. Current developments in the mechanical systems design and analysis area including dynamic systems, controls, and design with presentations by students, faculty and visitors. May be repeated for credit. (S/U grading only.)

296. Fluid and Thermal Sciences (1) I, II, III. The Staff
Seminar—1 hour. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

390. The Teaching of Mechanical Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)

Courses in Aeronautical Science and Engineering (EAE)

Lower Division Course

25. Aeronautical Engineering Fundamentals (3) II. Rehfield
Lecture—3 hours. Prerequisite: Mathematics 21A. Restricted to Mechanical and Aeronautical Science and Engineering majors. History of aeronautics. Aircraft subsystems and nomenclature. Fundamentals of aircraft aerodynamics, performance, stability and control, structures and aeroelasticity, and propulsion. Not open for credit to students who have completed course 125.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

Upper Division Courses

126. Theoretical and Computational Aerodynamics (4) III. Hafez
Lecture—3 hours; discussion—1 hour. Prerequisite: course 25; Engineering 103B; Engineering 180 or Applied Science Engineering 115 or Mathematics 128C. Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design.

127. Applied Aircraft Aerodynamics (4) I. Chattot
Lecture—3 hours; discussion—1 hour. Prerequisite: course 126. Experimental characteristics of wing sections. High-lift devices. Lift and drag at high Mach numbers. Drag aerodynamics. Total aircraft drag estimation. Aerodynamic design procedures.

128. Aircraft Performance (4) II. van Dam
Lecture—3 hours; discussion—1 hour. Prerequisite: course 127. Aircraft propulsion systems and their performance characteristics. Methods for computing and presenting aircraft performance data. Modern techniques of numerical analysis and energy methods. Application of techniques to aircraft design.

129. Aircraft Stability and Control (4) II. Snell
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102. Aircraft static stability and control. Derivation and linearization of general equations of motion for aircraft. Longitudinal dynamic stability analysis. Introduction to lateral-directional dynamic stability. Stability derivatives. Application of numerical methods to aircraft design.

130. Aircraft Preliminary Design (4) III. van Dam
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 128 and 129. Aircraft preliminary design including estimation of weight/ volume, aerodynamics, performance, stability and control. Design iteration and trade-off studies.

***131. Aircraft Flight Performance Laboratory** (3) III. The Staff
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 25 and 128. Measurements and analysis of aircraft characteristics and performance, in flight and with flight simulator.

133. Finite Element Methods in Structures (4) III. Sarigul-Klijn
Lecture—3 hours; laboratory—3 hours. Prerequisites: Engineering 104. Open to Engineering students only. An introduction to the aerospace structural design process. History of aircraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures.

135. Aerospace Structures (3) I. Sarigul-Klijn
Lecture—3 hours. Prerequisite: course 133. Analysis and design methods used in aircraft structures. Shear flow in open, closed and multi-cell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling.

137. Structural Composites (4) II. Rehfield
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104. Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications.

138. Aircraft Propulsion (4) II. Capece
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103B, and 105B. Analysis and design of modern aircraft gas turbine engines. Development and application of cycle performance prediction techniques for important engine configurations. Introduction to the operation and design of inlets, compressors, burners, turbines, and nozzles. Cycle design studies for specific applications.

139. Introduction to Aeroelasticity (4) III. Sarigul-Klijn
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103B and 104. Introduction to fluid-structure interaction. Flexible structures. Design of structural components under aeroelastic constraints. Static aeroelasticity. Control effectiveness. Unsteady aerodynamics. Flutter. Aeroelastic tailoring in design.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

***232. Advanced Aerodynamics** (3) II. Chattot
Lecture—3 hours. Prerequisite: course 126. Study of inviscid and viscous flows about aerodynamic shapes at subsonic, transonic and supersonic conditions. Application of aerodynamic theory to design for reduced drag and increased lift.

***233. Introduction to Computational Aerodynamics and Fluid Dynamics** (4) I.
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. Introduction to numerical methods for solution of fluid flow problems. Discretization techniques and solution algorithms. Finite difference solutions to classical model equations pertinent to wave phenomena, diffusion phenomena, or equilibrium. Application to the incompressible Navier-Stokes equation. Offered in alternate years.

***234. Computational Aerodynamics** (4) II.
Lecture—4 hours. Prerequisite: courses 230, 233. Numerical methods for aerodynamics flow simulation in the transonic regime. Solutions of steady and unsteady potential and compressible boundary layer equations. Numerical schemes for mixed type equations and shock waves/numerical grid generation. Viscous/inviscid interaction and coupling procedures. Offered in alternate years.

***236. Aerodynamics in Nature and Technology** (3) III. White
Lecture—3 hours. Prerequisite: Engineering 103B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind tunnel testing.

237. Analysis and Design of Composite Structures (4) III. Rehfield
Lecture—3 hours; discussion—1 hour. Prerequisite: course 137. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes. Offered in alternate years.

***238. Advanced Aerodynamic Design and Optimization** (4) III.
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Application of aerodynamic theory to obtain optimum aerodynamic shapes. Both analytic solutions and solutions obtained with numerical optimization techniques will be examined. Includes introduction to the calculus of variations and numerical optimization techniques. Offered in alternate years.

***240. Computational Methods in Nonlinear Mechanics** (4) II.
Lecture—4 hours. Prerequisite: Applied Science Engineering 115; Mathematics 128B. Deformation of solids and the motion of fluids are treated within the framework of the state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; vector computers with special applications to nonlinear mechanics. Offered in alternate years.

241. Advanced Aerospace Structures (3) I. Sarigul-Klijn
Lecture—3 hours. Prerequisite: course 135. Classical methods applied to aerospace structural analysis. Thin-walled members. Thin plate theory. Stresses in multi-cell structures. Stability of thin-walled members. Introduction to thermoelastic effects.

248. Advanced Turbomachinery (3) I. Capece
Lecture—3 hours. Prerequisite: Engineering 103B, 105B. Preliminary aerodynamic design of axial and radial flow compressors and turbines. Design of diffusers. Selection of turbomachine configurations and approximations to optimum dimensions and flow angles. Introduction to through flow analysis. Rotating stall and surge, and aeromechanical considerations.

***261. Gas Dynamics** (4) III.
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B or the equivalent. Flow of compressible fluids. Isentropic flow. Flow with friction, heat transfer, chemically reacting gas and particle mixtures. Normal and oblique shock waves, combustion, blast and expansion waves. Method of characteristics. Steady compressible boundary layer flow. Offered in alternate years.

275. Advanced Aircraft Stability and Control (3) III. Hess, Snell
Lecture—3 hours. Prerequisite: Mechanical Engineering 172. Development and analysis of aircraft equations of motion. Flexible modes. Response to control actuation. Random inputs and disturbances. Stability and control augmentation system design. Handling qualities.

289A-D. Selected Topics in Aeronautical Science and Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. **(A)** Advances in Finite Elements and Optimization; **(B)** Quantitative Feedback Theory; **(C)** Human-Machine Integration in Dynamic Systems; **(D)** Advances in Propulsion Systems. May be repeated for credit.

290C. Graduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

390. The Teaching of Aeronautical Science and Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Aeronautical Science and Engineering. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)

English

(College of Letters and Science)

Karl F. Zender, Ph.D., Chairperson of the Department

Department Office, 176 Voorhies Hall, (916-752-2257)

Faculty

Don P. Abbott, Ph.D., Associate Professor
Max Byrd, Ph.D., Professor
Caron A. Cioffi, Ph.D., Assistant Professor
Peter A. Dale, Ph.D., Professor
Joanne F. Diehl, Ph.D., Professor
Sandra M. Gilbert, Ph.D., Professor
Peter L. Hays, Ph.D., Professor
W. Jack Hicks, Ph.D., Senior Lecturer
Michael J. Hoffman, Ph.D., Professor
Alessa Johns, Ph.D., Assistant Professor
Michael P. Kramer, Ph.D., Associate Professor
Richard A. Levin, Ph.D., Associate Professor, *Academic Senate Distinguished Teaching Award*
Kari E. Lokke, Ph.D., Associate Professor
Clarence Major, Ph.D., Professor

*Course not offered this academic year.

Sandra J. McPherson, B.A., Professor
Patricia L. Moran, Ph.D., Associate Professor
Linda A. Morris, Ph.D., Professor
Marijane Osborn, Ph.D., Professor
David A. Robertson, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Catherine M. Robson, Ph.D., Assistant Professor
Winfried Schleiner, Ph.D., Professor
Gary Snyder, B.A., Professor
David Van Leer, Ph.D., Professor
Katherine A. Vaz, M.F.A., Assistant Professor
Raymond B. Waddington, Ph.D., Professor
Alan B. Williamson, Ph.D., Professor
W .B. Worthen, Ph.D., Professor *(Dramatic Art, English)*
Karl F. Zender, Ph.D., Professor

Emeriti Faculty

William E. Baker, Ph.D., Professor Emeritus
Everett Carter, Ph.D., Professor Emeritus
Thomas A. Hanzo, Ph.D., Professor Emeritus
Wayne Harsh, Ph.D., Professor Emeritus
John O. Hayden, Ph.D., Professor Emeritus
Robert H. Hopkins, Ph.D., Professor Emeritus
Arthur E. McGuinness, Ph.D., Professor Emeritus
James J. Murphy, Ph.D., Professor Emeritus
Gwendolyn Schwabe, M.A., Senior Lecturer Emerita
Karl J. Shapiro, Professor Emeritus
Daniel Silvia, Ph.D., Professor Emeritus
Brom Weber, Ph.D., Professor of American Literature Emeritus
James L. Woodress, Ph.D., Professor Emeritus
Celeste T. Wright, Ph.D., Professor Emerita

Affiliated Faculty

Cynthia J. Bates, M.A., Lecturer
Linda N. Bates, Ph.D., Lecturer
Mary E. Bly, M.A., Lecturer
John Boe, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Marlene B. Clarke, Ph.D., Lecturer
Mardena E. Creek-Michelson, Ph.D., Lecturer
Elizabeth Davis Ph.D., Lecturer
Pamela Demory, Ph.D., Lecturer
Margaret Eldred, Ph.D., Lecturer
Dale B. Flynn, Ph.D., Lecturer
Gary S. Goodman, Ph.D., Lecturer
Jared Haynes, M.A., Lecturer
Donald B. Johns, Ph.D., Lecturer
Pamela J. Major, Ph.D., Lecturer
Nancy V. Morrow, Ph.D., Lecturer
Susan E. Palo, Ph.D., Lecturer
Janet L. Papale, M.A., Lecturer, *Academic Federation Excellence in Teaching Award*
Raquel Scherr, Ph.D., Lecturer
Eric J. Schroeder, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Jayne L. Walker, Ph.D., Lecturer

The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect.

The Program. The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a *teaching* emphasis, a *creative writing* emphasis, or a *general literature* emphasis. The teaching emphasis focuses on the study of composition and of language. The writing emphasis focuses on fiction, poetry, and article writing. Creative writing majors have an opportunity to work with distinguished professional writers of fiction and poetry. The general literature emphasis focuses on a series of related courses in various historical periods of English and American literature. A Senior Honors Program is available to an invited group of English majors, who prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. Graduate courses lead to the M.A. and Ph.D. degrees.

Career Alternatives. Graduates have found the major excellent pre-professional training for graduate study in English, as well as for careers in teaching, law, medicine, and library work. Many graduates are employed in journalism, publishing, advertising, and public information. Others have worked in local, state, and federal government agencies, as well as in industry and agriculture. Some have established their own businesses.

A.B. Degree Requirements:

UNITS

Preparatory Subject Matter 20
English 1 or 3 4
English 45.....4
English 46A, 46B, 46C 12

Depth Subject Matter 44
Shakespeare, English 117A, 117B, or 117C....4
British literature, two courses in periods prior to 1800: English 111, 113A, 113B, 115, 122, 123, 150A, 155A, or suitable section of 177 8
American literature, two courses, one pre-Civil War (English 142, 143, 158A, or suitable sections of 177 or 185A), one post-Civil War (English 144, 146, 158B, 181A, 181B, or suitable sections of 152, 177, 178, 179, or 185B).....8
Senior Seminar, one course selected from English 187, 188, 189, 194H.....4
Area of Emphasis (choose one) 20

General Emphasis

Five upper division English electives 20

Creative Writing Emphasis

Three sections of English 100F, 100P and/or 100NF 12

Two upper division English electives 8

(Students pursuing the Creative Writing Emphasis may replace the senior seminar portion of the core requirement with a third upper division English elective of 4 units.)

Teaching Emphasis

English 101 or 104A, 104B, 104C, 104D, or 104E.....4

English 105 or Linguistics 104 4

One course selected from English 178, 179, 181A, 181B, or an upper division ethnic literature course from outside the English department.....4

Two upper division English electives 8

Total Units for the Major 64

English Majors
Up to four upper division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

Minor Program Requirements:

UNITS

English 19-20
Five upper division courses, at least four of which will be literature courses.....19-20

Campus Writing Center. The Campus Writing Center, an affiliate of the English Department, provides writing instruction across the curriculum. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course all relate to the subject matter of the companion course. These are credit-bearing courses offered in conjunction with both lower and upper division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should call the Campus Writing Center, 916-752-0431, for the current schedule of courses.

Subject A. Students must have met the Subject A requirement before taking any course in English.

Prerequisites. English 1 or 3 is required for admission into courses 20, 30A, 30B, 45, 46A, 46B, 46C, and all upper division courses, unless otherwise stated in the course listings. Course 45 is recommended as preparation for the 46 series and all upper division literature courses. Comparative Literature 1, 2, 3, or 4 may normally be substituted for English 1 or 3.

Meeting for Majors. All new and prospective English majors are invited to attend a general meeting for majors at the beginning of each year; all English majors should see their advisers, individually, in the spring quarters of their sophomore and junior years.

Undergraduate Adviser: P.L. Moran.

Major Advisers. D. P. Abbott, M. Byrd, C.A. Cioffi, J.F. Diehl, S.M. Gilbert, P.L. Hays, W.J. Hicks, M.J. Hoffman, A. Johns, R.A. Levin, K.E. Lokke, C. Major, S.J. McPherson, P.L. Moran, L.A. Morris, M. Osborn, D.A. Robertson, C.M. Robson, W. Schleiner, D. Van Leer, K.A. Vaz, R.B. Waddington, A.B. Williamson, W.B. Worthen, K.F. Zender.

Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees and should consult with the graduate adviser.

Honors and Honors Program. The honors program consists of four units of 194H and four units of 195H, normally taken during the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Office, 176 Voorhies Hall. Refer to the Academic Information chapter for Dean's Honors List information.

Teaching Credential Subject Representative. P. Moran. See also under Teacher Education Program.

Graduate Study. The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

The department's affiliation with the Critical Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in theories and methodologies in the humanities and social sciences).

Graduate Adviser. M.J. Hoffman.

Courses in English (ENL)

Lower Division Courses

***A. Language Skills** (2)
Lecture/discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Focus on critical thinking, reading, and writing; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for a letter grade. Minimum passing grade is a C; students receiving a C– or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

R. Communications Skills Workshop (0) I.
The Staff (Chairperson in charge)
Lecture—4 hours; workshop—2 hours; reading laboratory—1 hour. Workshop in language skills for students from non-standard-English backgrounds who need to strengthen basic skills before taking English 57 (offered by Sacramento City College). Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

1. Expository Writing (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

3. Introduction to Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Introductory study of several genres of English literature, emphasizing both analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

***4. Critical Inquiry and Literature: Freshman Seminar** (4)
Seminar—4 hours. Prerequisite: completion of Subject A requirement and consent of instructor; enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, classroom dialogue, and the writing of several papers or a longer seminar paper. GE credit: ArtHum, Wrt.

5F. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge).
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination. GE credit: Wrt.

5P. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

18. Style in the Essay (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: course 1 or 3 or the equivalent. Style, language, and structure in the essay. Instruction in analyzing style, developing a written voice, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

19. Writing Research Papers (4) I, II, III.
The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: course 1 or 3 or the equivalent. Development of skills in critical reading, analysis, documentation, and writing needed for research-based assignments. Instruction provided in formulating research topics and in developing effective arguments. Reading and writing assignments may focus on a single theme. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

30A. Survey of American Literature (4) II. Kramer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from the seventeenth century to 1865. GE credit: ArtHum, Div, Wrt.

30B. Survey of American Literature (4) III. Hays
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1865 to the present. GE credit: ArtHum, Div, Wrt.

45. Close Reading of Poetry (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: course 1 or 3. Close reading of selections from English and American poetry. Frequent written exercises. GE credit: Wrt.

46A. Masterpieces of English Literature (4) I. Levin; II. Cioffi; III. Schleiner
Lecture—3 hours; discussion—I hour. Prerequisite: course 1 or 3. Selected works of principal writers to 1640. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. GE credit: Wrt.

46B. Masterpieces of English Literature (4) I. The Staff ; II. Johns; III. Byrd
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1640 to 1832. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. GE credit: Wrt.

46C. Masterpieces of English Literature (4) I. Robson; II. Moran
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1832 to present. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. GE credit: Wrt.

92. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: course 1 or 3. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100F. Creative Writing: Fiction (4) I. Byrd, Major; II. Vaz; III. Byrd, Vaz
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.

100NF. Creative Writing: Non-Fiction (4) III. Hicks
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 1 or 3, or consent of instructor; priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination.

100P. Creative Writing: Poetry (4) I. McPherson; II. Gilbert, Williamson; III. McPherson
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

101. Advanced Composition (4) I, II, III.
The Staff (Director of Composition in charge)
Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Instruction for students in all disciplines in advanced principles of expository writing. Focus on writing tasks both within and beyond the academy. Assignments provide practice in a variety of modes of writing: narrative, analysis, explanation, argument, critique. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

102. Writing in the Disciplines (4) I, II, III.
The Staff (Director of Composition in charge)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or 3 or the equivalent; concurrent enrollment in a specified course in a subject-matter discipline, acceptance into a specified major, or consent of instructor. Advanced instruction in the elements of expository writing with special emphasis on their application to writing projects in a specified academic discipline. May be repeated once for credit if taken in conjunction with a different subject-matter course. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

104A. Writing in the Professions: Business Reports and Technical Communication (4) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent, and upper division standing. Instruction designing, writing, and documenting formal and informal reports directed toward a variety of work-related audiences. Instruction in presenting data graphically. Suitable for students planning careers in science, government, business, engineering, or industry. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

104B. Writing in the Professions: Law (4) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Instruction in advanced principles of critical thinking, argumentation, and style, with special emphasis on their application to situations in the legal profession. Suitable for students planning careers in law, business, administration, or management. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

104C. Writing in the Professions: Journalism (4) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Advanced instruction in writing non-fiction for magazines and newspapers, including problems of style and language. Special emphasis on conducting research, interviewing, analyzing markets, and writing query letters. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

104D. Writing in the Professions: Elementary and Secondary Education (4) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Advanced instruction in a variety of modes of expository writing, concentrating on topics related to teaching and issues in contemporary American education. Strongly recommended for teaching credential candidates. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

104E. Writing in the Professions: Science (4) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division or graduate science curriculum. Advanced instruction in writing abstracts, research proposals, scientific papers, other forms of scientific communication and in presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

105. History of the English Language (4) II. Schleiner; III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. History of the English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of teaching credential candidates. GE credit: ArtHum, Wrt.

107. Freedom of Expression (4) II. Abbott
Lecture—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historical development of fundamental issues and contemporary controversies about freedom of expression, with emphasis on literary and artistic censorship. Not open for credit to students who have completed Rhetoric and Communication 125. (Former course Rhetoric and Communication 125.) GE credit: ArtHum, Wrt.

***110A. Introduction to Principles of Criticism** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Essentials of literary criticism and its history from Aristotle to the modern era, with emphasis on the major critics. GE credit: Wrt.

110B. Introduction to Principles of Criticism (4) III. Moran
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of literary criticism in the modern era, with emphasis on the ties with the past and the special problems presented by modern literary theory. GE credit: Wrt.

111. Medieval Literature (4) I. Osborn; III. Cioffi
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused

intensive examination of topics in medieval literature. May be repeated for credit when content differs. GE credit: Wrt.

113A. Chaucer: Troilus and the "Minor" Poems (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's artistry and the evolution of the poet's ideas from his first work to his culminating masterpiece, *Troilus and Criseyde*. Courses 113A and 113B need not be taken in sequence. GE credit: Wrt.

113B. Chaucer: *The Canterbury Tales* (4) II. Osborn
Lecture—3 hours; term paper. Prerequisite: course 1 or 3. *The Canterbury Tales* complete as a work of art. Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer. Courses 113A and 113B need not be taken in sequence. GE credit: Wrt.

115. Renaissance Literature (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of the Renaissance. May be repeated for credit when content differs. GE credit: Wrt.

117A. Shakespeare: The Early Works (4) I. Waddington; II. Levin
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's early period, up to 1599. Courses 117A-117B-117C need not be taken in sequence. GE credit: Wrt.

117B. Shakespeare: The Middle Period (4) I. Schleiner; III. Zender
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's middle period, up to 1604. Courses 117A-117B-117C need not be taken in sequence. GE credit: Wrt.

117C. Shakespeare: The Later Works (4) II. Waddington; III. Schleiner
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's later period. Courses 117A-117B-117C need not be taken in sequence. GE credit: Wrt.

118. Shakespeare (4) II. Worthen
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works by Shakespeare. Recommended for non-majors. May not be applied toward the English major. GE credit: ArtHum, Wrt.

122. Milton (4) II. Waddington
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works, including *Paradise Lost*. GE credit: Wrt.

123. 18th-Century British Literature (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of 18th-century English literature. May be repeated for credit when content differs. GE credit: Wrt.

130. British Romantic Literature (4) I. Lokke
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of Romantic English literature. May be repeated for credit when content differs. GE credit: Wrt.

133. 19th-Century British Literature (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 19th-century English literature. May be repeated for credit when content differs. GE credit: Wrt.

137. 20th-Century British Literature (4) II. Moran
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 20th-century English literature. Authors who might be taught are Conrad, Joyce, Lawrence, Eliot, Woolf, Larkin. May be repeated for credit when content differs. GE credit: Wrt.

142. Early American Literature (4) II. Van Leer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of American literature of the 17th and 18th centuries. May be repeated for credit when content differs. GE credit: Wrt.

143. 19th-Century American Literature to the Civil War (4) I. Kramer; II. VanLeer; III. Diehl
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 19th-century American literature. May be repeated for credit when content differs. GE credit: Wrt.

144. Post-Civil War American Literature (4) III. Kramer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of post-Civil War American literature. May be repeated for credit when content differs. GE credit: Wrt.

146. 20th-Century American Literature (4) I. Hicks; II. Hays
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 20th-century American literature. May be repeated for credit when content differs. GE credit: Wrt.

149. Topics in Literature (4) II. Lokke
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Intensive examination of literature considered in topical terms, not necessarily historically. May be repeated for credit when content differs. GE credit: Wrt.

150A. British Drama to 1800 (4) I. Levin
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically focused study of works of English drama prior to 1800. May be repeated for credit when content differs. GE credit: Wrt.

***150B. British Drama from 1800 to the Present** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically focused study of works of British drama from 1800 to the present. May be repeated for credit when topic differs. GE credit: Wrt.

***152. American Drama** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of American dramatic literature. Either a historical survey from 18th-century beginnings to the present or an in-depth analysis of fewer playwrights, such as O'Neill, Miller, Williams. May be repeated for credit when content differs. GE credit: Wrt.

153. Topics in Drama (4) I. Worthen
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical or thematic study of drama. May be repeated for credit when topic differs. GE credit: Wrt.

155A. 18th-Century British Novel (4) III. Johns
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of the 18th-century British novel, with particular emphasis on its evolution, including the epistolary novel, the picaresque novel, and the Gothic novel: Richardson, Fielding, Sterne, Austen. GE credit: Wrt.

155B. 19th-Century British Novel (4) I. Robson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of 19th-century British novelists, with emphasis on the historical novel, the social novel, and novels by women: Scott, Dickens, the Brontes, Eliot, Hardy. GE credit: Wrt.

***155C. 20th-Century British Novel** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of the 20th-century British novel, with emphasis on impressionism; the revolt against naturalism; the experimental novel; the anti-modernist reaction: Conrad, Joyce, Woolf, Lawrence, Drabble, Rhys. GE credit: Wrt.

156. The Short Story (4) I. The Staff; II. Vaz; III. Moran
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. GE credit: ArtHum, Wrt.

158A. The American Novel to 1900 (4) I. Hoffman
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of the rise and development of the American novel from its beginnings; Hawthorne, Melville, Twain, James, and others. GE credit: Wrt.

158B. The American Novel from 1900 to the Present (4) III. Hays
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of American novelists of the twentieth century; Faulkner, Hemingway, Fitzgerald, Morrison, and others. GE credit: Wrt.

***159. Topics in the Novel** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Examination of major novels arranged thematically. Topics might include Bildungsroman, stream-of-consciousness novel, Gothic novel, historical novel. May be repeated for credit when topic differs. GE credit: Wrt.

160. Film As Narrative (4) III. The Staff
Discussion—2 hours; lecture and film study—3 hours. Prerequisite: course 1 or 3. Study of modern film (1930 to the present) as a storytelling medium. GE credit: ArtHum, Wrt.

162. Film Theory and Criticism (4) I. The Staff
Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 1 or 3. Film theory and criticism, with a study of ten major works of international film art. Offered in alternate years. GE credit: ArtHum, Wrt.

165. Topics in Poetry (4) I. Williamson; II. Diehl; III. McPherson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 and course 45. Intensive examination of various topics expressed in poetry from all periods of English and American literature. May be repeated for credit when topic covers different poets and poems. GE credit: Wrt.

171A. The Bible as Literature: The Old Testament (4) II. Robertson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***171B. The Bible as Literature: Prophets and New Testament** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***173. The Literature of Science Fiction** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literary modes and methods of science fiction. The course will analyze representative novels and short stories which exemplify major themes and styles in this genre—e.g., time travel; alternative universes; utopian, anthropological, sociological science fiction. GE credit: ArtHum, Wrt.

***175. American Literary Humor** (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3, or standing above freshman level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-provincialists; modernist poets and prose writers; black humor. GE credit: ArtHum, Wrt.

177. Study of an Individual Author (4) II. Zender; III. Morris
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Survey of the works of an individual author other than Chaucer, Shakespeare, or Milton. May be repeated for credit when a different author is studied. GE credit: Wrt.

178. Special Topics in Ethnic Literature (4) I. Kramer; III. Hoffman
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Intensive study of a topic drawn from multiethnic literature. Course may focus on particular ethnic groups, historical periods, writers, genres, and/or themes. May be repeated once for credit when topic differs. GE credit: Div, Wrt.

179. Multi-Ethnic Literature (4) III. The Staff
Lecture/discussion—3 hours; papers. Prerequisite: course 1 or 3, or standing above freshman level. Fiction, poetry, and other writings by Americans of ethnic minority background (Native, Black, Hispanic, Jewish, Italian, etc.) which reveal their immigrant experience, cultural diversity, and contributions to American literature. GE credit: Div, Wrt.

180. Children's Literature (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography. GE credit: ArtHum, Wrt.

181A. African American Literature to the Harlem Renaissance (4) II. Morris
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. African American literature from the slavery period to the end of the 1930s. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition. Offered in alternate years. GE credit: Div, Wrt.

181B. African American Literature from the Harlem Renaissance to the Present (4) III. Major
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Major African American writers in the context of cultural history from 1940 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paule Marshall, Toni Morrison, Alice Walker, Clarence Major. Offered in alternate years. GE credit: Div, Wrt.

182. Literature of California (4) II. Hicks
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. California literature in the context of California's social, political, and intellectual history. Reading of poetry, fiction, and essays. Emphasis on nineteenth- and twentieth-century naturalists, turn of the century novelists, the Beats, and writers of the last two decades. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

184. Literature of the Wilderness (4) II. Robertson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the theme of wilderness primarily in American Literature, with some consideration of Biblical and European antecedents. Major attention given to Thoreau, Muir, London, Austin, Faulkner, Snyder, and Abbey. Offered in alternate years. GE credit: ArtHum, Wrt.

185A. Literature by Women I (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from Bradstreet and Behn to the Brontes, Eliot, and Dickinson. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism. GE credit: Div, Wrt.

185B. Literature by Women II (4) III. Gilbert
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3; course 185A recommended. English language literature by women from Chopin and Woolf to Plath, Rich, and Morrison. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism. GE credit: Div, Wrt.

187. Literature and the Other Arts (4) III. Waddington
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of the relationship between the forms of literature and the forms of the other arts, with detailed study of one of the crucial periods of artistic development in western culture. GE credit: Wrt.

188. Special Topics in Literary Studies (4) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of a special topic drawn from English or American literature. Course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment. GE credit: Wrt.

189. Seminar in a Major Writer (4) II. Diehl (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing; a major in English or consent of instructor. One major writer's artistic development with attention to intellectual and literary milieu. Limited enrollment. GE credit: Wrt.

192. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. A maximum of 4 units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.)

194H. Special Study for Honors Students (4) I. Morris
Seminar—3 hours; term paper. Prerequisite: admission to English Department Senior Honors Program. Study of a special literary topic or of the works of a major writer, and preparation for writing an honors thesis in course 195H.

195H. Honors Thesis (4) II. The Staff (Morris in charge)
Independent study—12 hours. Prerequisite: course 194H. Preparation of a thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction.

197T. Tutoring in English (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Does not fulfill requirement for major. May be repeated for credit for a total of 8 units. (P/NP grading only.)

197TC. Community Tutoring in English (1-4) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-4 hours. Prerequisite: upper division standing and a major in English; consent of Chairperson. Field experience, with individuals or in classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: one course from courses 1, 3, 5F, 5P. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200. Techniques of Literary Scholarship (4) II. The Staff
Discussion—3 hours; term paper. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

***201. Literary Criticism** (4)
Discussion—3 hours; term paper. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

***205. Anglo-Saxon Language and Culture** (4)
Lecture—3 hours; conference and term paper. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry. Offered in alternate years.

***206. Beowulf** (4)
Discussion—3 hours; oral and written reports; conferences with students. Prerequisite: course 205 or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Offered in alternate years.

207. Middle English (4) I. Osborn
Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with investigation of the regional dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts.

***209. Present-Day English Linguistics** (4)
Discussion—3 hours; term paper. Theory and methods of structural linguistics and transformational grammar as applied to the analysis of English. Emphasis will be on recent linguistic techniques, particularly as these relate to the teaching of language, literature, and composition.

210. Readings in English and American Literature (4) I. Hays
Seminar—3 hours; conference—1 hour. Prerequisite: upper division English course in area to be studied. Offered in multiple sections each quarter. Content varies according to specialty of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

***215. Middle English Romance** (4)
Seminar—3 hours; conference—1 hour. The sources of Medieval Romance genre. Continental and English literary treatment; significant changes of attitudes in post-Malory literature.

***225. Topics in Irish Literature** (4)
Seminar—3 hours; conference—1 hour. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

***230. Study of a Major Writer** (4)
Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

232. Problems in English Literature (4) III. Abbott
Seminar—3 hours; conferences with individual students—1 hour. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit when different period or topic is studied.

233. Problems in American Literature (4) I. Diehl; II. Major
Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics for intensive investigation. May be repeated for credit when different topic or period is studied.

***234. Dramatic Literature** (4)
Seminar—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

235. Theory of Fiction (4) II. Hicks
Seminar—3 hours; preparation and evaluation of paper on a work of fiction. Theories of fiction as they relate to the professional writer 's practice of the craft. Designed for students in the creative writing program.

236. Poetics (4) III. Williamson
Seminar—3 hours; conference—1 hour. Structure, prosody, and idiom of British and American poetry variably approached—sometimes through an intensive study of a single writer, sometimes historically or theoretically—at the instructor's discretion. Preparation and evaluation of research papers. Directed toward Creative Writing master's degree students.

***237. Modern Critical Theory** (4)
Seminar—3 hours; conference—1 hour. Examination of problems in the theory underlying the practice of literary criticism from I.A. Richards and T.S. Eliot to the present.

*Course not offered this academic year.

***238. Special Topics in Literary Theory** (4)
Seminar—3 hours; term paper. Prerequisite: course 237 or the equivalent. Advanced topics in literary theory and criticism. Preparation and evaluation of research paper. May be repeated for credit when topic and/or reading list differs. Offered in alternate years.

240. Medieval Literature (4) II. Cioffi
Seminar—3 hours; conference—1 hour. Studies of Medieval literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

242. Sixteenth-Century Literature (4) I. Schleiner
Seminar—3 hours ; conference—1 hour. Studies in sixteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

244. Shakespeare (4) III. Worthen
Seminar—3 hours; conference—1 hour. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

246. Seventeenth-Century Literature (4) III. The Staff
Seminar—3 hours; conference—1 hour. Studies in seventeenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

248. Eighteenth-Century Literature (4) I. Johns
Seminar—3 hours; conference—1 hour. Studies in eighteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

250. Romantic Literature (4) II. The Staff
Seminar—3 hours; conference—1 hour. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

252. Victorian Literature (4) II. Robson
Seminar—3 hours; conference—1 hour. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

254. Twentieth-Century British Literature (4) I. Moran
Seminar—3 hours; conference—1 hour. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

256. Early American Literature (4) II. Kramer
Seminar—3 hours; conference—1 hour. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

258. American Literature: 1800 to the Civil War (4) I. Van Leer
Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

***260. American Literature: Civil War to 1914** (4)
Seminar—3 hours; conference—1 hour. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

262. American Literature after 1914 (4) II. Williamson; III. Diehl
Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

264. Studies in Modern British and American Literature (4) III. Gilbert
Seminar—3 hours; conference—1 hour. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

***285. Literature by Women** (4)
Seminar—3 hours; conference—1 hour. Studies in literature by women and the theoretical approaches to literature by women. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when topic and/or reading list differs.

290F. Seminar in Creative Writing of Fiction (4) I. Vaz; II. Byrd; III. Major
Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose. Evaluation of written materials and individual student conferences. May be repeated for credit.

***290NF. Seminar in Creative Writing of Non-Fiction** (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in the master's program in Creative Writing. A workshop in the writing of literary nonfiction, with emphasis—according to staff and student interest—on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives.

290P. Seminar in Creative Writing of Poetry (4) I. Gilbert; II. McPherson; III. Snyder
Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written materials and individual student conferences. May be repeated for credit.

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

298C. Colloquium on Literary Scholarship (1-4) I, II, III. The Staff (Chairperson in charge)
Oral presentation and critique of research papers. (S/U grading only.)

299. Individual Study (1-12) I. II. III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

***300. Problems in Teaching English Language, Literature, and Composition in Secondary Schools** (3)
Lecture—3 hours. Prerequisite: graduate standing; an English teaching major or minor. This course should be completed in conjunction with practice teaching. Course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

390. Theory and Practice of University-Level Composition Instruction (4) I. The Staff (Director of Composition in charge)
Seminar—3 hours; term paper. Prerequisite: graduate standing; appointment as Teaching Assistant in the Composition Program. Examination of current theories about the teaching of writing and their practical application to undergraduate writing courses at UC Davis. (S/U grading only.)

391. Teaching Creative Writing (2) I. Hicks
Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program. Designed for new instructors of English 5F or 5P; discussion of ways to facilitate creative writing workshops and to respond to student manuscripts. (S/U grading only.)

392. Teaching Expository Writing (2) II. The Staff
Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program; completion of course 390 or the equivalent. Discussion of problems related to teaching expository writing at the univeristy level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.)

393. Teaching Literature and Composition (2) I. The Staff
Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program. Designed for new instructors of English 3 or the equivalent courses; discussion of problems related to teaching literature and composition to lower division students. (S/U grading only.)

Entomology

(College of Agricultural and Environmental Sciences)

Michael P. Parrella, Ph.D., Chairperson of the Department

Department Office, 367 Briggs Hall (916-752-0475)

Faculty

James R. Carey, Ph.D., Professor
Hugh Dingle, Ph.D., Professor
Sean S. Duffey, Ph.D., Professor
Lester E. Ehler, Ph.D., Professor
Bruce F. Eldridge, Ph.D., Professor
Jeffrey Granett, Ph.D., Professor
Bruce D. Hammock, Ph.D., Professor *(Entomology, Environmental Toxicology)*
Richard Karban, Ph.D., Professor
Harry K. Kaya, Ph.D., Professor *(Entomology, Nematology)*
Lynn S. Kimsey, Ph.D., Professor
Sharon P. Lawler, Assistant Professor
Susumu Maeda, Ph.D., Associate Professor
Fumio Matsamura, Ph.D., Professor *(Entomology, Environmental Toxicology)*
Robert E. Page, Ph.D., Professor
Michael P. Parrella, Ph.D., Professor *(Entomology, Environmental Horticulture)*
Christine Y. S. Peng, Ph.D., Professor
Jay A. Rosenheim, Ph.D., Associate Professor
Thomas W. Scott, Ph.D., Professor
Arthur Shapiro, Ph.D., Professor *(Entomology, Evolution and Ecology)*
Diane E. Ullman, Professor
Philip S. Ward, Ph.D., Professor

Emeriti Faculty

Oscar G. Bacon, Ph.D., Professor Emeritus
Richard M. Bohart, Ph.D., Professor Emeritus
Norman E. Gary, Ph.D., Professor Emeritus
Albert A. Grigarick, Jr., Ph.D., Professor Emeritus
Charles L. Judson, Ph.D., Professor Emeritus
Harry H. Laidlaw, Jr., Ph.D., Professor Emeritus
W. Harry Lange, Jr., Ph.D., Professor Emeritus
G. A. H. McClelland, Ph.D., Senior Lecturer Emeritus
Donald L. McLean, Ph.D., Professor Emeritus
Timothy Prout, Ph.D., Professor Emeritus
Robbin W. Thorp, Ph.D., Professor Emeritus
Robert K. Washino, Ph.D., Professor Emeritus

Affiliated Faculty

Mary L. Flint, Ph.D., Lecturer
Larry Godfrey, Ph.D., Lecturer
Eric C. Mussen, Ph.D., Lecturer
Richard E. Rice, Ph.D., Lecturer
Charles G. Summers, Ph.D., Lecturer
Frank G. Zalom, Ph.D., Lecturer

The Major Program

The Entomology major is a general biological curriculum of interest to students intrigued by insects, their diversity and biology. Areas of emphasis include agricultural entomology, bee management and biology,

behavior, ecology, insects affecting human and animal health, natural history, and physiology.

The Program. Students begin their study in entomology with selected insect biology courses. After completing these courses, students may enroll in courses in their particular area of interest. A student interested in agricultural entomology, for example, could enroll in courses such as economic entomology, biological control of insects, and apiculture.

Internships and Career Alternatives. Entomology majors have participated in internships with the State Department of Agriculture in the areas of insect identification, insect surveys, and the development of entomological libraries. Other interns have worked with professional entomologists in the area of supervised pest control. Graduates are prepared for managerial and technical positions with state and federal agencies and agricultural production or supporting industry; entomology graduates also teach biological sciences in high schools. Others matriculate in graduate programs leading to a higher degree.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable and may be critical for the attainment of some career goals. *Courses shown without parentheses are required.*)

English Composition Requirement 0-8
See College Requirement

Preparatory Subject Matter 46-47
Biology (Biological Sciences 1A, 1B, 1C)...15
Chemistry (Chemistry 2A, 2B, 8A, 8B).....16
Mathematics 16A 3
Physics (Physics 1A, 1B) 6
Statistics (Statistics 13, 32, or Agricultural Systems and Environment 150) 3-4
Computer science or additional mathematics or statistics (Agricultural Systems and Environment 21, Engineering 5, or Mathematics 16B) 3

Breadth Subject Matter.....6-24
Satisfaction of General Education requirement

Depth Subject Matter 32-36
Cell or microbiology (Microbiology 102, Plant Biology 118, 119, Plant Pathology 120) 4-5
Biological Sciences 101.....4
Ecology (Environmental Studies 100 or Evolution and Ecology 101).....4
Evolution (Evolution and Ecology 100) 3-4
Physiological chemistry (Biological Sciences 102 and 103).....6
Entomology 100, 100L 5
At least 7 units from Entomology 101, 102, 103, 104, 107, 109, or 116 7

Restricted Electives 34
Upper division entomology courses 14
Upper division electives related to student's interest with approval of adviser 20
Note: No more than a total of 6 units from Entomology 192, 197T and 199 may count toward fulfilling depth subject matter or restricted elective units.

Unrestricted Electives 32-60

Total Units for the Major 180

Major Adviser. J. Granett.

Minor Program Requirements:

The Department of Entomology has seven minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

UNITS

Entomology 18-24
Entomology 100, 100L 5
At least two courses from Entomology 101, 102, 103, 104, 107 7-8
At least two additional upper division Entomology courses (except courses 192, 198, 199).....6-11

UNITS

Agricultural Entomology 18
Entomology 100, 100L, 110, 110L, 135 14
At least four additional upper division Entomology units.....4

UNITS

Apiculture 17-22
Entomology 100, 100L, 119 8
Entomology 104 or 110 3-5
Additional courses: choose two from Evolution and Ecology 121, Plant Biology 102, 173, 174 6-9

UNITS

Insect Ecology.....19
Entomology 100, 100L, 104 8
Seven units from Entomology 103, 107, 109...7
Evolution and Ecology 149 or Environmental Studies 121 4

UNITS

Medical-Veterinary Entomology.....18
Entomology 100, 100L, 104, 153, 156 15
At least three units from Entomology 156L; Pathology, Microbiology and Immunology 126, 126L, 128 3

Minor Adviser. J. Granett.

Graduate Study. The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See the Graduate Studies section and the *Graduate Announcement* for further details.

Graduate Advisers. See *Class Schedule and Room Directory.*

Related Courses. See courses in Nematology.

Courses in Entomology (ENT)

Lower Division Courses

10. Natural History of Insects (3) II. Duffey, Kaya
Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 100, but students who have taken this course may take course 100 for credit. An introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. GE credit: SciEng.

17. Evolution and Behavior (4) III. Dingle/Page
Lecture—3 hours; discussion—1 hour. Introduction to the theory of natural selection, using evaluations and applications of behavioral adaptations, ranging from insects to humans. GE credit: SciEng, Wrt.

90X. Special Topics in Entomology (2) I, II, III. The Staff
Seminar—2 hours. Freshman seminar for in-depth examinaton of a special topic in entomology.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100. General Entomology (3) I. Granett in charge
Lecture—3 hours. Prerequisite: Biological Sciences 1B. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: SciEng.

100L. General Entomology Laboratory (2) I. Granett in charge
Laboratory—6 hours. Prerequisite: course 100 (may be taken concurrently). Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit with concurrent enrollment in course 100: Wrt.

101. Functional Insect Morphology (3) II. Peng
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. GE credit: SciEng.

102. Insect Physiology (4) III. Duffey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SciEng.

103. Insect Systematics (3) III. Ward
Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. GE credit: SciEng, Wrt.

104. Behavioral Ecology of Insects (3) II. Page
Lecture—3 hours. Prerequisite: introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. GE credit: SciEng.

***107. California Insect Diversity** (5) III. L. Kimsey
Lecture—1 hour; laboratory—6 hours; fieldwork—6 hours. Prerequisite: an introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. Offered in alternate years. GE credit: SciEng, Wrt.

109. Field Taxonomy and Ecology (7) Extra-session summer. Ward
Lecture—2 hours; laboratory—36 hours; five-week course. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in alternate years. GE credit: SciEng, Wrt.

110. Arthropod Pest Management (5) II. Granett, Parrella
Lecture—3 hours; laboratory—6 hours. Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SciEng, Wrt.

111. Insects and Human Affairs (4) II. Dingle; III. Ullman
Lecture—2 hours; discussion—1 hour; film/demonstration—1 hour; one required evening meeting. Prerequisite: Biological Sciences 10 recommended. Diversity, structure and function of insects. Their role as benefactors, competitors, and destroyers of human resources and health. Their contribution to human culture and scientific knowledge. Approaches to insect pest control and its environmental, social and political correlates. GE credit: SciEng, Wrt.

116. Biology of Aquatic Insects (3-5) III. Lawler
Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes. GE credit: SciEng.

119. Apiculture (3) III. Peng
Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C recommended. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: SciEng, Wrt.

*Course not offered this academic year.

123. Plant-Virus-Vector Interaction (3) I. Lucas, Gilbertson, Ullman
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Plant Biology 105, Plant Pathology 120, and course 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Plant Biology 123/Plant Pathology 123.)

135. Introduction to Biological Control (4) III. Ehler, Kaya
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of biological control of arthropod pests and weeds. Biology of pathogens, entomopathogenic nematodes, parasitoids, and predators. Implementation in classical and augmentative biological control. Role of biological control in pest management.

147. Evolution of Life on Earth (4) I. L. Kimsey
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 10 or Biological Sciences 10. Relationships between physical changes in the continents and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years. GE credit: SciEng, Wrt.

153. Medical Entomology (4) I. Scott
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne human diseases and principles of their control. GE credit: SciEng, Wrt.

156. Biology of Parasitism (3) III. R. Kimsey, Theis, Westerdahl
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructors. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SciEng.

156L. Biology of Parasitism Laboratory (1) III. R. Kimsey in charge
Laboratory—3 hours. Prerequisite: course 156 (concurrently) or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit with concurrent enrollment in course 156: Wrt.

192. Internship (1-12) I, II, III, extra session. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.)

197T. Tutoring in Entomology (1-3) I, II, III. The Staff
Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, summer. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200A. Conceptual Basis of Entomology: Basic Biology (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with an emphasis on theoretical and fundamental aspects of natural selection, behavior, ecology, physiology, and biochemistry as relates to the regulation of insect populations. Provides the theoretical framework for course 200B.

200B. Conceptual Basis of Entomology: Application (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with emphasis on the application of theoretical/conceptual outlines from course 200A to epidemiology, biotechnology, biological control and integrated pest management for pursuing current insect pest problems concerning food, fiber, and health.

206. Ecology of Insect Parasitoids (4) II. Rosenheim
Lecture—3 hours; seminar—1 hour. Prerequisite: introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address currrent topics in behavior, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological hypotheses emphasized. Offered in alternate years. (Same course as Population Biology 206.)

212. Molecular Biology of Insects and Insect Viruses (3) II. Maeda
Lecture—3 hours. Prerequisite: consent of instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expression vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses.

220. Chemical Ecology of Plant–Insect Interactions (4) II. Duffey
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory organic chemistry and biochemistry. Investigation of the interface between plants, herbivorous insects and their natural enemies from a mechanistic point of view, stressing principles of biochemistry, physiology, and toxicology rather than those of ecology. Major emphasis is placed on plant natural products. (Same course as Ecology 220.)

225. Terrestrial Field Ecology (4) III. Karban
Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing , data gathering, analysis and written and oral presentation of results. (Same course as Ecology 225/ Population Biology 225.)

230. Advanced Biological Control (4) I. Ehler
Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to indentification and life history of the major groups of parasitic and predaceous arthropods. Offered in alternate years.

***253. Advanced Medical Entomology** (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 153) and one course in microbiology: course 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Offered in alternate years.

290. Special Topics in Entomology (1-4) I, II, III. The Staff (Chairperson in charge)
Seminar—1-4 hours. Prerequisite: consent of instructor.

291. Seminar in Medical Entomology (2) I. Eldridge, Scott, R. Kimsey
Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated for credit.

292. Seminar in Insect Physiology (2) I. Duffey, Hammock, Maeda
Seminar—2 hours. Prerequisite: course 102. Critical examination of areas of current interest to insect physiology and biochemistry. May be repeated for credit.

293. Seminar in Systematic Entomology (2) III. Ward, Kimsey
Seminar—2 hours. Prerequisite: course 103. Selected topics in systematics and evolution are presented and discussed. Some topics may be illustrated by laboratory sessions. May be repeated for credit.

294. Seminar in Insect Ecology (2) III. Carey, Ehler, Karban, Dingle, Rosenheim
Seminar—2 hours. Prerequisite: a general ecology course. Discussions of advanced topics in ecology with emphasis on analysis of factors influencing the distribution and abundance of insects. Includes consideration of applications of basic theory as in biological control and related approaches. May be repeated for credit.

295. Seminar in Agricultural Entomology (2) II. Granett, Parrella, Rosenheim
Seminar—2 hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of pest insect population management. May be repeated for credit.

296. Seminar in Bee Biology (2) I. Page, Peng
Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of behavior, ecology, management, and general biology of bees (Apoidea) with emphasis on the honeybee. May be repeated for credit.

297. Seminar in Insect Behavior (2) III. Dingle, Page
Seminar—2 hours. Prerequisite: a course in animal behavior. Analysis of contemporary advances in insect behavior, interpretation and description of observations, physiological mechanisms, functional kinds of behavior, application of general principles to the solution of problems in the laboratory and field. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III, summer. The Staff (Chairperson in charge)
(S/U grading only.)

Environmental and Resource Sciences

(College of Agricultural and Environmental Sciences)

Faculty. See under departments of Agricultural and Resource Economics, Agronomy and Range Science, and Land, Air and Water Resources.

The Major Program

The environmental and resource sciences major is a program for study of the biological, chemical, and physical features of environmental resources, and the economical and social considerations associated with their use, conservation, protection, and management and restoration. Students who choose this major include those with an interest in careers associated with environmental resource utilization and management, as well as those pursuing post-baccalaureate, academic, or professional training.

The Program. The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. At the same time, certain courses are required in the basic physical and biological sciences areas. Upper division general environmental resource sciences courses, a resource economics course, and a specified number of units of environmental and resource-oriented courses are required for all students in the major. Environmental and resource-oriented courses shall be selected in consultation and with approval of the student's adviser. Considerable care should be taken to ensure effective utilization of the flexibility of the major, and to meet individual academic and career objectives. Students specialize their study by selecting of one of the options within the

major or, in consultation with their adviser, pursuing other specializations.

Internships and Career Alternatives. Positions now held by graduates in environmental and resource sciences are quite varied, but many are employed as resource analysts and planners as well as technical and environmental specialists with government agencies, municipalities, and private firms. A significant proportion of graduates undertake further studies leading to advanced degrees in resources, the environment, and related fields.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

Written/Oral Expression 0-8
See College requirement

Preparatory Subject Matter 53-63
Atmospheric Science 60 4
Biological sciences (Biological Sciences 1A-1B-1C) 15
Chemistry (Chemistry 2A-2B).....10
Environmental quality (Environmental Toxicology 10) 3
Geology (Geology 1 or 50).....3
Mathematics (Mathematics 16A-16B or 21A-21B) 6-8
Students are encouraged to take the avanced series—consult with your adviser.
Microcomputer skills, computer programming (Agricultural Systems and Environment 21, 121, Engineering 5, Computer Science Engineering 10, 15) 6-7
Physics (Physics 1A-1B or 9A-9B-9C—see option requirements).....6-12
Students are encouraged to take the avanced series—consult with your adviser.
Statistics (Statistics 13) 4

Breadth/General Education 24
Satisfaction of General Education requirements; additional units in social sciences and humanities to total 24 units.

Depth Subject Matter 24-27
Written expression (in addition to college requirement), (English 101, 104) 3-4
Agricultural and Resource Economics 147 or 148 3-4
Environmental and Resource Sciences 131...3
Soil Science 100 4
Hydrologic Science 100 or Environmental and Resource Sciences 121.....3-5
Social-political awareness (Environmental Studies 161, 179; Environmental Toxicology 138, Geography 161, Geology 134, Wildlife, Fish and Conservation Biology 154).....3-4
Plant or animal ecology (Entomology 104, Environmental Studies 100, Plant Biology 117, Plant Science 101, Zoology 125) 3-4

Areas of Specialization (choose one)

Air Resource Option **.....34**
Directed towards a general understanding of the atmosphere as a finite resource and of environmental problems currently faced by humankind. The option provides a broad understanding of the physical and chemical properties of the atmosphere, including the impacts of air pollution and global climate change. Employment opportunities include positions within federal, state, and county agencies concerned with environmental quality and with private companies.

Atmospheric Science 30, 60, 110, 124, 133 17
Atmospheric Science 192 (Internship).....3
Environmental Studies 110.....4
Environmental and Resource Science 131...3
Geography 116 4
Additional electives (Environmental Studies 116, Geography 115, Environmental and Resource Sciences 103).....3
Unrestricted electives (to total 180) 19-34

Environmental Resources Option **.....39-43**
For the general study of the physical, chemical and biological features of renewable natural resources, and the economic and social considerations associated with their use, protection and management. For those who plan careers associated with resource utilization and management, and those pursuing postbaccalaureate, academic, or professional training.

Statistics (Agricultural Systems and Environment 120, Environmental Studies 123) 3-4
Environmental and Resource Sciences 192...3
Upper division resource-oriented courses chosen in consultation and with approval of adviser 18-24
Environmental and Resource Sciences upper division breadth courses (choose from three of the following areas).....9-12
Agricutural economcs, agronomy and range science, animal science, botany, agricultural engineering, civil and environmental engineering, economics, environmental horticulture, environmental studies, environmental toxicology, geography, geology, plant science, range management, environmental and resource science, soil science, water science, wildlife, fish and conservation biology, and zoology.

Unrestricted electives (to total 180) 10-29

Energy Systems Option **.....28**
Provides a general, semi-technical appreciation of the roles and importance of energy conversion systems to industrial societies and the associated environmental (physical-biological) impacts of existing technologies. Appropriate preparation for careers with utilities, monitoring and environmental quality agencies.

Environmental Studies 1, 126, 167, 169 (select three courses) 12
Atmospheric Science 131 4
Environmental and Resource Sciences 3 3
Environmental and Resource Sciences 103...3
Environmental and Resource Sciences 192 (Internship).....3

Unrestricted Electives 25-40

Hydrobiology Option **.....32-35**
Training in the biological aspects of water resources focusing on the understanding and protection of polluted and unpolluted water systems; the structure, function, and principles of aquatic systems. Graduates may seek employment with state and federal agencies such as Water Resources Control Board, Department of Fish and Game, Department of Water Resources, or consulting firms concerned with environmental impacts.

Hydrologic Science 122, 122L.....5
Plant Biology 118 4
Entomology 116 5
Wildlife, Fish and Conservation Biology 120, 120L 4
Hydrologic Science 134 or 136.....3
Hydrologic Science 192 (Internship) 3
Additional electives (Environmental Studies 123, 151 and 151L, Environmental Toxicology 101, Hydrologic Science 21, 141, Wildlife, Fish and Conservation Biology 153).....6-10

Unrestricted Electives (to total 180).....18-36

Land and Water Management Option**.....24-28**
A broad background in management of soil and water resources in both natural and agricultural ecosystems. Emphasis on analysis of soils and plants for estimating crop nutrient requirements and principles of irrigation and drainage of agricultural land. Appropriate for those seeking employment with state and federal agencies or with agroindustry.

Soil Science 109, 118.....7
Hydrologic Science 103, 110.....6
Soil Science 192 or Hydrologic Science 192 (Internship).....3
Additional Soil Science or Hydrologic Science courses selected with adviser's approval 6-10

Unrestricted Electives 25-44

Total Units for the Major 180

Major Adviser. J. Stasulat (South Hall).

Advising Center for the major is located in 148 Hoagland Hall (916-752-1669)**.**

Related Courses. See courses listed under Agricultural and Resource Economics, Agricultural Systems and Environment, Animal Science, Entomology, Environmental Biology and Management, Environmental Studies, Environmental Toxicology, Evolution and Ecology, Geography, Geology, Hydrologic Science, Plant Biology, Range Science, Soil Science, Wildlife, Fish and Conservation Biology.

Courses in Environmental and Resource Sciences (ERS)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 148 Hoagland Hall (916-752-1669).

Lower Division Courses

10. California: The State (3) II. Stasulat
Lecture—3 hours. Prerequisite: introductory geology or geography recommended. Introduction to geomorphology, physiography and natural resources of California. Interrelated impacts of terrain, climate and resources upon essential human activities. Analysis of the fundamental concepts and methods of inquiry guiding existing resource management policies. GE credit: SocSci.

10G. California: The State (Discussion) (1) II. Stasulat
Discussion—1 hour; brief essays. Prerequisite: course 10 concurrently. Small group discussion of topics assigned for course 10. Preparation and discussion of essays. GE credit with concurrent enrollment in course 10: Wrt.

60. Global Environmental Interactions (3) II. Southard/Nathan
Lecture—2 hours; discussion—1 hour. Prerequisite: high school algebra and biology or chemistry. Relationships among climate, hydrology, biogeochemical cycles, and vegetation distribution in diverse landscapes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator. GE credit: SciEng, Wrt.

92. Resource Sciences Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

103. Renewable Energy Resource (3) II. Flocchini
Lecture—3 hours. Prerequisite: course 3. Characteristics of solar energy; energy balance of structures; analysis of systems for heating water and air; air conditioning systems; electricity from the sun; biomass conversion; wind power.

*Course not offered this academic year.

121. Water and Society (3) I. Silk
Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10 or Geology 1. The role of water as an essential natural resource in contemporary society. Aspects of the scientific method, including descriptions of natural phenomena, measurement techniques, and predictive models. Supply and use of water for municipalities, agriculture, industry, wildlife and recreation. GE credit: SciEng, Wrt.

131. Air as a Resource (3) II. Flocchini
Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 10. Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. GE credit: SciEng, Wrt.

136. Chemistry of the Hydrosphere (3) III. Tanji
Lecture—3 hours. Prerequisite: Chemistry 2B and an upper division course in soil science, hydrologic science, geology, or limnology. Chemical characteristics of water in the hydrologic cycle. Understanding processes and conditions regulating chemical composition of natural waters with particular emphasis on dissolved mineral constituents. Not open for credit to students who have completed Water Science 180 or Hydrologic Science 136. (Former course Hydrologic Science 136.)

144. Trees and Forests (3) I. Barbour, Berry, Bledsoe, DeJong
Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity and agroforestry. (Former course 106.) (Same course as Plant Biology 144/Environmental Horticulture 144.)

186. Environmental Remote Sensing (3) II. Ustin
Lecture—3 hours. Prerequisite: upper division course in soil science, hydrologic science, environmental studies, or the plant sciences. Overview of satellite, airborne, and ground-based remote sensing. Building on properties of EM Radiation, isotropic and non-isotropic scattering and absorption, examines applications in hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry, and agriculture. Not open for credit to students who have taken Hydrologic Science 186. (Former course Hydrologic Science 186.)

192. Resource Sciences Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

194H. Senior Honor Thesis (2-6) I, II, III. The Staff
Independent study. Prerequisite: senior standing, overall GPA of 3.25 or higher and consent of master adviser. Two or three successive quarters of guided research on an environmentally related subject of special interest to the student. (Deferred grading only, pending completion of thesis.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Environmental Biology and Management

(College of Agricultural and Environmental Sciences)

Faculty

See under the Division of Environmental Studies.

The Major Program

The environmental biology and management major offers an education in the basic natural sciences, especially ecology, together with a set of management and public policy analysis courses. Students completing the program will understand the scientific basis for environmental decision making, and the legal, economic, and political issues involved in management of the environment in the United States and worldwide.

The Program. Courses in chemistry, physics, mathematics, biology, and earth sciences form the foundation of the curriculum; these are then tied together by courses in ecology. Computing, statistics, and other methods courses give the student basic quantitative research skills. Economics, political science, and techniques of quantitative management offerings dominate the management and public policy requirements.

A moderate degree of specialization is permitted in three upper division options. Students in the *Conservation Biology and Management* option take courses in conservation biology, genetics, evolution and biogeography, resource economcs, environmental policy making, quantitative analysis and field experience. The emphasis of this option is the study of biological diversity and the natural and human processes that control it. Key areas of the option include the design of nature reserves, the management of small populations of endangered species, environmental law, policy and economics.

Students in the *Environmental Biology* option take course work in population ecology, physiology, and other biological specialities, as well as quantitative analysis.

Students in the *Environmental Management* option take courses in recreation, resource economics, planning and public policy, and, especially, quantitative management techniques. This option emphasizes the management of public lands and natural resources in wildland and rural areas. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative approaches should examine the Environmental Policy Analysis and Planning major.

Career Alternatives. The major prepares students to enter careers in management of natural resources and public lands, as well as basic ecological research. Students interested in professional schools, e.g., medicine, should consult an adviser early to plan for their special requirements, such as organic chemistry. Graduates who chose the Environmental Biology option are prepared for graduate or professional training and, eventually, careers working for public agencies and private firms specializing in environmental quality, natural resources, or ecological research. Graduates with the Environmental Management option are prepared for jobs in public agencies at the federal, state, or local levels.

B.S. Major Requirements:

(The *usual* courses taken to satisfy requirements are shown in parentheses. Equal or more comprehensive courses may be taken with the adviser's written approval. *Courses shown without parentheses are required.*) Students are required to plan their course selection with their adviser.

UNITS

English Composition Requirement.....6-15
See College requirement 0-8
Additional English (English 102 concurrently with Environmental Studies 1).....3
Oral expression (Rhetoric and Communication 1 or Dramatic Art 10).....3-4

Preparatory Subject Matter.....49-54
Biological sciences (Biological Sciences 1A, 1B, 1C).....15
Chemistry (Chemistry 2A-2B or 2AH-2BH)..10
Computer science (Agricultural Systems and Environment 21, or Computer Science Engineering 10, 15, or 30).....3-4
Environmental analysis (Environmental Studies 1 or 30; choose Environmental Studies 1 if Environmental Management option is selected).....3-4
Policy analysis (Political Science 1, or Economics 1A; choose Economics 1A if Environmental Management option is selected).....4-5
Mathematics (Mathematics 16A-16B or 21A-21B).....6-8
Physics (Physics 7A-7B or 9A-9B).....8

Breadth/General Education.....12-24
Satisfaction of General Education requirement to include 12 units of humanities and/or Civilization and Culture.....12-24

Depth Subject Matter.....26-32
(These units must be taken for a letter grade attaining an overall grade-point average of 2.000 or higher.)
Ecology (Select one of Plant Biology 117, Environmental Studies 100, Evolution and Ecology 101, Wildlife, Fish and Conservation Biology 151).....3-4
Survey of environmental science, Environmental Studies 110 4
Physical processes in the environment (Select two courses from: Atmospheric Science 120, Environmental Studies 150A, Environmental and Resource Sciences 131, Geology 134, Hydrologic Science 100, 141, Soil Science 100).....6-8
Environmental Policy (Select one course from: Environmental Studies 161, 163, 166, 171, 179; Agricultural and Resource Economics 147, 175, 176) 3-4
(Choose Agricultural and Resource Economics if Environmental Management option is selected.)
Management of Public Lands, Environmental Studies 172 4
Mathematics and/or Statistics (Select one course from: Mathematics 16C, 21C, 22A, 22B, Agricultural Systems and Environment 120, Statistics 102 **OR** upper division mathematics, computing or statistics. Environmental Management students should enroll in Agricultural Systems and Environment 120, or Statistics 102 3-4
Research methods—Environmental Studies 123, 128, 178, Wildlife, Fish and Conservation Biology 100. Management students should enroll in Environmental Studies 178 3-5

Areas of Specialization.....25-38

Conservation Biology and Management Option
Conservation biology, Wildlife, Fish and Conservation Biology 154.....4
Genetics, Biological Sciences 101 4
Evolution and biogeography. Choose one from: Entomology 147, Evolution and Ecology 100, 102, 138, 147, 149, Geology 107 3-4
Resource economics, Agricultural and Resource Economics 176 or Environmental Studies 175 3
(Students must select a course which was not taken in "Depth Subject Matter.")
Environmental policy making. Choose one from: Agricultural and Resource Economics 147, Environmental Studies 161, 166, 171, 172.....3-4

(Students must select a course which was not taken in "Depth Subject Matter.")
Quantitative analysis, Environmental Studies 121 or Wildlife, Fish and Conservation Biology 122 4
Field experience. Choose from Environmental Studies 123, 124, 151L, 155L, Wildlife, Fish and Conservation Biology 100, 102...3-10
(Students may select Biological Sciences 122 or a course at an approved field station or an off-campus field biology research site.)

Environmental Biology Option
Behavioral ecology (Choose one from: Anthropology 154A, Entomology 104, Evolution and Ecology 137, Neurobiology, Physiology and Behavior 102, Psychology 150, Wildlife, Fish, and Conservation Biology 140).....3-5
Evolution and genetics (Choose one from: Biological Sciences 101, Evolution and Ecology 100, Geology 107) 3-4
Quantitative analysis (Mathematics 22A-22B, upper division mathematics or statistics) 6-8
Taxonomy, including laboratory experience (Entomology 103, Evolution and Ecology 112-112L, Plant Biology 102, 108, 116, Wildlife, Fish and Conservation Biology 110, 111, 111L, 120).....4-8
Note: Most of these courses require one or two additional chemistry or basic physiology courses as prerequisites. Plan a sequence in consultation with adviser.
Physiology, including laboratory experience. Choose from: Entomology 102, Neurobiology, Physiology and Behavior 101, Plant Biology 111, Wildlife, Fish and Conservation Biology 121 3-5
Advanced environmental biology. Choose two courses from the following: Avian Sciences 100, Environmental Studies 121, 151, 151L, 150B, 150C, 155, 155L, Evolution and Ecology 149, Hydrologic Science 122, 122L, Plant Biology 102, 117, Wildlife, Fish and Conservation Biology 100, 120, 122, 130 6-8

Environmental Management Option
Resource policy evaluation (see adviser) ...4
Microeconomics, Economics 100 or 104 or Agricultural and Resource Economics 100A.....5
Bureaucratic policy making, Environmental Studies 166, or Political Science 182....4
Environmental management, Environmental Studies 179 3
Statistical analysis, Agricultural and Resource Economics 106 or Sociology 106, or Statistics 108.....4
Management of a natural resource, choose *two* courses from *one* of the following three groups.....6-8
Animal Resources:
Agricultural Systems and Environment 135, or Wildlife, Fish and Conservation Biology 110, 111, 120, 122, 151, 154, or Environmental and Resource Sciences 101, or Environmental Studies 123.
Forest and Rangeland Resources:
Agricultural Systems and Environment 131, 134.
Air, Water, and Soil Resources:
Environmental and Resource Sciences 131, or Hydrologic Science 21, 103, 122, 141, or Soil Science 118, or Environmental Studies 151 and 151L, 155 and 155L.

Unrestricted Electives 20-62
Total Units for the Degree.....180

Major Adviser: J.F. Quinn *(Environmental Studies).*

Minor Program Requirements:

The faculty for Environmental Biology and Management offers a minor in Recreation for students in Landscape Architecture desiring to specialize in recreation area design; Physical Education, Psychology, Sociology, Human Development, and Community and Regional Development students wishing to work in educational and therapeutic recreation; Environmental Policy Analysis and Planning students seeking careers in public recreation policy analysis and management; Agricultural and Managerial Economics students wishing to go into the administration of commercial recreation enterprises; and those students in Plant Science interested in park landscape construction and maintenance.

UNITS
Recreation 18-20
Resource economics (Agricultural and Resource Economics 147, 176, Economics 123).....3-4
Urban recreation programs, (Environmental Planning and Management 134) 3-4
Recreation policy analysis (see adviser).....4
Recreation administration, (Agricultural and Resource Economics 112, Community and Regional Development 163, 170, Political Science 183, 189.....4
Internship in Recreation Management, Environmental Studies 192 4

Minor Adviser. R.A. Johnston *(Environmental Studies).*

Courses in Environmental Biology and Management

Questions pertaining to courses in Environmental Biology and Management should be directed to the Environmental Biology and Management advising office, 2134 Wickson Hall. See also Environmental Planning and Management listing following Environmental Horticulture.

Environmental Design

(College of Agricultural and Environmental Sciences)
JoAnn Stabb, M.A., Chairperson, Design Program
Mark Francis M.L.A., Chairperson, Landscape Architecture Program
Department Office, 142 Walker Hall (916-752-6223)

Faculty. See faculty listings under Design and Landscape Architecture.

Programs of Study. See the undergraduate majors in Design and Landscape Architecture and the graduate program in Textile Arts and Costume Design (information pertaining to Textile Arts and Costume Design graduate courses is listed under the Design major).

Related Courses. See Design and Landscape Architecture course lists.

Environmental Geology

(College of Letters and Science)

The minor in Environmental Geology examines the multidisciplinary factors of geology and related earth science fields, and planning and resources oriented programs.

Students in the minor are encouraged to participate in internship programs that assist them in solidifying the Environmental Geology minor with their Geology major or other major field areas that include geologic components.

The minor is sponsored by the Department of Geology, 174 Physics/Geology Building.

Minor Program Requirements:

UNITS
Environmental geology 23-25
Geology 130, 134, and Geography 106 ...10
Soil Science 118.....4
Hydrologic Science 141 or Civil and Environmental Engineering 142.....3
Two courses chosen from Environmental Studies 160, 171 or 179; Geology 135, or Geography 108; Hydrologic Science 145.....6-8

Minor adviser: R. Twiss, Department of Geology, 395 Physics/Geology Building, 752-1860.

Environmental Horticulture

(College of Agricultural and Environmental Sciences)
David W. Burger, Ph.D., Chairperson of the Department
Department Office, 140 Environmental Horticulture Building (916-752-0130)

Faculty

Michael G. Barbour, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Alison M. Berry, Ph.D., Associate Professor
David W. Burger, Ph.D., Associate Professor
Don J. Durzan, Ph.D., Professor
Richard Y. Evans, Ph.D., Lecturer
Seymour M. Gold, Ph.D., Professor
James A. Harding, Ph.D., Professor
J. Heinrich Lieth, Ph.D., Associate Professor
Patricia A. Lindsey, Ph.D., Lecturer
James D. MacDonald, Ph.D., Professor *(Plant Pathology)*
Carolyn Napoli, Ph.D., Assistant Professor
Michael P. Parrella, Ph.D., Professor *(Entomology)*
Michael S. Reid, Ph.D., Professor
Lin L. Wu, Ph.D., Professor

Emeriti Faculty

Thomas G. Byrne, M.S., Lecturer Emeritus
Richard W. Harris, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Charles E. Hess, Ph.D., Professor Emeritus
Anton M. Kofranek, Ph.D., Professor Emeritus
Andrew T. Leiser, Ph.D., Professor Emeritus
John H. Madison, Jr., Ph.D., Professor Emeritus
Jack L. Paul, Ph.D., Professor Emeritus
Roy M. Sachs, Ph.D., Professor Emeritus

Affiliated Faculty

Thomas Ledig, Ph.D., Lecturer
Greg McPherson, Ph.D., Lecturer
Truman P. Young, Ph.D., Lecturer

The Program. Students of Environmental Horticulture learn how plants improve the environment and the quality of our lives. Plants are used to revegetate and restore disturbed landscapes, control erosion, and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, and commercial sites is an important aspect of the study of environmental horticulture.

Students interested in Environmental Horticulture can obtain a B.S. degree and may in specialize in Floriculture/Nursery Management, Urban Forestry, or Landscape Horticulture. Students can develop an individual major with the help of an Environmental Horticulture faculty adviser and approval of the College's Individual Major Committee. A minor in Environmental Horticulture is available to students in other majors.

*Course not offered this academic year.

Career Alternatives. Opportunities in this field include growing and/or managing plants in a variety of settings, consulting as an urban horticulturist, business ownership, working for public agencies or private landscape firms/corporations, park management and landscape contracting. Students are encouraged to develop internships on or off campus to augment their activities in the classroom and laboratory.

Related Undergraduate Programs and Graduate Study. See the undergraduate majors in Environmental Horticulture and Urban Forestry, Agricultural Systems and Environment, and Environmental Biology and Management; and for graduate study, refer to the Graduate Studies section.

Related Courses. See Plant Science.

Minor Program Requirements:

	UNITS
Environmental Horticulture	**22-24**
Environmental Horticulture 6	3
Plant Biology 171	4
Environmental Horticulture 105 or 107	4
Select two courses from Environmental Horticulture 125, 130, 133	7-9
Environmental Planning and Management 110 or 134	4

Minor Advisers: J.A. Harding or D.W. Burger.

Courses in Environmental Horticulture (ENH)

Lower Division Courses

1. Introduction to Environmental Horticulture/Urban Forestry (3) I. Burger
Lecture—3 hours. Introduction to the use of plants to enhance the physical, visual and social environment. The use of ecological principles in developing sustainable, low maintenance landscape systems will be presented. Career opportunities will be discussed. GE credit: SciEng, Wrt.

6. Introduction to Environmental Plants (3) I. The Staff
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Introduction to the classification, nomenclature, and variation of environmental plants. The use of floral and vegetative characteristics and terminology to key unknown plants. Characteristics of plant groups and the development and maintenance of cultivars. Identification of 150 common landscape plants.

***10. Landscape Horticulture for the Home and Community** (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing, Biological Sciences 1C or Plant Biology 12, and consent of instructor. Work experience off or on campus in flower and nursery crop production, and marketing, landscape horticulture, and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

100. Urban Forestry (3) I. McPherson
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C, Agricultural Systems and Environment 2. Principles and practices of planning and managing urban vegetation. The basics of tree appraisal, natural resource inventory, and development of long-term urban forest management plans will be covered.

102. Physiological Principles in Environmental Horticulture (4) III. Burger
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C. Physiological principles and processes essential to floriculture, nursery crop production, turfculture and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad species range in greenhouse and extensive landscape environments.

105. Taxonomy and Ecology of Ornamental Plants (4) III. Harding
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 6 or Biological Sciences 1C. Classification and identification of exotic and native species used in the western landscape. Emphasis on plant adaptations to environmental variation, patterns of morphological diversity and phyletic relationships of plants that are important factors in the human environment.

107. Herbaceous Environmental Plants (4) III. Harding
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: introductory course in environmental plants (course 6) or in plant taxonomy (Plant Biology 108). Evolutionary relationships, hybridization, selection and cultural uses of herbaceous, environmental plant materials with emphasis on family characteristics and genetic and environmental differences. Plants are identified with the use of taxonomic keys.

120. Management of Container Media (3) I. Evans
Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 10. Principles of soil science and practices related to management of container media are taught, emphasizing appropriate use of soils and amendments, irrigation, and fertilizers. Physical and chemical properties are tested and effects of management on crops are evaluated in the laboratory.

125. Greenhouse and Nursery Crop Production (5) II. Lieth
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 2. Principles and techniques necessary for the greenhouse and nursery production of ornamental crops.

130. Turfgrass and Amenity Grassland Utilization and Management (4) III. Wu
Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: Biological Sciences 10 or Agricultural Systems and Environment 2. Utilization and management of amenity and landscape grassland systems. Emphasis on biology of grass species, ecology and culture practice of sports turf and landscape grassland systems, social and environmental benefits, environmental impact, and integrated management systems.

133. Woody Plants in the Landscape: Growth, Ecology and Management (4) II. Berry
Lecture—3 hours; laboratory—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C or the equivalent preparation in plant biology. Principles and practices of managing trees and shrubs in the urban landscape and other managed environments. Topics include woody plant form; growth response and adaptation; tree management in relation to soil, moisture, climate; plant problems.

144. Trees and Forests (3) I. Barbour, Berry, Bledsoe, DeJong
Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity and agroforestry. (Same course as Plant Biology 144/Environmental and Resource Sciences 144.)

150. Genetics and Plant Conservation: The Biodiversity Crisis (2) II. Ledig
Lecture/discussion—2 hours. Prerequisite: Biological Sciences 1C or the equivalent. Conservation of genic diversity, including how diversity is measured, why it is threatened and why protected, the process of extinction, how diversity is distributed, what to save and how to save it. Examples are drawn largely from forest tree species.

192. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units, two upper division courses in Environmental Horticulture appropriate for the internship, and consent of instructor. Work experience off or on campus in flower production and marketing, nursery crop production and marketing; landscape horticulture; and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

197T. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff
Hours and duties will vary depending on course tutored. Prerequisite: upper division standing, completed course or the equivalent being tutored, and consent of instructor. Leading discussion sections, conducting laboratory exercises or proctoring in individualized instruction format classes under faculty guidance. Weekly conferences on subject matter and instructional techniques. May be repeated once for credit if different course is tutored.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only.)

Graduate Courses

***220. Tree Biotechnology** (2) II. Durzan
Lecture—2 hours. Prerequisite: Bachelor's or Master's degree in a plant science discipline (botany, plant physiology, genetics, horticulture, related fields). Develop understanding of basic principles of biotechnology of woody perennials. Cell and tissue culture methods and current process control problems are emphasized. Recombinant DNA methods covered where appropriate. Develop analytical evaluation skills. Review trends in commercialization.

241. Analysis of Horticultural Problems (3) III. The Staff
Lecture—1 hour; laboratory—6 hours. Prerequisite: a B.S. degree (or the equivalent) in Plant Science or consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, insects, pathogens, chemical agents, climatic conditions and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods for confirmation. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which include plant morphogenesis, floriculture, greenhouse production and modeling, landscape plant ecology, arboriculture, turf culture, post harvest, plant breeding, etc. (S/U grading only.)

290C. Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: students in a plant science graduate program. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which includes plant morphogenesis, floriculture, greenhouse production, landscape plant ecology, arboriculture, turf culture, post harvest, and plant breeding related to environmental horticulture. (S/U grading only.)

297T. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff (Chairperson in charge)
Tutoring—4-8 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and/or consent of instructor. Leading discussion sessions, conducting laboratory exercises, and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conference on subject matter and instructional techniques. May be repeated for credit by tutoring in different courses.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (S/U grading only.)

Courses in Environmental Planning and Management (ENP)

Questions pertaining to the following courses should be directed to the instructor.

Upper Division Courses

110. Urban and Regional Planning (4) II. Gold (Environmental Horticulture)
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: upper division standing. The history, nature, scope and significance of planning in America, with emphasis on basic definitions and concepts, the planning process and comprehensive plan, significant problems and potentials, design alternatives, the future, innovation, and the profession.

134. Recreation Planning (4) III. Gold
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: courses 110, 116. Description of basic concepts, principles, techniques and methods used to prepare park, recreation, and open space plans for urban environments.

Environmental Horticulture and Urban Forestry

(College of Agricultural and Environmental Sciences)

Faculty

See under Department of Environmental Horticulture.

The Major Program

Students majoring in Environmental Horticulture and Urban Forestry learn how plants improve the environment and the quality of our lives. The major focuses on the biological and physical concepts and horticultural principles of plant production, management of plants and plant ecosystems in landscape settings and sociological aspects of plant/people interactions in the urban environment. Plants are used to revegetate and restore disturbed landscapes, control erosion and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, interiorscapes and commercial sites is an important aspect of this major. Students may select one of the following four areas of specialization: Urban Forestry, Floriculture/Nursery, Landscape Management/Turf, or Plant Biodiversity.

Internships and Career Opportunities. Students are encouraged to develop internships on or off campus to augment their activities in the classroom and laboratory. Internships are available with the department's greenhouse facility, the UC Davis Arboretum, landscape designers, government agencies or regional nurseries. Career opportunities in this field include growing and/or managing plants in a variety of settings, consulting as an urban horticulturist, business ownership, working for public agencies or private landscape firms/corporations, park management and landscape contracting.

B.S. Major Requirements

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses listed without parentheses are required.*)

UNITS

English Composition Requirement 0-8
See College Requirement

Preparatory Subject Matter 59-66
Environmental Horticulture 1 and 6 6
Landscape Architecture 40 3
Soil Science 10 3
Biological sciences (Biological Sciences 1C or Agricultural Systems and Environment 2) 4-5
Physical sciences (Chemistry 2A and Chemistry 2B and Physics 10) 14
Agricultural sciences (Agricultural Systems and Environment 22 or Plant Biology 12) 3-4
Resource sciences (Select two courses from Atmospheric Science 5; Environmental and Resource Sciences 3, 10, 60; Geography 1; Geology 50; Hydrology 21) ..6-8
Environmental sciences (Environmental Studies 1 or 10, and 30) 7
Social sciences (Select two courses from Geography 2, Nature and Culture 1, Psychology 1, Sociology 1 or 2) 7-9
Quantitative skills (Agricultural Systems and Environment 21 and either Mathematics 16A or Statistics 13) 6-7

Depth Subject Matter 40-44
Plant physiology (Environmental Horticulture 102) 4
Resource sciences (Select two courses from Environmental Horticulture 144, Environmental and Resource Sciences 103, 121, 131) 6
Social sciences and planning (Select three courses from Anthropology 133, Environmental Planning and Management 110, 134 or Environmental Studies 171, Nature and Culture 100, Political Science 100, 107, Psychology 144) 4
Plant systematics (Environmental Horticulture 105 or Plant Biology 102 or 108) 4-5
Pest management (Entomology 110, Plant Pathology 120) 9
Internship, Environmental Horticulture 192 (minimum of 3 units) 3

Areas of Specialization (Choose One)

Urban Forestry Option **22**
Environmental Horticulture 100, 130, 133...11
Landscape Architecture 155 3
Evolution and Ecology 121 4
Geography 155 4

Floriculture / Nursery Option **22**
Plant Biology 142, 171 8
Environmental Horticulture 120, 125 8
Entomology 135 4
Applied Biological Systems Technology 165 2

Landscape Management / Turf Option **21**
Environmental Horticulture 130, 133 8
Plant Pathology 125 4
Applied Biological Systems Technology 165 2
Landscape Architecture 155 3
Evolution and Ecology 117 4

Plant Biodiversity Option **19-26**
Select two courses from Plant Biology 102, 108, 116, Wildlife, Fish and Conservation Biology 156 8-10
Select two courses from Environmental Horticulture 144, Environmental Studies 155, Evolution and Ecology 117, 121, Plant Biology 121 6-8
Environmental Horticulture 107 or 150, or Evolution and Ecology 100 2-4
Agricultural Systems and Environment 130 or 150, or Landscape Architecture 153, or Wildlife, Fish, and Conservation Biology 103 3-4

Unrestricted Electives 26-60

Total Units for the Major 180

Major Advisor. J.A. Harding.

*Course not offered this academic year.

Environmental Planning and Management

See Environmental Biology and Management; Environmental Horticulture; and Environmental Horticulture and Urban Forestry

Environmental Policy Analysis and Planning

(College of Agricultural and Environmental Sciences)

The Major Program

The major in environmental policy analysis and planning develops an understanding of governmental policy-making and skills for analyzing policy in fields related to environmental quality.

Any student in good standing is eligible to transfer to the EPAP major; to do so, please see the major adviser, S.I. Schwartz (2140 Wickson Hall) or staff adviser, D. DuMont (2134 Wickson Hall).

The Program. This major provides students with a general background in the natural sciences relevant to environmental policy. It also provides sufficient training in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options. A strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation is included. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water pollution control, or energy.

Career Alternatives. Environmental policy analysis and planning graduates are prepared for employment in public agencies, consulting firms, and businesses concerned with environmental affairs. The major is also excellent preparation for students who want to go on to graduate work in law, planning, public policy, or management.

B.S. Major Requirements:

(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 10-11
See College requirement 0-8
Additional English (English 102 concurrently with Environmental Studies 1) 3
Oral expression (Rhetoric and Communication 1 or Dramatic Art 10) 3-4

Preparatory Subject Matter 51-58
Biological sciences (Biological Sciences 1A or 10) 4-5
Chemistry (Chemistry 2A, 2B) 10
Computer science (Agricultural Systems and Environment 21, Engineering 5, Computer Science Engineering 10, 30) 3-4
Economic principles (Economics 1A, 1B) ..10
Environmental science/agriculture (Animal Science 1, Biological Sciences 1B, Geology 1, Hydrologic Science 100, 124, Plant Biology 12, Soil Science 100) 3-5
Environmental studies (Environmental Studies 1) 4

Mathematics (Mathematics 16A-16B or 21A-21B) 6-8
Physics (Physics 1A).....3
Political science (Political Science 1).....4
Statistics (Statistics 13, 32).....3-4

Breadth/General Education.....6-24
Satisfaction of General Education requirement

Depth Subject Matter 37-40
(Students must take these units on a letter grade basis, and must attain an overall grade-point average of 2.000 or higher in the Depth Subject Matter courses.)
Environmental Studies 110, 160, 164, 166, 168A.....21
Environmental Studies 161, 173, or Hydrologic Science 150 3-4
Environmental Studies 171 or 179 3-4
Research methods, Environmental Studies 178 or Sociology 103, 106 or Agricultural and Resource Economics 106 or Statistics 108 7-8
Economic analysis, Economics 100 or 104 or Agricultural and Resource Economics 100A; and Agricultural and Resource Economics 176 7-8

Areas of Specialization (choose one) 17-23

Advanced Policy Analysis Option
Political institutions (Political Science 102, 105, 108, 155).....4
Political behavior (Political Science 164, 165, 170).....4
Science policy (Environmental Studies 165)..4
Policy evaluation research (Environmental Studies 168B).....4
Policy evaluation (Civil and Environmental Engineering 153, 160, Agricultural and Resource Economics 155, Economics 130).....3-4

City and Regional Planning Option
Urban design (Art History 168, Environmental Planning and Management 110; Landscape Architecture 40 recommended) 3-4
Urban geography (see adviser).....4
Transportation planning (Civil and Environmental Engineering 160).....3
Environmental impact assessment (Soil Science 118, Environmental Studies 179) 3-4
Urban economics (see adviser).....4
Urban politics (Political Science 102, 100)...4
(Enroll for Environmental Studies 173 for law requirement under Depth Subject Matter above.)

Energy Policy Option
Environmental health (Environmental Studies 126, Environmental Toxicology 101) 4
Nuclear hazards (see adviser).....3
Energy technology (Engineering 160, 162)..4
Solar energy (Environmental and Resource Sciences 103) 3
Economics of energy (Environmental Studies 175) 4
Energy policy (Environmental Studies 167)...4

Environmental Science Option
Students choosing the Environmental Science area of specialization must consult with a faculty adviser to identify an emphasis within this specialization and to select suitable courses. Possible areas of emphasis are: biological conservation, pollutants in the environment, ecology, planning in the presence of environmental hazards. If you are considering this area of specialization, please contact the major adviser as soon as possible.

Recreation Policy Option
Internship in Recreation Management, Environmental Studies 192 4
Public Land Management, Environmental Studies 172 4
Urban recreation programs (Environmental Planning and Management 134, Physical Education 150).....3-4
Recreation policy analysis (see adviser) 4
Recreation administration (Agricultural and Resource Economics 112, Applied Behavioral Science 163, 170, Political Science 183, 189) 4

Transportation Planning Option
Urban structure (Economics 125 or see adviser) 4
Transportation planning (Civil and Environmental Engineering 160).....3
Transportation engineering and analysis (Civil and Environmental Engineering 161, Environmental Studies 168B).....3-4
Energy policy (Environmental Studies 167, Engineering 160).....4
Air quality (Environmental and Resource Sciences 131) 3
Energy and environmental aspects of transportation (Environmental Studies 163)...3

Water Quality Option
Water resource management (Environmental Studies 126, Environmental Toxicology 101, Geography 162).....4
Water pollution (Hydrologic Science 21, Soil Science 120).....2-3
Freshwater systems (Hydrologic Science 122, Environmental Studies 151) 3-4
Field and laboratory methods (Hydrologic Science 122L, Environmental Studies 151L).....2-3
Water chemistry (Hydrologic Science 113, 136).....3-4
Hydrology (Hydrologic Science 141).....3
(Enroll in Hydrologic Science 150 for law requirement under Depth Subject Matter above.)

Unrestricted Electives 24-59
Total Units for the Degree.....180

Major Adviser. S.I. Schwartz *(Environmental Studies).*

Minor Program Requirements

The faculty for environmental policy analysis and planning offers the following two minors. The Energy Policy minor is for students from any major seeking basic training in energy technology, impacts and policy analysis methods applied to energy systems. The second minor is for natural and social science students desiring basic training in policy analysis theory and methods.

UNITS

Energy Policy 18-19
Preparation: Economics 1A; basic course in political science.
Environmental and Resource Sciences 3 or Engineering 160.....3-4
Environmental Studies 126 or Environmental Toxicology 101 4
Environmental and Resource Sciences 103 or Environmental Studies 115.....3
Environmental Studies 175.....4
Environmental Studies 167 or Political Science 171 4

UNITS

Environmental Policy Analysis 23-24
Preparation: Economics 1A; basic course in political science.
Environmental Studies 110, 160, 161, 166, 168A.....20
Environmental Studies 171 or 179 3-4

Minor Adviser. S.I. Schwartz *(Environmental Studies).*

Environmental Studies

(Intercollege Division)

Alan M. Hastings, Ph.D., Chairperson of the Division

Division Office, 2132 Wickson Hall (916-752-3026)

Faculty

Theodore C. Foin, Jr., Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Charles R. Goldman, Ph.D., Professor
Susan P. Harrison, Ph.D., Associate Professor
Alan M. Hastings, Ph.D., Professor
Jack D. Ives, Ph.D., Professor
Robert A. Johnston, M.S., Professor
David F. Layton, Ph.D., Assistant Professor
Benjamin S. Orlove, Ph.D., Professor
James F. Quinn, Ph.D., Professor
Eliska Rejmankova, Ph.D., Associate Professor
Peter J. Richerson, Ph.D., Professor
Paul A. Sabatier, Ph.D., Professor
Thomas W. Schoener, Ph.D., Professor *(Evolution and Ecology)*
Seymour I. Schwartz, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Daniel Sperling, Ph.D., Professor *(Environmental Studies, Civil and Environmental Engineering)*
Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor *(Environmental Studies, Political Science), Academic Senate Distinguished Teaching Award*
Marcia Weinberg, Ph.D., Assistant Professor

Emeriti Faculty

William J. Hamilton III, Ph.D., Professor Emeritus

Affiliated Faculty

Christine Schonewald, Ph.D., Associate Adjunct Professor

The Program of Study

The intercollege Division of Environmental Studies is a teaching and research unit offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The division offers Bachelor of Science degrees in Environmental Biology and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Studies also supplement major programs in a wide variety of established disciplines, although highly motivated undergraduates who find existing majors unsuited to their educational objectives are encouraged to contact the chairperson and faculty of the division regarding individual majors in the College of Agricultural and Environmental Sciences (see Individual Major in the Programs and Courses section).

Current Information. Through its continuing contacts with many other departments and teaching divisions on the campus, the division develops each year a variety of special courses and workshops that cannot be listed here. Students are advised to check with the Division Office and with the expanded course description handbook of the College of Agricultural and Environmental Sciences for up-to-date information about courses.

Graduate Study. The faculty of the division offers graduate instruction through the M.S. and Ph.D. degree programs of the Graduate Group in Ecology, as well as through the graduate programs of the disciplines with which they are associated, such as agricultural and resource economics, evolution and ecology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecology should be obtained from the chairperson of the Graduate Group in Ecology.

Graduate Adviser. J. Henier Lieth *(Ecology).*

Courses in Environmental Studies (EST)

Lower Division Courses

1. Environmental Analysis (4) II. Weinberg and staff
Lecture—3 hours; discussion—1 hour. Prerequisite: English 1; English 102, Economics 1A, 1B, Biological Sciences 1A, and Political Science 1 recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems, such as food production, energy development and conservation, pollution, and the conservation of natural environments. Emphasis on analysis of problems and the consequences of proposed solutions.

10. Introduction to Environmental Studies (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems. Not open for credit to students who have taken course 1. GE credit: SciEng, Wrt.

30. The Global Ecosystem (3) III. Richerson
Lecture—3 hours; 1 one-day field trip. Prerequisite: Biological Sciences 10 or Geography 1 or Anthropology 2. The interaction of climate and biotic adaptation and the production of ecological systems. The limits and opportunities for human use of different natural environments, and human utilization of the earth's biotic resources. GE credit: SciEng.

30G. The Global Ecosystem: Laboratory/Discussion (2) III. Richerson
Laboratory/discussion—3 hours. Prerequisite: course 30 concurrently. Presents natural history skills in plant and animal identification, soils, and geology. Emphasis on the diverse organisms and habitats of Northern California. GE credit with concurrent enrollment in course 30: Wrt.

92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

100. General Ecology (4) I. Harrison
Lecture—3 hours; discussion—1 hour. Prerequisites: Biological Sciences 1A, 1B, 1C, Mathematics 16A, 16B; Statistics 13 recommended. Theoretical and experimental analysis of the distribution, growth and regulation of species populations; predator-prey and competitive interactions; and the organization of natural communities. Application of evolutionary and ecological principles to selected environmental problems.

101. Human Ecology (4) II. Richerson, Mulder
Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 30, Anthropology 1, 2, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.) GE credit: SocSci, Div.

(a) Environmental Science

110. Principles of Environmental Science (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 5A, Mathematics 16B or 21B, and Biological Sciences 1A. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.

116. The Oceans (3) I. Spero; II. Cowen
Lecture—3 hours. Introductory survey of the marine environment; oceanic physical phenomena, chemical constituents, geological history, the sea's biota, and utilization of marine resources. (Same course as Geology 116.) GE credit: SciEng.

116G. The Oceans: Discussion (2) I. Spero; II. Cowen
Discussion—2 hours. Prerequisite: course 116/Geology 116 concurrently. Scientific method applied to the discovery of the processes, biota, and history of the oceans. Group discussion and preparation of papers on related topics. (Same course as Geology 116G). GE credit with concurrent enrollment in course 116: Wrt.

(b) Ecological Analysis

121. Population Ecology (4) II. Hastings
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B, 1C, Mathematics 16A-16B. Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and solve problems. Offered in alternate years. GE credit: SciEng, Wrt.

123. Introduction to Field and Laboratory Methods in Ecology (4) III. Quinn
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100 or the equivalent, Statistics 102 or the equivalent. Introduces students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists; emphasis on experimental design, scientific writing and data analysis.

124. Marine and Coastal Field Ecology (10) Extra-session summer. Chow
Lecture—6 hours; discussion—4 hours; seminar—1 hour; laboratory—18 hours (Summer Session I). Prerequisite: Biological Sciences 1A; Statistics 13; course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current ecological theory and problems with emphasis on marine populations and communities; techniques and evaluation of quantitative field research.

126. Environmental and Occupational Epidemiology (4) I. Beaumont
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in statistics and upper division standing. Methods and contemporary issues in environmental and occupational epidemiology. Effects of carcinogens, reproductive hazards, lifestyle factors, air and water pollution, infectious agents, and other hazards on human populations. Discussion of epidemiologic study designs, biases, and risk assessment.

***128. Analysis and Simulation of Complex Systems** (3) III. Foin
Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; Statistics 102; upper division standing in the biological or social sciences. Analysis of systems and construction of simulation models of ecological and socioeconomic systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

***128L. Modeling Complex Systems** (3) III. Foin
Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: course 128 concurrently. Simulation modeling using DYNAMO. Students complete a series of exercises from model formulation to model experiments and develop a term project of their own choosing.

(c) Cultural Ecology

133. Cultural Ecology (4) III. Orlove
Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Anthropology 133.) GE credit: SocSci, Div, Wrt.

***140. Mountain Geoecology I (Physical Geography)** (3) II. Ives
Lecture—3 hours. Prerequisite: introductory course in physical geology (Geology 50 or the equivalent); ecology (course 100); or consent of instructor. Broad overview of world mountain systems, including tectonics and structure, climate and vegetation, geomorphic processes and natural hazards. Will integrate relevant sections of cognate disciplines to focus on three-dimensional character of mountain regions—a physical geography of mountains.

***141. Mountain Geoecology II (Human Geography)** (3) III. Ives
Lecture—3 hours. Prerequisite: course 140 or consent of instructor. Analysis of traditional adaptations of mountain cultures to their habitats; resource use and environmental degradation; tourism impacts and Third World development issues. Emphasis on Himalaya; also Andes, Alps and Rocky Mountains, provide historical perspective and discussion of current environmental crises.

(d) Aquatic Ecosystems Analysis

150A. Physical and Chemical Oceanography (4) I. McClain, Spero
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 9B, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geo-chemical cycles. (Same course as Geology 150A.)

150B. Geological Oceanography (3) II. McClain (Geology)
Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 150B.)

150C. Biological Oceanography (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology, or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use of and impact on the ocean. (Same course as Geology 150C.) Offered in alternate years.

151. Limnology (4) III. C. Goldman
Lecture—3 hours; discussion—1 hour; special project. Prerequisite: Biological Sciences 1A and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3) III. C. Goldman
Laboratory—6 hours; two weekend field trips. Prerequisite: course 151 (may be taken concurrently); junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

155. Wetland Ecology (3) I. Rejmankova
Lecture—3 hours. Prerequisite: course 100 or Botany 117; course 110 or 151 recommended. Introduction to wetland ecology. The structure and function of major wetland types and principles that are common to wetlands and that distinguish them from terrestrial and aquatic ecosystems.

155L. Wetland Ecology Laboratory (3) I. Rejmankova
Lecture—1 hour; laboratory—6 hours; fieldwork—two 1-day weekend field trips. Prerequisite: course 155 required (may be taken concurrently). Modern and classic techniques in wetland field ecology. Emphasis on sampling procedures, vegetation analysis, laboratory analytical procedures, and examples of successful wetland restoration techniques.

*Course not offered this academic year.

(e) Environmental Policy Analysis

160. Environmental Decision Making (4) II. Sabatier
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, intermediate statistics, course 1 and course 166 or Political Science 182; upper division standing or consent of instructor. Alternative models of environmental policymaking, and application to case studies of decision making in the U.S. and California.

161. Environmental Law (4) II. Wandesforde-Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science (course 1, 10, 110, Biological Sciences 1A, Environmental Toxicology 10, or Resource Sciences 100); English 1 and Political Science 1 recommended. Introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. GE credit: SocSci, Wrt.

163. Energy and Environmental Aspects of Transportation (3) II. Sperling
Lecture—3 hours. Prerequisite: Civil and Environmental Engineering 160 recommended. Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (Same course as Civil and Environmental Engineering 163).

164. Ethical Issues in Environmental Policy (3) III. Sabatier
Lecture—3 hours. Prerequisite: courses 160, 168A; seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policymaking.

***165. Science, Experts and Public Policy** (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 160 or Political Science 108 recommended. Analysis of factors affecting the influence of scientists, planners, and other experts in policymaking. Several cases and controversies will be examined.

166. Policymaking in Natural Resource Agencies (4) I. Wandesforde-Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, Statistics 13. Analysis of factors affecting decisionmaking within administrative agencies responsible for managing natural resources, such as the Forest Service and EPA. Emphasizes critical examination of written materials. GE credit: Wrt.

***167. Energy Policy** (4) I. The Staff
Lecture—4 hours. Prerequisite: Resource Sciences 3 or Engineering 160; course 160 or Political Science 101, 107, or 109. Overview of U.S. energy policy; policy analysis, philosophy and methods; major policy issues, such as renewable vs. nonrenewable; and applied studies of power plants, solar residential, and state policy options. Offered in alternate years.

168A. Methods of Environmental Policy Evaluation (5) I. Schwartz
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: Statistics 13; Economics 100 or Agricultural and Resource Economics 100A; Mathematics 16B or 21B; course 1; upper division standing. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefit-cost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation.

168B. Methods of Environmental Policy Analysis (4) III. Schwartz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. Students will apply the methods and concepts by means of a major project.

(f) Environmental Planning

170. Conservation Biology Policy (4) III. Layton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Economics 1A; Economics 100 or Agricultural and Resource Economics 100A recommended. Analysis of policies designed to conserve species and their habitats. Emphasis on how individual incentives affect the success of conservation policies. Valuation of endangered species and biodiversity. Criteria for deciding conservation priorities.

171. Environmental Planning (4) III. Johnston
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; a course in social science and a course in environmental science. Laws, institutions, design and analysis methods, and means of implementation of plans for land use, air and water quality, transportation, and energy are examined. Theoretical and practical readings are used. Political and technical problems common to all planning processes emphasized.

172. Public Lands Management (4) II. Layton
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the range of resource allocations. GE credit: SocSci.

173. Land Use and Growth Controls (4) III. Johnston
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, intermediate statistics (Sociology 106 or Statistics 102 or the equivalent), and local government (Applied Behavioral Science 157, 158 or Political Science 100, 102 or 104.) Exposes students to the economic, political, and legal factors affecting land use and growth controls, and helps students critically evaluate written materials in terms of their arguments and supporting data.

175. Natural Resource Economics (3) II.
Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (groundwater, forests, fisheries and wildlife populations), and non-renewable resources (minerals and energy resources, soil). (Same course as Agricultural and Resource Economics 175.)

178. Applied Research Methods (4) I. Weinberg
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 103 or Sociology 106 or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data.

179. Environmental Impact Reporting (3) I. Johnston
Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing; Biological Sciences 1A; one course from the following: course 1, 10, 110, Environmental Toxicology 10, or Environmental and Resource Sciences 100. Methods of analysis used in environmental impact reporting. Emphasis on effective writing; review and management of impact reports in the context of rational democratic planning systems.

(g) Other Courses

190. Workshops on Environmental Problems (1-8) I, II, III. The Staff
Laboratory—2-16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Department Chair person in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

212A. Environmental Policy Process (4) III. Sabatier
Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Studies 160); environmental law (e.g., Environmental Studies 161); course in bureaucratic theory (e.g., Political Science 187 or Environmental Studies 166); course in statistics (e.g., Sociology 106 or Agricultural and Resource Economics 106). Introduction to selected topics in the policy process, applications to the field of environmental policy. Develops critical reading skills, understanding of frameworks of the policy process and political behavior, and an ability to apply multiple frameworks to the same phenomena. Offered in alternate years. (Same course as Ecology 212A.)

212B. Environmental Policy Evaluation (4) II. Schwartz
Lecture—1 hour; discussion—1 hour; seminar—2 hours. Prerequisite: intermediate microeconomics (e.g., Economics 100); Statistics 108 or Agricultural and Resource Economics 106; policy analysis (e.g., Environmental Studies 168A or the equivalent); Agricultural and Resource Economics 176. Methods and practices of policy analysis; philosophical and intellectual bases of policy analysis and the political role of policy analysis. (Same course as Ecology 212B.)

220. Tropical Ecology (3) III. Rejmankova
Lecture—2 hours; discussion—1 hour. Prerequisite: advanced introductory ecology course—course 100, Evolution and Ecology 101, 117; Evolution and Ecology 138 recommended. Open to graduate and undergraduate students who meet requirement subject to consent of instructor. An overview of present status of knowledge on structure and processes of major tropical ecosystems. Differences and similarities among tropical and temperate systems stressed. Offered in alternate years.

***228. Advanced Simulation Modeling** (3) III. Foin
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 128-128L; Statistics 108 or Agricultural and Resource Economics 106. Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models.

***228L. Modeling Laboratory** (3) III. Foin
Laboratory—2 hours; modeling and computing—7 hours. Prerequisite: courses 128-128L; course 228 concurrently. Continuation of course 128L. Students expected to complete series of exercises on advanced topics in modeling and a term project based on their graduate research.

252. Sustainable Transportation Technology and Policy (3) III. Sperling
Lecture—2 hours; discussion—1 hour. Prerequisite: course 160 or the equivalent. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. Offered in alternate years. (Same course as Civil and Environmental Engineering 252.)

278. Research Methods in Environmental Policy (3) II. Sabatier
Lecture/discussion—3 hours. Prerequisite: Agricultural and Resource Economics 106 or the equivalent. Introduction to scientific research in environmental

policy. Major issues in the philosophy of the social sciences. How to design research that acknowledges theoretical assumptions and that is likely to produce evidence in an intersubjectively reliable fashion with explicit recognition of its uncertainties. Offered in alternate years.

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (S/U grading only.)

Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Fumio Matsumura, Ph.D., Chairperson of the Department

Department Office, 4138 Meyer Hall (916-752-1142)

Faculty

M. Judith Charles, Ph.D., Assistant Professor
Michael S. Denison, Ph.D., Associate Professor
Bruce D. Hammock, Ph.D., Professor *(Environmental Toxicology, Entomology)*
Theodore L. Hullar, Ph.D., Professor
Fumio Matsumura, Ph.D., Professor
Marion G. Miller, Ph.D., Associate Professor
Robert H. Rice, Ph.D., Professor
Takayuki Shibamoto, Ph.D., Professor
Barry W. Wilson, Ph.D., Professor *(Environmental Toxicology, Avian Sciences)*
Dorothy E. Woolley, Ph.D., Professor *(Environmental Toxicology, Neurobiology, Physiology and Behavior)*

Emeriti Faculty

Richard G. Burau, Ph.D., Professor Emeritus
Donald G. Crosby, Ph.D., Professor Emeritus
Dennis P. H. Hsieh, Sc.D., Professor Emeritus
Ming-yu Li, Ph.D., Lecturer Emeritus
James N. Seiber, Ph.D., Professor Emeritus
Wray W. Winterlin, M.S., Lecturer Emeritus

Affiliated Faculty

Gary N. Cherr, Ph.D., Lecturer
Norman A. Kado, Ph.D., Assistant Adjunct Professor
Michael W. Stimmann, Ph.D., Cooperative Extension Specialist

The Major Program

Toxic agents found in the environment include pesticides, food additives, industrial waste, metals and chemicals produced by animals, plants, fungi and bacteria. Environmental Toxicology majors learn about the potential for toxicants to produce adverse effects by understanding both the environmental fate and biological activity of compounds. They learn about monitoring concentrations and the distribution and persistence of agents found in water, soil, air and foods. Toxicity testing procedures and exposure assessment are used to help signal potential for harm to humans and other species. By understanding the cellular targets and biochemical mechanisms perturbed by toxicants, toxicologists can better estimate adverse effects. Overall, the program teaches students how knowledge of the origin, fate and action of toxic agents helps toxicologists evaluate the risk of adverse effects and balance risks against the benefits of use.

The Program. Preparatory courses in biology, chemistry, mathematics, and physics are required to provide the chemical and biological principles which underlie toxicology. Students in the major are expected to understand the environmental fate and biological activity of different classes of toxic substances, and the legislative issues which arise from chemical use. Opportunities are available to develop in-depth understanding in areas of emphasis through selection of electives.

Internships and Career Alternatives. Occupations that use environmental toxicology are environmental health and safety, monitoring and field sampling, residue or forensic analysis, pest control, pharmaceutical or food additive toxicity testing and research, risk assessment and managing regulatory compliance. A substantial proportion of graduates elect to pursue advanced training in graduate or professional schools. Others with the B.S. degree have gone on to law or medical school, as well as to degrees in pharmacology, toxicology, agricultural and environmental chemistry, or public health. During undergraduate study, optional internships or research projects are recommended to provide training and work experience to help students set future goals.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible; equivalent or more comprehensive courses may be substituted with adviser's approval. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 61-69
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A-2B-2C, or 2AH-2BH-2CH and 118A-118B-118C or 128A-128B-128C).....24-27
Computer science (Agricultural Systems and Environment 21) 3
Environmental sciences (Environmental Toxicology 10 or Environmental Studies 10) 3-4
Mathematics (Mathematics 16A-16B or 21A-21B) 6-8
Physics (Physics 1A-1B or 7A-7B).....6-8
Statistics (Statistics 100) 4

Breadth/General Education 36
Satisfaction of the General Education requirement to include courses selected with adviser's approval to complement the major (courses in agricultural economics, environmental studies, political science, psychology, and sociology are particularly recommended.) 24
Additional breadth in humanities and social sciences 12

Depth Subject Matter 29-30
Genetics and/or Biochemistry (Biological Sciences 101, 102, 103) 6-7
Environmental Toxicology 101, 112A-112B, 114A-114B, 138 and (128, 130A-E, 131, 132, 135, or 146).....23

Restricted/Other Electives 24
Electives selected for area of specialization with adviser's approval.

Unrestricted Electives 13-30

Total Units for the Degree.....180

Major Adviser. M.G. Miller.

Advising Center for the major, is in 4137 Meyer Hall (916-752-1042).

Minor Program Requirements:

UNITS

Environmental Toxicology 18
Environmental Toxicology 101, 112A, 114A, 138 12
Elective courses 6 units minimum, selected from Environmental Toxicology 10, 128, 130A-E, 131, 132, 135, 146, 190, 198 and 199 (4 units combined maximum of 190, 198 and 199 with adviser approval).....6

Minor Adviser. T. Shibamoto.

Related Courses: See Atmospheric Science 149A, Environmental Studies 10, 126, 161, Hydrologic Science 21, Environmental and Resource Sciences 131, Wildlife, Fish and Conservation Biology 153.

Graduate Study. Programs of study leading to M.S. and Ph.D. degrees are available through related Graduate Groups such as Pharmacology and Toxicology, Ecology, and Agricultural and Environmental Chemistry. For information on graduate study, contact the Advising Office or the appropriate graduate adviser. Refer also to the Graduate Studies section in this catalog.

Graduate Advisers. A.R. Buckpitt, J.A. Last, M.G. Miller *(Pharmacology and Toxicology),* T. Shibamoto *(Agricultural and Environmental Chemistry).*

Courses in Environmental Toxicology (ETX)

Lower Division Courses

10. Introduction to Toxicology (3) I. Hullar
Lecture—3 hours. Open to science and non-science majors. Study of some natural and man-made toxic substances in personal, occupational, community, and global environments. Emphasis placed upon occurrence, properties, and effects of toxic substances. Biological and physical factors which alter fate of substances are described. GE credit: SciEng.

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Principles of Environmental Toxicology (3) I. Denison
Lecture—3 hours. Prerequisite: Chemistry 8B, 118B, or 128B, and Biological Sciences 1A. The fate, consequences, and assessment of toxicants in environmental and biological systems; classes of environmental toxicants discussed include pesticides, air and water pollutants, phytotoxins, mycotoxins, food-borne toxicants, and heavy metals. GE credit: SciEng.

112A. Toxicants in the Environment (3) II. The Staff
Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence their distribution and transformations; action of environmental forces which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants. GE credit: SciEng.

112B. Toxicants in the Environment (4) III. Shibamoto
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2C; course 112A; consent of instructor. Continuation of 112A. Toxic chemicals—primarily pollutants—in the environment; concepts and techniques of sampling, detecting, and measuring toxicants of current concern; collection, interpretation, and use of analytical data. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment. GE credit: SciEng.

114A. Biological Effects of Toxicants (3) II. Rice
Lecture—3 hours. Prerequisite: course 101 and Biological Sciences 102; Neurobiology, Physiology and Behavior 101 recommended. Illustrates the biological effects of toxic substances in living organisms. Topics covered include metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. GE credit: SciEng.

114B. Biological Effects of Toxicants: Experimental Approaches (4) III. Miller
Lecture/discussion—2 hours; discussion/laboratory—4 hours. Prerequisite: course 114A and consent of instructor if non-major. Illustrates basic principles of toxicology and acquaints students with laboratory techniques for evaluating potential toxicity of chemi-

*Course not offered this academic year.

cals. Continuation of course 114A. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment. GE credit: SciEng.

128. Food Toxicology (3) III. Shibamoto, Russell (Food Science and Technology)
Lecture—3 hours. Prerequisite: Biological Sciences 102 and 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128.) GE credit: SciEng.

130A-E. Selected Topics in Environmental Toxicology (3) I. II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours. Prerequisite: consent of instructor; course 101 recommended. Selected topics of current interest in environmental toxicology. Topics will vary each time the course is offered, and will emphasize such areas as the microbiology of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in food, and the safe handling of toxic substances.

131. Air Pollutants and Inhalation Toxicology (3) II. Last (Internal Medicine)
Lecture—3 hours. Prerequisite: Chemistry 8B (may be taken concurrently) or the equivalent; Biological Sciences 102 recommended. Toxicology of air pollutants in the ambient and occupational environments. Environmental fates, biological effects, air-quality criteria and standards, and pulmonary responses to these pollutants. GE credit: SciEng.

***132. Chromatography for Analytical Toxicology** (4) II. The Staff (Chairperson in charge)
Discussion—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 8B or the equivalent (may be taken concurrently); consent of instructor. Application and theory of basic chromatographic techniques such as thin-layer, gas-liquid, high-pressure liquid and column chromatography useful for analytical toxicology; residue analysis comprises one-third of course.

135. Health Risk Assessment of Toxicants (3) I. The Staff
Lecture—3 hours. Prerequisite: course 101; course 114A recommended. Current practices of health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals. GE credit: SciEng.

138. Legal Aspects of Environmental Toxicology (3) II. Stimmann
Lecture—3 hours. Prerequisite: consent of instructor; courses 10 and 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer protection, and occupational exposure to toxic substances; roles of Federal regulatory agencies; alternatives to governmental control. GE credit: SocSci.

146. Exposure and Dose Assessment (3) III. The Staff
Lecture—3 hours. Prerequisite: course 112A; course 135 recommended. The exposure component of risk assessment; specifically, the presence and/or formation of toxic substances in environmental media, their movement within and between contaminated media, and the contacts of human populations with those media. GE credit: SciEng.

190. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Selected topics presented by students, faculty, or outside speakers covering current research and instructional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (P/NP grading only.)

190C. Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

194HA-194HB. Honors Research (3-3) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing, minimum GPA of 3.25, consent of instructor. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (P/NP grading only; deferred grading pending completion of sequence.)

194HC. Honors Research (3) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-9 hours; discussion—1 hour. Prerequisite: senior standing, minimum GPA of 3.25, and consent of instructor. Continuation of course 194HA-194HB. (P/NP grading only.)

197T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge)
Hours and duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***203. Environmental Toxicants** (4) II. The Staff
Lecture—3 hours ; discussion—1 hour. Prerequisite: Chemistry 128C (or the equivalent), or Chemistry 8B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance. Offered in alternate years.

214. Mechanisms of Toxic Action (3) III. Hammock, Denison
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103 and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

220. Analysis of Toxicants (3) I. The Staff
Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

220L. Analysis of Toxicants Laboratory (2) I. The Staff
Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) II. Shibamoto
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 129C; or consent of instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentations and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students.

234. Neurophysiological Basis of Neurotoxicology (3) I. Woolley
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101 or the equivalent; basic understanding of neurophysiology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Physiology 234.)

240. Ecotoxicology (3) III. Matsumura
Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology or the equivalent, or consent of instructor. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modelling, and field research. Selected case histories are analyzed and presented in class.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S/U grading only.)

297T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge)
Hours and duties will vary depending upon course being tutored. Prerequisite: graduate standing in Environmental Toxicology, a related major, or the equivalent experience, and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Epidemiology

See Epidemiology and Preventive Medicine (under Medicine, School of); and Medicine and Epidemiology

Epidemiology (A Graduate Group)

Tim E. Carpenter, Ph.D., Chairperson of the Group

Group Office, 2102 Tupper Hall (Department of Medicine and Epidemiology) (916-752-9174; FAX: 916-752-0414)

Faculty. Includes members from the Departments of Medicine and Epidemiology, Epidemiology and Preventive Medicine, Population Health and Reproduction, the Division of Statistics, Institute of Toxicology and Environmental Health, and other related departments in the Schools of Medicine, Veterinary Medicine, Graduate School of Management, and the College of Agricultural and Environmental Sciences.

Graduate Study. The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include: environmental/occupational epidemiology; chronic and infectious disease epidemiology; epidemiologic methods; health services and econom-

ics; and metabolic, nutritional, reproductive and wildlife epidemiology. For detailed information regarding the program, address the chairperson of the group.

Graduate Advisers. M. Thurmond (Medicine and Epidemiology, 752-5635), J. Beaumont (Epidemiology and Preventive Medicine, 752-8036).

Required Courses for the Program

Prerequisite Courses. Prerequisites may be taken concurrently with required courses below.

Mathematics 16A-16B or 21A-21B
Statistics 102, 106, and 108

Required Courses. These courses are required of all students in the program (M.S. and Ph.D. degrees). These requirements cannot be waived and must be met before a student's Qualifying Examination.

Epidemiology 290 or Occupational and Environmental Health 190C
Preventive Veterinary Medicine 405, 406, 407
Statistics 130A-130B
Select two courses from the three groups below: (the two courses may not be from the same group)
(a) Population Health and Reproduction 202 or Statistics 144
(b) Epidemiology 222 or 223
(c) Population Health and Reproduction 203

Related Courses. For additional course work in Epidemiology, please see Medicine and Epidemiology, Preventive Veterinary Medicine, Population Health and Reproduction, and Epidemiology and Preventive Medicine.

Courses in Epidemiology (EPI)

Graduate Courses

210A. Analytic Epidemiology I: Case-Control Studies (3) III. Kass
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Statistics 130B and Preventive Veterinary Medicine 406 (or the equivalent), or consent of instructor. Theory and practice of epidemiologic data analysis. Topics include confounding, stratification, matching, interaction, and logistic regression. (Same course as Population Health and Reproduction 210A.)

210B. Analytic Epidemiology II: Cohort Studies (3) I. Kass
Lecture—3 hours. Prerequisite: course 210A. Theory and practice of epidemiologic data analysis. Topics include rates, rate standardization, cohort analysis, Poisson regression, and survival/failure-time methods. (Same course as Population Health and Reproduction 210B.)

220. Problems in Epidemiologic Study Design (4) III. Gold
Lecture—3 hours; term paper. Prerequisite: Preventive Veterinary Medicine 405 and 406 or the equivalent; Population Health and Reproduction 207 concurrently; Statistics 102 and 106 or the equivalent. Design and development of research protocols and funding applications for peer review. Application of research methods data collection and management and statistical analysis in research proposals. Methods of evaluating research proposals, mechanisms of funding, specifying human subjects considerations.

***222. Epidemiological Modeling** (3) II. Carpenter
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405. Techniques of model building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, construction and validation will be emphasized. Offered in alternate years. (Former course Epidemiology and Preventive Medicine 222.)

223. Spatial Epidemiology (3) II. Carpenter
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405 or Environmental Studies 126 or Veterinary Medicine 409. Geographic Information Systems (GIS) and spatial statistics. Students are expected to complete a term project based on their graduate research. Offered in alternate years.

240. Principles of Injury Epidemiology (3) I. Romano
Lecture/discussion—3 hours. Overview of the epidemiology of human injury, including general principles, surveillance methods, behavioral factors, environmental factors, treatment issues and engineering and legal interventions related to vehicular injuries, drownings, falls, fires and burns, poisonings, firearm injuries, and other intentional injuries.

250. Introduction to Clinical Research Design and Epidemiology (1) I. McCurdy, Romano
Lecture—1 hour. Prerequisite: graduate standing or medical/nursing personnel. For medical personnel who are or will be involved in medical research. Review of basics of clinical study design and analysis of clinical data. (S/U grading only.)

***251. Environmental Epidemiology** (3) II. Gold
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 405 (may be taken concurrently); upper division undergraduates who have completed Environmental Studies 126; or the equivalent. Examination of the human health effects and the risk of disease from community, occupational, and personal exposure to toxic substances. Offered in alternate years.

260. Epidemiology of Chronic Diseases and Aging (3) II. Haan
Lecture/discussion—3 hours. Overview of the epidemiology of chronic disease in old age. Topics include biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementias, functional status and prevention of disease.

***270. Research Methods in Occupational Epidemiology** (3) III. Beaumont
Laboratory/discussion—3 hours. Prerequisite: Environmental Studies 126 or Preventive Veterinary Medicine 405; and Statistics 102 or Epidemiology and Preventive Medicine 402. Methods used in epidemiologic research on occupational hazards. Topics include design and analysis of cohort and case-control studies, sample size, measuring dose, choosing a control group, validation of employment and health data, interpreting negative studies, and analysis software. Offered in alternate years.

271. Epidemiology of Diseases and Injuries in Agriculture (3) III. Beaumont
Lecture/discussion—3 hours. Prerequisite: Environmental Studies 126 or Preventive Veterinary Medicine 405, or consent of instructor. Overview of disease and injury hazards in agriculture with emphasis on epidemiologic studies. Topics include respiratory diseases, zoonoses, occupational injuries, child injuries, suicide, stress, pesticide injuries and illnesses, infectious disease hazards, reproductive hazards, and cancer hazards. Offered in alternate years.

290. Seminars in Epidemiology (1) III. The Staff
Seminar—1 hour. Students will actively participate in presentation and discussion of ongoing or published research projects in epidemiology. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Seminar—1-5 hours. Group study in selected areas of epidemiology.

299. Research (1-12) I, II, III. The Staff
Research in selected areas of epidemiology. (S/U grading only.)

Exercise Science

(College of Letters and Science)

Edmund M. Bernauer, Ph.D., Chairperson of the Department

Department Office, 264 Hickey Gymnasium (916-752-0511)

Faculty—Exercise Science

David Hawkins, Ph.D., Assistant Professor
Robert G. Holly, Ph.D., Senior Lecturer
Paul A Molé, Ph.D., Professor
Melvin R, Ramey, Ph.D., Professor *(Civil and Environmental Engineering)*
Keith R. Williams, Ph.D., Associate Professor

Faculty—Physical Education

G. Robert Biggs, B.A., Supervisor
Gary Colberg, M.A., Principal Recreation Supervisor
Kathleen M. DeYoung, B.A., Supervisor
Pamela L. Gill-Fisher, M.A., Supervisor
Raymond S. Goldbar, M.A., Supervisor
Barbara A. Jahn, M.S., Supervisor
Phillip S. Swimley, M.A., Supervisor
Deanne M. Vochatzer, M.A., Associate Supervisor
Jon E. Vochatzer, M.S., Supervisor
Suzanne C. Williams, M.S., Supervisor

Emeriti Faculty

William C. Adams, Ph.D., Professor Emeritus
Edmund M. Bernauer, Ph.D., Professor Emeritus
Charles R. Kovacic, Ed.D., Professor Emeritus
Willard S. Lotter, Ed.D., Senior Lecturer Emeritus
E. Dean Ryan, Ed.D., Professor Emeritus

Affiliated Faculty—Exercise Science

Paul B. Salitsky, Ph.D., Lecturer

Affiliated Faculty—Physical Education

Stephen T. Bronzan, M.S., Lecturer/Coach
Jorja E. Hoehn, M.S., Lecturer/Coach
Jeff Hogan, B.A., Supervising Athletic Trainer/Lecturer
Sharon King, M.S., Lecturer/Coach
Daryl Lee, M.S., Lecturer/Coach
Bill Maze, M.B.A., Lecturer/Coach
Maryclaire Robinson, M.S., Lecturer/Coach
Dwayne Schaffer, M.A., Lecturer/Coach
Lisa Varnum, B.S., Athletic Trainer/Lecturer
Robert A. Williams, M.A, Lecturer/Coach

The Major Program

The mission of the Department of Exercise Science is the integrative study of human biology in the context of physical activity.

The Program. The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is primarily for those students who desire a liberal arts program with a broadly based lower division curriculum. This program permits specialization in either the biological or psychological aspects of exercise science, and is most appropriate for those who intend to pursue careers in coaching, teaching, or in community/corporate exercise programs, and for those intending graduate study in the behavioral aspects of sport and exercise.

The Bachelor of Science program is for students who desire a more intense curriculum in the natural sciences. It involves more extensive lower division preparation in physical and life sciences and requires additional upper division course work more specific to either biomechanics or exercise physiology.

Career Alternatives. This degree program provides preparation for graduate study in exercise and sport science, for careers in the allied health sciences, and for professional schools in medicine, physical therapy, and podiatry.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**34-35**
Biological Sciences 1A-1B	10
Chemistry 2A, 2B	10
Exercise Science 45	3
Physics 1A or 7A	3-4
Psychology 1	4
Additional requirements	4
Biological emphasis—Statistics 13	
Psychological emphasis—Psychology 41	
Depth Subject Matter	**44**
Cell Biology and Human Anatomy 101, 101L	7
Exercise Science 101, 101L, 102, 103, 104, 105	16

*Course not offered this academic year.

Neurobiology, Physiology and Behavior 101...5
Minimum of 12 upper division units in exercise science chosen with approval by a major adviser 12
Biological emphasis:

Students electing this emphasis must select a minimum of 9 units from Exercise Science 110, 111, 112, 113, 115, 116, 117, or 118.

Psychological emphasis:

Students electing this emphasis must select a minimum of 7 units from Exercise Science 120, 121 or 122.

Minimum of 4 upper division non-exercise science units in either the biological or the psychological area selected from the following lists. Substitutes may be made only with the prior written approval of a major adviser.
Biological emphasis: Anthropology 101, 152 or 153, Biological Sciences 101, Neurobiology, Physiology and Behavior 113, or Nutrition 101.....4

Psychological emphasis: Psychology 114, 115, 136, 143, 145, or 160.....4

None of the variable-unit courses or Physical Education 100, 128A, 128B, 143A, 143B, or 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

Total Units for the Major 78-79

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-59
Anthropology 1.....4
Biological Sciences 1A-1B.....10
Chemistry 2A-2B or 2AH-2BH.....10
Mathematics 16A-16B or 21A-21B 6-8
Exercise Science 45.....3
Physics 7A-7B or 9A-9B.....8
Psychology 1.....4
Statistics 13 or 102.....4

Additional Requirements
Biomechanics emphasis: Computer Science Engineering 10 or 30 or Engineering 5, and Physics 7C or 9C 7-8
Exercise Physiology emphasis: Chemistry 8A-8B, or 118A-118B 6-8

Depth Subject Matter 52
Cell Biology and Human Anatomy 101, 101L 7
Exercise Science 101, 101L, 102, 103, 104, 105 16
Neurobiology, Physiology and Behavior 101, 101L 7
Restricted electives.....22
(1) Minimum of 10 upper division units from outside the major selected with adviser's approval and as restricted below.

Biomechanics emphasis: at least 3 of the 10 units must be selected from the following: Engineering 102A, Neurobiology, Physiology and Behavior 112, Evolution and Ecology 170, 170L.

Exercise Physiology emphasis: at least 6 of the 10 units must be selected from the following: Biological Sciences 102 or Nutrition 110; Neurobiology, Physiology and Behavior 112, 113, 140.

(2) Minimum of 12 upper division units of Exercise Science courses, including

Biomechanics emphasis: Exercise Science 113, 115, 126.

Exercise Physiology emphasis: at least 9 of the 12 units must be selected from Exercise Science 110, 111, 112, 113, 116, 117, 118.

None of the variable-unit courses or Physical Education 100, 128A, 128B, 143A, 143B, or 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

Total Units for the Major 107-111

Honors Program. Those students with outstanding records in the major requirements may elect to enter the Honors Program with the consent of an adviser. A senior project must be completed, for which up to 10 units (minimum of 6 units) of Exercise Science 199 (split over two quarters) may be earned. These units are taken in addition to the major requirements, and it should be realized that only a maximum of ten 199 units may be counted toward the B.S. degree total unit requirement.

Major Advisers. W.C. Adams, E.M. Bernauer, D. Hawkins, R.G. Holly, P.A. Molé, P.B. Salitsky, K.R. Williams.

Teaching Major. The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

Minor Program Requirements:

UNITS

Exercise Science 18
At least 18 upper division units in exercise science from one of three options.....18
(a) Biomechanics

1) Exercise Science 103 and one course from 101, 102, 104, 105.

2) Minimum of two courses from Exercise Science 113, 115, 126.

3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Physical Education 100, 128A, 128B, 143A, 143B, 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

(b) Exercise Physiology

1) Exercise Science 101 and 101L, and one course from 102, 103, 104, 105.

2) Minimum of three courses from Exercise Science 110, 111, 112, 113, 116, 117, 118.

3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Physical Education 100, 128A, 128B, 143A, 143B, 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

(c) Psychological Aspects

1) Exercise Science 105, and one course from 101, 102, 103, 104.

2) Minimum of two courses from Exercise Science 120, 121, 122.

3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Physical Education 100, 128A, 128B, 143A, 143B, 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

Minor Advisers. Same as major advisers.

Teaching Credential Subject Representative. S. Williams. See also the section on the Teacher Education Program.

Graduate Study. A program of study and research leading to the M.S. degree is available in exercise science. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Exercise Science. See also the Graduate Studies section in this catalog. Admission to study for the M.A. degree in Physical Education is closed for the 1997-98 academic year.

Graduate Adviser. P.A. Molé.

Class and Recreational Use of Facilities. The incidental fee payable by all students at the time of registration entitles students to the use of the gymnasium, showers, towels, lockers, tennis courts, and athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. Lockers must be turned in on the last day of class, i.e., before the final examination period. Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

Physical Education Program

The physical education program provides courses of interest to non-majors. The program focuses on physical activities and education, fitness and health, and recreation. The basic activities series includes Physical Education 1, beginning sports skills and knowledge, Physical Education 6, for students participating in intercollegiate athletics, and Physical Education 7, for students interested in a career in teaching/coaching in grades K-12.

Additional lower division courses include those in special skill areas, such as life-saving and water safety, scuba diving, and health and fitness. Upper division courses include advanced skills in scuba diving and a series of courses that meet the mandated requirements for students pursuing teacher preparation and certification.

The Physical Education program is independent of the degree programs, but is available as part of a student's general educational experience to enhance and broaden the understanding of physical activity in the maintenance of lifetime health and fitness.

Courses in Exercise Science (EXS)

(Formerly courses in Physical Education)

Lower Division Courses

45. Foundations of Physical Education and Exercise Science (3) I. Adams
Lecture—3 hours. An introduction to historical, biomechanical, physiological, psychological and sociological foundations of physical education and exercise science. Not open for credit to students who have taken Physical Education 45.

90X. Lower Division Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
Lecture—1-2 hours. Prerequisite: lower division standing and consent of instructor. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Science in a small class setting. Not open for credit to students who have taken Physical Education 90X.

92. Exercise Science Internship (1-5) I, II, III. The Staff (Chairperson in charge)
Internship—3-15 hours. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit once but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

97T. Tutoring in Exercise Science (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—2-14 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in exercise science course-related projects. Regular meetings with instructor in charge and written report required. May be repeated for credit. (P/NP grading only.)

97TC. Tutoring Exercise Science in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring in the community in exercise science related projects under the guidance of the Exercise Science faculty. Regular meetings with

instructor in charge and written report required. May be repeated once for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Physiological Regulation During Exercise (3) I. Bernauer, Molé
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101. Review of physiological mechanisms underlying acute exercise response. Focus is on physiological regulation and control in response to metabolic demand. Metabolism, fluid composition, acid-base, and temperature regulation are studied in relation to control by the cardiovascular, respiratory, and renal systems. Not open for credit to students who have taken Physical Education 101. GE credit: SciEng.

101L. Exercise Physiology Laboratory (1) Molé
Laboratory—3 hours (for 5 weeks); discussion—2.5 hours (for 5 weeks). Prerequisite: course 101 (may be taken concurrently), Neurobiology, Physiology and Behavior 101. Series of laboratory experiments demonstrating the principles of physiological regulation to standardized exercise regimens. The assessment of physiological, environmental and anthropological factors limiting exercise capacities performed on quantitatively controlled ergometric devices, while monitoring physiological variables by noninvasive methods. Not open for credit to students who have taken Physical Education 101L.

102. Physiological Adaptations to Exercise (2) II. Adams in charge
Lecture—2 hours. Prerequisite: course 101 or consent of instructor. Study of physiological capacities with reference to genotypic and adaptive aspects. Analysis of physiological adaptations to chronic physical activity and selected environmental stressors. Not open for credit to students who have taken Physical Education 102.

103. Analysis of Human Movement (4) III. K. Williams, Hawkins
Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: Cell Biology and Human Anatomy 101 and Physics 1A; Physics 7A recommended. Anatomical and mechanical fundamentals of human motion. Qualitative and quantitative application of kinesiological principles to a variety of movement situations. Not open for credit to students who have taken Physical Education 103. GE credit: SciEng.

104. Introduction to Motor Control and Skill Acquisition (3) I. Salitsky
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1, and course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neurophysiological and behavioral accounts of motor control processes are examined. Theories of movement retention and motor learning are covered. Not open for credit to students who have taken Physical Education 104.

105. Psychosocial Factors in Motor Performance (3) I, II. Salitsky
Lecture—3 hours. Prerequisite: Psychology 1. Survey of theories and experimental findings from social psychology and human motivation and their application to motor performance, including gender differences, success and failure, expectations, anxiety, competition, and aggression. Not open for credit to students who have taken Physical Education 105. GE credit: SocSci.

110. Exercise Metabolism (3) II. Molé
Lecture—2 hours; laboratory—five 4-hour sessions. Prerequisite: courses 101, 102; Chemistry 2A. Focus on energy metabolic pathways and fuels used during different modes of exercise. Also, exercise-induced adaptations which affect metabolism and performance will be discussed. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise. Not open for credit to students who have taken Physical Education 110. GE credit: SciEng, Wrt.

111. Environmental Effects on Physical Performance (3) III. Adams in charge
Lecture—2 hours; laboratory—3 hours, with discussion— 1 hour (alternate weeks). Prerequisite: courses 101 and 102, or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied. Not open for credit to students who have taken Physical Education 111.

112. Clinical Exercise Physiology (4) III. Holly
Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined in normal and diseased populations (cardiovascular, pulmonary, diabetic). Assessment (graded exercise testing), exercise prescription and effects of exercise conditioning are examined in detail. Not open for credit to students who have taken Physical Education 112.

113. Growth and Development in Human Performance (3) II. Adams, Molé
Lecture—3 hours. Prerequisite: Cell Biology and Human Anatomy 101, and Neurobiology, Physiology and Behavior 101. Development of human performance potential from conception to old age, including influence of exercise, athletic participation, and preventive medicine. Alterations in motor skill patterns, morphology, and body composition, and physiological capacities with aging. Not open for credit to students who have taken Physical Education 113. GE credit: SciEng.

115. Biomechanical Bases of Movement (3) I. K. Williams
Lecture—2 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: course 103 or consent of instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography, and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion. Not open for credit to students who have taken Physical Education 115. GE credit: SciEng.

116. Nutrition for Physically Active Persons (3) III. Molé
Lecture—3 hours. Prerequisite: course 101, Neurobiology, Physiology and Behavior 101. The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans. Not open for credit to students who have taken Physical Education 116.

117. Exercise and Aging in Health and Disease (3) II. Holly
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) or 113 (concurrently). Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. Not open for credit to students who have taken Physical Education 117. GE credit: SciEng.

118. Bionomics of Work: Physical Performance and Standards in the Workplace (3) III. Bernauer
Lecture—2 hours; discussion—1 hour. Explores principles and practices of physical performance in the workplace. Established assessment procedures including validation of job standards are presented. Cost of medical benefits are examined with respect to on-site and off-site programs of fitness maintenance and remediation. Not open for credit to students who have taken Physical Education 118. GE credit: SciEng, Wrt.

120. Sports in American Society (4) I. Salitsky
Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religion, art, sexism, racism, and education; current trends and problems. Not open for credit to students who have taken Physical Education 120. GE credit: SocSci, Div.

121. Sport Psychology (4) III. Salitsky
Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection in sport psychology through a critical examination of relevant experimental, clinical, and field data. Not open for credit to students who have taken Physical Education 121.

122. Psychological Effects of Physical Activity (3) II. Salitsky
Lecture—3 hours. Prerequisite: Psychology 1 or 15, and upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety). Not open for credit to students who have taken Physical Education 122.

***125. Neuromuscular and Behavioral Aspects of Motor Control** (3) II. Hawkins
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences. Not open for credit to students who have taken Physical Education 125.

126. Tissue Mechanics (3) II. Hawkins
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: course 103 or consent of instructor. The mechanical properties of biological tissues are investigated. Tissues considered include bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. Not open for credit to students who have taken Physical Education 126. GE credit: SciEng.

***131. The Teaching of Physical Activity to Special Populations** (4) I. J. Vochatzer
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103. The diverse and complex nature of the atypical individual, their disabilities, what caused those disabilities, how they adapt to their disability in daily living, and how physical activity/recreational programs play a role in their daily living. Not open for credit to students who have taken Physical Education 131.

133. Prevention and Care of Sports Injuries (3) II. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—6 hours. Prerequisite: upper division standing; Cell Biology and Human Anatomy 101 (may be taken concurrently). Management of the prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques. Not open for credit to students who have taken Physical Education 133.

135. Advanced Procedures in Evaluation and Management of Athletic Injuries (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 133, Cell Biology and Human Anatomy 101, and consent of instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. In-depth study of selected current topics in athletic training. Not open for credit to students who have taken Physical Education 135.

***146. Theory and Practice of Exercise Training** (1) I, II, III. The Staff
Lecture/discussion—1 hour. Prerequisite: course 2 or 45 or 102. Physiological adaptations, exercise programming and behavioral techniques focusing on young and middle-aged adults. Topics include exer-

*Course not offered this academic year.

cise prescription, nutrition, psychological effects of exercise, stress management techniques, and exercise adherence techniques. Not open for credit to students who have taken Physical Education 146. (P/NP grading only.)

***146L. Shape-Up Testing and Training Laboratory** (1) I, II, III. The Staff
Laboratory—3 hours. Prerequisite: course 146 (may be taken concurrently). Primary activities involve leading shape-up class, attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (Former course 146L.) (P/NP grading only.)

147L. Adult Fitness Training Laboratory (1) I, II, III. The Staff
Laboratory—3 hours. Prerequisite: courses 146, 146L, and 102 (may be taken concurrently); current CPR. Involves attending and assisting with aerobic training sessions for older adults, and assisting with physiological testing sessions. Not open for credit to students who have taken Physical Education 147L. (P/NP grading only.)

148. Theory and Practice of Exercise Testing (1) I, II, III. Holly
Lecture/discussion—1 hour. Prerequisite: courses 101, 102, 112 (may be taken concurrently), and 146; current CPR. Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. Not open for credit to students who have taken Physical Education 148. (P/NP grading only.)

148L. Adult Fitness Testing Laboratory (1) I, II, III. Holly
Laboratory—3 hours. Prerequisite: courses 146, 148 (concurrently); current CPR. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (Former course Physical Education 148L.) (P/NP grading only.)

149L. Cardiopulmonary Rehabilitation Laboratory (1) I, II, III. Holly
Laboratory—3 hours. Prerequisite: courses 148 and 148L; current CPR certification. Testing and training of cardiac patients or individuals at high risk of developing heart disease. Present mini-lectures to program participants, maintain patient records, and present patients' cases in rounds. Two quarters minimum; third quarter permitted. (Former course Physical Education 149L.) (P/NP grading only.)

192. Exercise Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit for total of 12 units (including course 92), but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

197T. Tutoring in Exercise Science (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—2-15 hours. Prerequisite: upper division standing and consent of chairperson. Tutoring of students in exercise science course-related projects. Regular meetings with instructor in charge and written report required. May be repeated for credit. (P/NP grading only.)

197TC. Tutoring Exercise Science in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: upper division standing and consent of chairperson. Tutoring in the community in exercise science related projects under the guidance of the Exercise Science faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of Department Chairperson. (P/NP grading only.)

Graduate Courses

200A. Introduction to Research: History and Philosophy in Physical Education (2) I. Molé/Bernauer
Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science and their application to current research in human performance; benchmark studies in the evolution of the field. Not open for credit to students who have taken Physical Education 200A.

200B. Problem Solving and Research Design in Physical Education (2) III. Molé/Salitsky
Discussion—1 hour; seminar—1 hour. Prerequisite: course 200A. Conventional approaches to problem solving; processes in research design and analysis; written and oral presentation of a thesis proposal. Not open for credit to students who have taken Physical Education 200B.

***201A. Sports Medicine: Medical Aspects of Sports Injuries** (3) I. Bernauer
Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. Not open for credit to students who have taken Physical Education 201A.

220. Research Topics in Biomechanics (3) III. K. Williams
Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing and consent of instructor; course 115 recommended. Survey of current research into diverse areas of the biomechanics of human movement. Topics will include locomotion, sport biomechanics, electromyography, musculoskeletal and tissue mechanics, advances in measurement technology, clinical biomechanics. (Same course as Biomechanical Engineering 220.) Not open for credit to students who have taken Physical Education 220.

221. Anthropometry in Physical Activity (3) III. Adams
Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisite: courses 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, and of body structural and compositional changes accompanying prolonged, systematic physical conditioning. Offered in alternate years. Not open for credit to students who have taken Physical Education 221.

222. Metabolic Functions in Exercise (4) III. Molé
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 102, Neurobiology, Physiology and Behavior 101. Review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions. Not open for credit to students who have taken Physical Education 222.

***223. Physiological Basis of Physical Fitness** (2) II. Bernauer
Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical training and adaptation. Offered in alternate years. Not open for credit to students who have taken Physical Education 223.

224. Exercise Electrocardiography (2) I. Holly
Lecture—2 hours. Prerequisite: course 112 or consent of instructor. Physiological bases and clinical implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as is the predictive significance of normal and abnormal ECG. Offered in alternate years. Not open for credit to students who have taken Physical Education 224.

***225. Seminar in Cardiac Rehabilitation** (2) I. Holly
Seminar—2 hours. Prerequisite: course 112 or graduate standing and consent of instructor. Critical examination of literature dealing with the causes, prevention and treatment of cardiovascular disease with particular emphasis on intervention through cardiac rehabilitation. Both the theoretical bases and practical approaches to cardiac rehabilitation will be examined. Offered in alternate years. Not open for credit to students who have taken Physical Education 225.

226. Measurement of the Biological Aspects of Human Performance (3) I. Adams in charge
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101; consent of instructor. Introduction to primary measurement strategies used to investigate the biological bases of human performance. Emphasis placed on the critical selection of the most valid tests and on obtaining the most accurate and reliable results. Not open for credit to students who have taken Physical Education 226.

227. Research Techniques in Biomechanics (4) II. K. Williams, Hawkins
Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hours. Prerequisite: consent of instructor, Mathematics 22B; course 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. Not open for credit to students who have taken Physical Education 227. (Same course as Biomedical Engineering 227/Mechanical Engineering 227.)

228. Skeletal Muscle Mechanics: Form, Function, Adaptability (3) III. Hawkins
Lecture—3 hours. Prerequisite: graduate standing, consent of instructor, and basic background in biology, physiology, and engineering; Engineering 3 and 45, Mathematics 22B, and Neurobiology, Physiology and Behavior 101 recommended. Basic structure and function of skeletal muscle is examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Special emphasis on the relation between muscle structure and muscle mechanics (e.g., force, work, power). Not open for credit to students who have taken Physical Education 228. (Same course as Biomedical Engineering 228.)

***230. Human Performance: Psychological Aspects** (3) II. Salitsky
Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Critical review of current literature on learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport. Not open for credit to students who have taken Physical Education 230.

***232. Health Psychology: Effects of Physical Activity** (3) I. The Staff
Seminar—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health. Not open for credit to students who have taken Physical Education 232.

290. Seminar in Exercise Science (1) II. Chairperson in charge
Seminar—1 hour. Prerequisite: graduate standing; required of all first year students for first two quarters. Presentation and discussion of topics of interest, and the analysis of research in exercise science. Not open for credit to students who have taken Physical Education 290. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing; consent of instructor and Department Chairperson. (S/U grading only.)

Courses in Physical Education (PHE)

Lower Division Courses

1. Physical Education for Men and Women (1/2) I, II, III. The Staff (Chairperson in charge)
Laboratory—2 hours. Sections in: (a) sports skills, rules and strategy; (b) physical fitness and personal health; (c) recreation; (d) dance, and (e) intercollegiate athletics. May be repeated along with course 6 for a combined total of 6 units. (P/NP grading only.)

***2. Principles of Basic Exercise Conditioning** (2) I. (Swimley in charge)
Lecture—1 hour; laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches current in selected exercise training regimens, e.g., theory of aerobic function and capacity, exercise and diet in weight control, muscular strength development and maintenance, and limitations of environment, age, and gender on fitness levels. (P/NP grading only.)

6. Preparation and Participation in ICA Competition (1) I, II, III. ICA Staff (Director in charge)
Discussion/laboratory—10-20 hours. Prerequisite: consent of instructor (coach). Preparation and participation in Intercollegiate Athletics. Development of fundamental and advanced individual and team skills. In-depth knowledge of rules and strategy. Advanced sports competition and Conference and NCAA levels. May be repeated along with course 1 for a combined total of 6 units. (P/NP grading only.)

7. Professional Physical Education Activities: Men and Women (1) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; or laboratory—2 hours. Fundamental skills for: (a) coaching competitive athletics; (b) classroom teaching and coaching, and (c) classroom teaching and officiating. May be repeated for a total of six units.

***15. Administration of Intramural Sports** (2) I. Colberg
Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

25. Theory of Lifesaving and Water Safety (2) I, II, III. Jahn
Lecture—1 hour; laboratory—2 hours. Prerequisite: sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and save his/her own life or the life of another in an aquatic emergency. (American Red Cross Advanced Lifesaving Certificate awarded upon successful completion of necessary requirements.)

27. Training Course for Water Safety Instructors (2) III. Jahn
Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American Red Cross Water Safety Instructor's Certificate awarded upon successful completion of necessary requirements.)

29. Basic Scuba (2) I, III. Fastenau
Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swimming test. Introduction to basic knowledge required for scuba diving, function and maintenance of equipment, physics and physiology of diving, diver first aid and CPR, oceanography and marine life, and underwater communication. Pool and open water sessions available for certification. (P/NP grading only.)

40. Drugs and Society (2) I, III. D. Vochatzer
Lecture—2 hours; fieldwork—2 hours total; film-viewing—5 hours total. Pharmacology, methods of use, and effects of use of psychoactive and performance-enhancing drugs. Historical overview of drug use. Identification of behavior of "at-risk" and "user" populations. (P/NP grading only.)

44. Principles of Healthful Living (2) III. Gill-Fisher in charge
Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.)

92. Physical Education Internship (1-5) I, II, III. The Staff (Chairperson in charge)
Internship—3-15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit once but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

97T. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—1-5 hours. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit. (P/NP grading only.)

97TC. Tutoring in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring in the community in physical activity related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

Upper Division Courses

100. Field Experience in Teaching Physical Education (2) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; fieldwork—4 hours. Prerequisite: upper division standing and appropriate course 1 or 7. Tutoring or teacher's aide in physical education activities, including athletic coaching, in public schools under the guidance of a regular teacher with supervision by a departmental faculty person. May be repeated once for credit. (P/NP grading only.)

128A. Intermediate Scuba Diving (4) II. Fastenau
Lecture—3 hours; laboratory—3 hours; fieldwork—2 hours. Prerequisite: course 29 and consent of instructor. Lectures and practice in diver safety, rescue, accident management and patient care. Pool and open water sessions required for certification. (P/NP grading only.)

128B. Research Diving Techniques (4) III. Fastenau
Lecture—3 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: course 128A; consent of instructor. Lectures and application on search and light salvage, night diving, research techniques, cold-water, low visibility diving, blue water, deep and altitude diving. Pool and open water sessions required for certification. (P/NP grading only.)

***132. First Aid Leadership and Accident Management** (3) I, II, III. ———
Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety and first aid programs in school and community sports, recreation and all types of group activities. The study and practice of first aid leadership skills. (The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

142. Physical Education in the Public Schools (3) I. S. Williams
Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.

143. Coaching Effectiveness (3) II. The Staff
Lecture—3 hours. Prerequisite: upper division standing; 3 units of courses 1 and 6 combined. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology and basic management and administration of athletics in public high schools. (P/NP grading only.)

***144. Principles of Health Education** (2) II.
Lecture—2 hours. Prerequisite: course 44 and upper division standing or consent of instructor. Principles of teaching health education in the public schools. (P/NP grading only.)

***145. Administration of Health/Fitness Programs** (2) III. ————
Lecture—2 hours. Principles of organizing and directing health/fitness programs. Includes selection and training of personnel, methods of evaluating personnel and programs, and elements of planning.

150. Recreation in the Community (3) III. Jahn
Lecture—2 hours; discussion—1 hour; two Saturday field trips—8 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities.

192. Physical Education Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours; written project proposal and evaluation. Prerequisite: upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for a total of 12 units (including course 92) but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

197T. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—1-5 hours. Prerequisite: consent of chairperson. Tutoring of students in lower division physical activity courses. Written reports on methods and materials required. May be repeated once for credit. (P/NP grading only.)

197TC. Tutoring in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: upper division standing and consent of Department Chairperson. Tutoring in the community in physical education related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

*Course not offered this academic year.

199. Special Study for Advanced Undergraduates (1-5) The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Professional Courses

300. The Elementary Physical Education Program (2) III. Goldbar
Lecture—1 hour; laboratory—2 hours; field trips to selected programs. Prerequisite: senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program.

380. Methods of Teaching Physical Education (3) III. S. Williams
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 7; or consent of instructor. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only.)

Family and Community Medicine

See Medicine, School of

Feminist Theory and Research

Suad Joseph, Ph.D., Program Director

Program Office, 2201 Hart Hall (916-752-4686)

Graduate Study. The program in Women's Studies offers courses leading to a designated emphasis in Feminist Theory and Research. The courses provide theoretical and interdisciplinary perspectives to students already preparing for the Ph.D. in one of twelve participating departments (Anthropology, Comparative Literature, Dramatic Art, Education, English, French, German, History, Italian, Psychology, Spanish, and Sociology). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consist of two core courses (Women's Studies 200A and 200B) and two courses on gender, one of which must be in the student's home department. It is expected that an analysis of gender will be a central component of the student's doctoral examination and dissertation.

Graduate Adviser. Consult the Women's Studies office (916-752-4686).

Fermentation Science

(College of Agricultural and Environmental Sciences)

The Major Program

The Fermentation Science major is a program of study of the fundamental and applied sciences related to the use of microorganisms as production and processing agents. A broad interdisciplinary food-related education is offered which may be combined with specializations in enology (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations and waste treatments in the production of microbial cells, drugs, enzymes, hormones, solvents, acids, and vitamins are further opportunities for study.

The Program. The major in fermentation science leads to a Bachelor of Science degree. Most of the instruction for the major is done in the Department of Viticulture and Enology and in the Department of Food Science and Technology. Students also take courses in chemistry, microbiology, molecular and cellular biology, genetics, and computer science. Electives often include additional courses in sensory science, management and viticulture.

Career Alternatives. Graduates qualify for supervisory, technical, production, product development, quality control, research, sales, or executive positions in the food, beverage, and allied industries, in the fermentation industries, and in governmental agencies. Students who choose to continue in graduate study have done so in such areas as food science-enology, microbiology, agricultural chemistry, and biochemistry.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

	UNITS
English Composition Requirement	**0-8**
See College requirement	
Preparatory Subject Matter	**59-66**
Biochemistry (Biological Sciences 102, 103)	6
Biology (Biological Sciences 1A)	5
Chemistry (Chemistry 2A-2B-2C; and 8A-8B or 128A-128B, 129A)	21-25
Computer science (Agricultural Systems and Environment 21)	3
Mathematics (Mathematics 16A-16B or 21A-21B)	6-8
Microbiology (Microbiology 102-102L)	6
Physics (Physics 7A and 7B)	8
Statistics, including analysis of variance (Agricultural Systems and Environment 120 or Statistics 106)	4
Breadth/General Education	**0-24**
See General Education requirement	
Depth Subject Matter	**40**
(Courses in depth subject matter may not be taken on the P/NP grading basis. Overall GPA in depth subject matter must be 2.0 or greater.)	
Choose from Biological Sciences 101; Chemical Engineering 161A, 206; Chemistry 107A, 107B, 108, 130; Food Science and Technology 102A, 102B, 104, 104L, 108, 109, 110A, 110B, 123, 123L, 128, 150, 205, 250, 250L; Microbiology 105, 140, 150, 155L, 250; Viticulture and Enology 3, 123, 124, 125, 126, 127, 128, 129, 135, 140, 186, 190X, 219, 225, 235 (no variable-unit 190, 192, 199, 299 courses allowed toward depth requirement)	
Restricted Electives	**28**
Selected according to student's educational goals and upon approval by adviser. Only 6 units of 192 or 6 units of 190, 198, 199, 290, or 298 may be counted; or a total of 8 units of these courses combined. A list of approved courses is availble from advisers.	
Unrestricted Electives	**14-23**
Total Units for the Degree	**180**

Major Adviser. A. Waterhouse.

Graduate Study. Refer to the Graduate Studies degree programs in Agricultural and Environmental Chemistry, Biochemistry, Chemical Engineering, Food Science, Genetics, Microbiology.

Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

Faculty

See Textiles and Clothing.

The Major Program

The fiber and polymer science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use.

The Program. All students in this major are required to take a common core of course work in chemistry, physics, and mathematics, and depth subject matter in fiber and polymer science, organic and physical chemistry, and technical writing. In the restricted electives, the student is expected to select courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles.

Career Alternatives. The major prepares the student for a career in a wide range of industries in the areas of research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). The companies employing Fiber and Polymer Science graduates are in the fiber, polymer, absorbent product, textile and/or chemical business. Graduates are prepared to enter the graduate program in textiles or agricultural and environmental chemistry with a specialization in fiber and polymer chemistry, and fiber and polymer science programs at other universities.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

	UNITS
English Composition Requirement	**7-12**
See College requirement	0-8
Rhetoric and Communication 1	4
Additional English (English 104)	3
Preparatory Subject Matter	**52-55**
Chemistry (Chemistry 2A-2B-2C)	15
Computer science (Computer Science Engineering 15 or 30)	4
Mathematics (Mathematics 16A, 16B, 16C or 21A, 21B, 21C)	9-12
Physics (Physics 5A, 5B, 5C or 9A, 9B, 9C)	12
Statistics (Statistics 13 or Agricultural Systems and Environment 120)	4
Textiles and clothing (Textiles and Clothing 6 and 8 or Engineering 45)	8
Breadth/General Education	**6-24**
Satisfaction of General Education requirement; See advising office for breadth requirement.	
Depth Subject Matter	**37**
Textiles Science: Textiles and Clothing 163, 163L, 180A, 180B,	8
Fiber and Polymer Science 100, 150, 161, 161L	10
Chemistry (Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B)	19
Restricted Electives	**30**
Select courses from the following: *Computer Science and Mathematics:* Agricultural Systems and Environment 21; Engineering 5; Applied Science Engineering 115, 116; Food Science and Technology 156; Mathematics 22A, 22B	

Chemistry:
Chemistry 108, 111, 115, 120, 121, 124A, 124B, 124C, 130, 131, 140
Marketing/Management:
Agricultural and Resource Economics 100A, 100B, 113, 136, 157, Economics 1A, 1B, Statistics 103
Material and Advanced Fiber/Polymer Science:
Aeronautical Science Engineering 137, Engineering 104A, 104B, Textiles and Clothing 250A-F, 290, 293
Textiles:
Textiles and Clothing 162, 162L, 164, 165, 171, 173, 174

Unrestricted Electives 23-40

Total Units for the Degree.....180

Major Adviser. Y.L. Hsieh *(Textiles and Clothing).*

Advising Center for the major is located in 129 Everson Hall (916-752-4417).

Minor Program Requirements:

UNITS

Fiber and Polymer Science 18
Textiles and Clothing 6 or Engineering 45 ...4
Courses selected from the following:
Fiber and Ploymer Science 100, 150, 161, 161L; and Textiles and Clothing 163 and 163L or 180A and 180B 14

Minor Adviser. Y.L. Hsieh.

Courses in Fiber and Polymer Science (FPS)

Upper Division Courses

100. Principles of Polymer Materials Science (3) II. Pan
Lecture—3 hours. Prerequisite: Chemistry 2A-2B; Chemistry 8A-8B or Engineering 45; introductory physics. The basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Materials Science Engineering 147.)

110. Plastics in Society and the Environment (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 10 or introductory course in physical sciences. Basic concepts and methodologies in the study of plastics. Formation, classification, structure, properties, processing, and formulation. Their application to societal needs, and their impact on society and the environment. GE credit: SciEng or SocSci, Wrt.

150. Polymer Syntheses and Reactions (3) III. Hsieh
Lecture—3 hours. Prerequisite: Chemistry 128B or 8B, and Chemistry 107A. Organic and physical chemistry aspects of polymer syntheses and reactions including polymerization mechanisms, kinetics and thermodynamics for major types of organic high polymers.

161. Structure and Properties of Fibers (3) I. Hsieh
Lecture—3 hours. Prerequisite: Textiles and Clothing 6 and Chemistry 8B. The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detergents. Offered in alternate years.

161L. Textile Chemical Analysis Laboratory (1) I. Hsieh
Laboratory—3 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries. Offered in alternate years.

Film Studies

(College of Letters and Science)

The interdisciplinary minor in Film Studies provides insight into and critical perspectives on the role of film in culture. The minor emphasizes connections between visual media and other forms of representation, and between Film Studies and other academic disciplines. Students will gain an understanding of the history of film, an awareness of genres, national traditions, and representational conventions, and an ability to "read" films aesthetically, culturally, ideologically, and historically. The minor is sponsored by the Humanities Program.

Minor Program Requirements:

UNITS

Film Studies.....20
Humanities10 4
Upper division courses selected from the following list, with no more than two courses from any one category 16

(a) Problems and Themes in Cinema:
Anthropology 136; Dramatic Art 115; English 160, 162; Women's Studies 162

(b) Cinema, Nation and Nationality:
German 142C; Japanese 106; Russian 129, Spanish 148

(c) Film and Social Identities:
African American and African Studies 170, 171; Women's Studies 160, 164

(d) Film/Video Production:
Art Studio 115, 116, 117

(e) Popular and Visual Culture:
American Studies 130; Art Studio 149; Rhetoric and Communication 140, 143

Restrictions: No more than two courses from a single department or program may be offered in satisfaction of the minor requirements.

Note: With a minor adviser's prior approval, up to four units of internship (American Studies 192, Rhetoric and Communication 192, or Women's Studies 192) in television/video/film production may be offered toward satisfying the requirements of the minor. Such courses will be considered part of the "Film/Video Production" category.

Advising. Humanities Program, 916-752-9934.

Fisheries

See Animal Science; and Wildlife, Fish and Conservation Biology

Food Biochemistry

(College of Agricultural and Environmental Sciences)

The Major Program

The major in food biochemistry stresses the principles of chemistry and biochemistry as related to constituents of foods and the changes which occur in the constituents before and during processing and during storage. Particular emphasis is placed on the role of and changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their effect on the quality attributes of foods.

The Program. The food biochemistry curriculum stresses a strong background in chemistry, physics, mathematics, and biology at the lower division level. At the upper division level, students take specialized courses in food science and technology and advanced biochemistry and nutrition. Through the appropriate choice of electives, students may emphasize certain research areas such as nutrition, food processing, or toxicology.

Career Alternatives. The main employment options for a food biochemistry graduate are in research and development at large food industry units; in laboratory-related employment in quality assurance, new food technology, and food analysis; or in any position requiring knowledge of biochemical techniques, such as in clinical laboratories. The major offers excellent preparation for graduate study in areas such as food science, nutrition, biochemistry, and environmental toxicology. Food biochemistry has also been chosen as a pre-professional major by students interested in medical, veterinary, optometry, pharmacy, or dental school.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 0-8
See College English requirement

Preparatory Subject Matter 77-79
Biochemistry (Biological Sciences 102, 103) 6
Biology (Biological Sciences 1A-1B-1C)...15
Chemistry (Chemistry 2A-2B-2C or 2AH-2BH-2CH; 118A-118B-118C or 128A-128B-128C, 129A; 107A-107B or 110A-110B) 32-33
Mathematics, (Mathematics 16A-16B-16C or 21A-21B-21C) 9
Physics (Physics 5A-5B-5C, 7A-7B-7C or 9A-9B-9C) 12
Other (one course from Computer Science Engineering 10, 30, Engineering 5, Mathematics 22A, 22B, 22C, Statistics 13, Agricultural Systems and Environment 120) 3-4

Breadth/General Education 24
Satisfaction of General Education requirement.

Depth Subject Matter 30
Food Science and Technology (to include Food Science and Technology 103, 104, 104L, 110A).....25
Biochemistry (Food Science and Technology 123, 123L) 5

Restricted Electives 24
At least one additional upper division biochemistry course, other than Molecular and Cellular Biology 120L. One upper division Microbiology course. One nutrition course other than Nutrition 10. Remaining courses can be selected from biochemistry, physiology, environmental toxicology, genetics, public health, microbiology or other subjects related to Food Science 24

Unrestricted Electives 15-25

Total Units for the Degree.....180

Major Adviser. G.M. Smith *(Food Science and Technology).*

Graduate Study. Refer to the Graduate Studies section in this catalog.

*Course not offered this academic year.

Food Science

(College of Agricultural and Environmental Sciences)

The Major Program

Food science applies chemical, physical, biological, engineering, and social sciences to processing, preservation, development, packaging, storage, evaluation, identity and utilization of foods.

The Program. Students majoring in food science spend the first two years of study developing the scientific and general background necessary for upper division study. The science courses include chemistry, biology, physics, and mathematics. General background is provided by courses in the social science/humanities area and by optional courses in introductory food science. At the upper division level, students take courses in nutrition, food microbiology, food chemistry, food analysis, food commodities, food processing, food engineering, and may choose to specialize in one of five career-oriented options. Students enrolled in the program are eligible for various scholarships, including, for three of the options, scholarships from the Institute of Food Technologists.

Career Alternatives. Opportunities for employment include positions in the food and allied industries, local, state, and federal government agencies, and educational and research institutions. Graduate study for the food science student may lead to the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, engineering, microbiology, and nutrition.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses may be taken with adviser's approval. *Courses shown without parentheses are required for all options.*)

UNITS

English Composition Requirement.....3-11
See College requirement 0-8
Additional English (English 102 with food science or related area, or English 104)....3

Preparatory Subject Matter.....26-32
Biology (Biological Sciences 1A) 5
General chemistry (Chemistry 2A-2B-2C)...15
Organic chemistry (see option for requirement)
Mathematics (Mathematics 16A-16B).....6
Physics (see option for requirement)
Food science and society (Food Science and Technology 1) recommended.....(3)
Introduction to food science and technology (Food Science and Technology 50) recommended .....(3)

Breadth/General Education.....24
Satisfaction of General Education requirement plus social science and humanities electives to total 24 units

Depth Subject Matter.....25-31
Biochemistry (Biological Sciences 102-103) 6
Food chemistry (Food Science and Technology 100A).....3
Food chemistry laboratory (Food Science and Technology 101A) 2
Food properties (Food Science and Technology 100B).....3
Food biochemistry (Food Science and Technology 100C).....3
Food microbiology (Food Science and Technology 104) 3
Food science seminar (Food Science and Technology 190).....1
Nutrition (see option for requirements)
Statistics (Agricultural Systems and Environment 120) 4
Internship (Food Science and Technology 192) recommended .....(3)
Special study (Food Science and Technology 199) recommended .....(3)

Select one of the following five options:

Food Technology Option
The Food Technology option provides a broad exposure to food chemistry, food microbiology, food engineering and food processing. Students find positions in quality assurance, product development, and food processing in the food industry.

Specific course requirements.....61-65
Biology (Biological Sciences 1B-1C) 10
Organic chemistry (Chemistry 8A-8B) 6
Mathematics (Mathematics 16C) 3
Physics (Physics 5A-5B or 7A-7B-7C) ...8-12
Food engineering (Food Science and Technology 110A-110B) 6
Food engineering laboratory (Applied Biological Systems Technology 110L) 2
Food processing (Food Science and Technology 180) 4
Food analysis (Food Science and Technology 103) 5
Food microbiology laboratory (Food Science and Technology 104L) 4
Nutrition (Nutrition 10 or approved substitute) 3
Plant sanitation (Food Science and Technology 108) 3
Product development (Food Science and Technology 160).....4
Quality assurance (Food Science and Technology 109) 3

Selected additional courses.....15
Select courses from a master list available from the department Advising Center.

Food Business and Management Option
The Food Business and Management option allows students to integrate study of the science and technology of food with that of business and economics in a unique program. Students prepare for positions of management in small food companies, and research-and-development oriented marketing or technical sales opportunities in coroporate food industries.

Specific course requirements.....60
Biology (Biological Sciences 1B-1C) 10
Organic chemistry (Chemistry 8A-8B) 6
Physics (Physics 1A-1B) 6
Microeconomics (Economics 1A) 5
Business organization (Agricultural and Resource Economics 112).....4
Marketing management (Agricultural and Resource Economics 113).....4
Personnel management (Food Service Management 123).....3
Quality assurance (Food Science and Technology 109) 3
Food laws and regulations (Food Science and Technology 140) 3
Food packaging (Food Science and Technology 131) 3
Introduction to food science and technology (Food Science and Technology 50) 3
Plant sanitation (Food Science and Technology 108) 3
Product development (Food Science and Technology 160).....4
Nutrition (Nutrition 10 or approved substitute) 3

Selected additional courses.....15
Select courses from a master list available from the department Advising Center.

Consumer Food Science Option
The Consumer Food Science option prepares students for jobs in food product formulation, research-and-development oriented marketing and sensory analysis, quality assurance, extension service, creative writing, and community service. Students who obtain the requirements for the teaching credential teach elementary or secondary school home economics.

Specific course requirements.....52
Biology (Biological Sciences 1B-1C) 10
Organic chemistry (Chemistry 8A-8B) 6
Physics (Physics 1A-1B) 6
Food properties laboratory (Food Science and Technology 101B) 2
Introduction to food science and technology (Food Science and Technology 50) 3
Sensory evaluation (Food Science and Technology 107A and 107B) 8
Food product development field trip (Food Science and Technology 47) 1
Consumer behavior (Consumer Science 100) 3
Product development (Food Science and Technology 160).....4
Business organization (Agricutural Economics 112) 4
Systemic Physiology (Neurobiology, Physiology and Behavior 101).....5

Selected additional courses.....18
Select courses from a master list available from the department Advising Center.

Food Biology/Microbiology Option
The Food Biology/Microbiology option is for students interested in research and development careers with food companies or government laboratories, in teaching and research at academic institutions, or in professional (medical, veterinary, pharmacy, optometry or dental) school. The Food Biology/Microbiology option prepares students for graduate study and research in several areas, including food science, biochemistry, biotechnology, microbiology, and post-harvest biology.

Specific course requirements.....55-65
Biology (Biological Sciences 1B-1C) 10
Organic chemistry (Chemistry 8A-8B or 118A-118B-118C) 6-12
Mathematics (Mathematics 16C) 3
Physics (Physics 5A-5B or 7A-7B-7C) ...8-12
Microbiology (Microbiology 102, 102L).....6
Food analysis (Food Science and Technology 103) 5
Food microbiology laboratory (Food Science and Technology 104L) 4
Food engineering (Food Science and Technology 110A-110B) 6
Food processing (Food Science and Technology 180) 4
Nutrition (Nutrition 10 or approved substitute) 3

Selected additional courses.....24
Select courses from a master list available from the department Advising Center.

Food Chemistry Option
The Food Chemistry option prepares students for graduate study and research in such areas as flavor chemistry, food additive chemisty, biotechnology, biochemistry and toxicology. This option is for students interested in research and development careers with food companies or government laboratories, in teaching and research at academic institutions, or in professional (medical, veterinary, or dental) school.

Specific course requirements.....57-58
Mathematics (Mathematics 16C) 3
Chemistry (Chemistry 124A) 3
Organic chemistry (Chemistry 118A-118B-118C or 128A-128B-128C-129A)...11-12
Physical chemistry (Chemistry 107A-107B) ..6
Physics (Physics 5A-5B-5C or 7A-7B-7C) 12
Food analysis (Food Science and Technology 103) 5
Food microbiology laboratory (Food Science and Technology 104L) 4
Food engineering (Food Science and Technology 110A-110B) 6
Food processing (Food Science and Technology 180) 4

Nutrition (Nutrition 10 or approved substitute) 3

Selected additional courses.....16
Select courses from a master list available from the department Advising Center.

Unrestricted Electives 13-29

Total Units for the Degree.....180

Major Adviser. E. Bandman *(Food Science and Technology).*

Advising Center for the major is located in 111 Cruess Hall.

Graduate Study. A program of study and research leading to the M.S. and Ph.D. degrees in Food Science is available (see below). For further information on graduate study, contact the graduate adviser.

Food Science (A Graduate Group)

David M. Ogrydziak, Ph.D., Chairperson of the Group

Group Office, 111 Cruess Hall (916-752-1415; Fax: 916-752-4759)

Faculty. Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree and to the Ph.D. degree. Graduate studies stress the application of the biological, chemical, physical, and behavioral sciences to the processing, preservation, quality evaluation, public health aspects, and utilization of foods. For the M.S. degree there are five areas of specialization: chemistry-biochemistry, microbiology, engineering-technology, sensory sciences, and enology. Individually designed programs are also acceptable. For the Ph.D. there are three areas of specialization: biochemistry, chemistry, and microbiology. Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the *Graduate Announcement.*

Graduate Advisers. Contact Graduate Studies for the list of advisers.

Food Science and Technology

(College of Agricultural and Environmental Sciences)

Charles F. Shoemaker, Ph.D., Chairperson of the Department

Department Office, 126 Cruess Hall (916-752-1465)

Faculty

Everett Bandman, Ph.D., Professor
Ericka L. Barrett, Ph.D., Professor
Stephanie R. Dungan, Ph.D., Assistant Professor *(Food Science and Technology, Chemical Engineering)*
J. Bruce German, Ph.D., Associate Professor
Jean-Xavier Guinard, Ph.D., Assistant Professor
Norman F. Haard, Ph.D., Professor
Ellen C. Hopmans, Ph.D., Assistant Professor
T. William Hutchens, Ph.D., Professor
John M. Krochta, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Kathryn L. McCarthy, Ph.D., Associate Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Michael J. McCarthy, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
David M. Ogrydziak, Ph.D., Professor
Michael A. O'Mahony, Ph.D., Professor
Chester W. Price, Ph.D., Professor
David S. Reid, Ph.D., Professor
Gerald F. Russell, Ph.D., Professor
Barbara O. Schneeman, Ph.D., Professor *(Food Science and Technology, Internal Medicine, Nutrition)*
Charles F. Shoemaker, Ph.D., Professor
R. Paul Singh, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Gary M. Smith, Ph.D., Professor

Emeriti Faculty

Richard A. Bernhard, Ph.D., Professor Emeritus
Walter L. Dunkley, Ph.D., Professor Emeritus
Robert E. Feeney, Ph.D., Professor Emeritus
Dieter W. Gruenwedel, Ph.D., Professor Emeritus
Jerald M. Henderson, D.Engr., Professor Emeritus
Walter G. Jennings, Ph.D., Professor Emeritus
Michael J. Lewis, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Bor S. Luh, Ph.D., Professor Emeritus
Mendel Mazelis, Ph.D., Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
Martin W. Miller, Ph.D., Professor Emeritus
Herman J. Phaff, Ph.D., Professor Emeritus
Thomas Richardson, Ph.D., Professor Emeritus
Howard G. Schutz, Ph.D., Professor Emeritus
Lloyd M. Smith, Ph.D., Professor Emeritus
Aloys L. Tappel, Ph.D., Professor Emeritus
John R. Whitaker, Ph.D., Professor Emeritus

Affiliated Faculty

Diane M. Barrett, Ph.D., Associate Specialist
Christine M. Bruhn, Ph.D., Specialist
John C. Bruhn, Ph.D., Specialist
Linda J. Harris, Ph.D., Assistant Specialist
Robert J. Price, Ph.D., Specialist
Moshe Rosenberg, Ph.D., Associate Specialist
Carl K. Winter, Ph.D., Associate Specialist

Major Program and Graduate Study. See the majors in Food Science and Food Biochemistry; and for graduate study, refer to the Graduate Studies section in this catalog.

Related Courses. See courses in Consumer Science, Engineering, Molecular and Cellular Biology, Nutrition, and Viticulture and Enology; Environmental Toxicology 101, Population Health and Reproduction 150, Plant Biology 172 and 172L.

Courses in Food Science and Technology (FST)

Lower Division Courses

***1. Food Science and Society** (3) II. The Staff
Lecture—2 hours; discussion—1 hour. Nature and scope of world food problems; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared foods; improvement and evaluation of acceptability and nutritional value of foods. Not open for credit to students who have received credit for course 100A, 100B.

2. Introductory Food Science (3) II, III. Russell
Lecture—3 hours; one industrial visit to a food factory (optional). Processes by which raw agricultural commodities are preserved and converted into edible foods; regulation of food manufacture and the chemistry and microbiology of food that control its qualities and safety. Not open for credit to students who have received credit for any other Food Science and Technology course. GE credit: SciEng or SocSci.

47. Food Product Development Field Study (1) III. Shoemaker
Discussion—6 hours; fieldwork—2 days (course given between winter and spring quarters). Prerequisite: advance enrollment required in winter quarter with instructor; background knowledge in foods from such courses as Food Science and Technology 1. Commercial aspects of the large-scale development, distribution, and evaluation of food products intended for human consumption. (Former course Consumer Science 47.) (P/NP grading only.)

50. Introduction to Food Science and Technology (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 2A, Biological Sciences 1A. Introduction to fruit, vegetable, dairy, seafood and meat technology. Overview of food processes used for preservation of food quality. Pilot plant exercises include food processing operations such as cheese making, canning, freezing, fermentation and dehydration of foods.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Shoemaker in charge)
(P/NP grading only.)

Upper Division Courses

100A. Food Chemistry (3) I. The Staff
Lecture—3 hours. Prerequisite: Chemistry 8B; Biological Sciences 1A recommended. Chemical aspects of food composition. Emphasis given to the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins and water.

100B. Food Properties (3) II. Guinard
Lecture—3 hours. Prerequisite: Chemistry 8B, course 100A. Further study of the properties of food with emphasis on the chemical basis of food quality attributes of flavor, texture, color, nutrition, and chemical safety.

100C. Principles of Food Biochemistry (3) III. Haard
Lecture—3 hours. Prerequisite: course 100B, Biological Sciences 103 (may be taken concurrently). Principles of physiology, cell biology, and biochemistry applied to postharvest changes in edible plant and animal tissues. Importance of enzymes in food quality and their use as food processing aids. Application of recombinant DNA technology to improving food quality.

101A. Food Chemistry Laboratory (2) I. Shoemaker
Lecture/laboratory—1 hour/3 hours. Prerequisite: course 100A (may be taken concurrently). Chemical aspects of food composition described in course 100A.

101B. Food Properties Laboratory (2) II. Shoemaker
Lecture/laboratory—1 hour/3 hours. Prerequisite: course 100B (may be taken concurrently). Study of properties of food described in course 100B.

102A. Malting and Brewing Science (4) II. The Staff
Lecture—4 hours. Prerequisite: Biological Sciences 102, 103; senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken course 102.

102B. Practical Malting and Brewing (4) III. The Staff
Lecture/discussion—2 hours; laboratory—6 hours. Prerequisite: course 102A and analytical experience beyond Chemistry 2C, such as Viticulture and Enology 123, Food Science and Technology 103, 123L, Molecular and Cellular Biology 120L. Open to seniors only in Fermentation Science or Food Science and Technology. Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing.

103. Physical and Chemical Methods for Food Analysis (5) I. Hopmans
Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 2C, 8B; Biological Sciences 103 (may be taken concurrently). An introduction to the theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis techniques are stressed.

*Course not offered this academic year.

104. Food Microbiology (3) II. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 102. Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry.

104L. Food Microbiology Laboratory (4) II, III. C. Price
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, course 104. Cultural and morphological characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods.

107A. Food Sensory Science (4) I. O'Mahony
Lecture—3 hours; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 120 (may be taken concurrently) or consent of instructor. Critical examination of techniques and theories of sensory measurement of food as analytical tools and as measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food.

107B. Food Sensory Science (3) II. Guinard
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107A. A critical examination of techniques and theories of sensory measurement applied to a range of food systems. Methods for analyzing the sensory attributes of food in relation to quality assurance, product development and optimization.

108. Food Processing Plant Sanitation (3) I. Ogrydziak
Lecture—3 hours. Prerequisite: Chemistry 8B, Biological Sciences 1A. Discussion of factors relating to sanitary control of food processing including water treatment, chemical and physical sanitizing agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the pertinence of government control agencies.

109. Principles of Quality Assurance in Food Processing (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Systems and Environment 120. Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry.

110A. Physical Principles in Food Processing (3) I. K. McCarthy
Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 5A and 5B or 7A-7B-7C or the equivalent; calculus recommended. Not open for credit to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and problem solving.

110B. Heat and Mass Transfer in Food Processing (3) II. Singh
Lecture/discussion—3 hours. Prerequisite: course 110A or the equivalent; Applied Biological Systems Technology 110L recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation heat transfer; microwave heating, refrigeration, freezing, psychrometrics; mass transfer during drying and storage.

119. Chemistry and Technology of Milk and Dairy Products (4) III. The Staff
Lecture—4 hours; demonstrations and a field trip. Prerequisite: Biological Sciences 1A and 102, or consent of instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products.

120. Principles of Meat Science (3) III. Bandman, Lee (Animal Science)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Anatomical, physiological, developmental and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology and public health issues associated with meat products. (Same course as Animal Science 120.) GE credit: SciEng.

120L. Meat Science Laboratory (2) III. Lee (Animal Science)
Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1A; course 120 (may be taken concurrently). Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plants. (Same course as Animal Science 120L.)

121. Principles of Poultry Product Technology (3) I. King (Avian Sciences)
Lecture—3 hours. Prerequisite: Biological Sciences 103 (may be taken concurrently). Quality, preservation, and processing of avian products. Topics include quality control, nutrition, chemistry, biochemistry, microbiology, and functional properties.

122. Marine Food Science (3) II. Ogrydziak, Haard
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 103 (may be taken concurrently). Biochemical, microbiological, and ecological principles unique to fish; where fish are found and why; fishing and landing techniques as they influence quality; processing, storage, and public health aspects of marine organisms; resource development, including aquaculture. Offered in alternate years.

123. Introduction to Enzymology (3) III. G. Smith
Lecture—3 hours. Prerequisite: Biological Sciences 103. Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by use of selected enzymes. (Former course Biochemistry and Biophysics 123.)

123L. Enzymology Laboratory (2) III. G. Smith
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103, course 123 (concurrently). Laboratory procedures involved in detection, purification and characterization of enzymes. (Former course Biochemistry and Biophysics 123L.)

127. Introduction to the Sensory Characteristics of Food (3) III. Guinard
Lecture—2 hours; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 120. Critical examination of techniques and theory of sensory measurement of food along with correlations with instrumental measures. For students not intending to specialize in food sensory science.

128. Food Toxicology (3) III. Shibamoto (Environmental Toxicology), Russell
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Environmental Toxicology 128.) GE credit: SciEng.

***131. Food Packaging** (3) III. Krochta
Lecture—3 hours. Prerequisite: Chemistry 8B, Biological Sciences 1A, Physics 5B or 7C. Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine.

***140. Food Laws and Regulation** (3) I. The Staff
Lecture—3 hours. Prerequisite: upper division standing. Legal and scientific issues involved in the regulation of the nation's food supply and nutritional status. Philosophy underpinning the application of regulatory statutes. Sources of information necessary for communication with government on public food policy information.

***151. Freezing Preservation of Food** (3) II. Reid
Lecture—3 hours. Prerequisite: course 110B, Biological Sciences 1A, and Chemistry 8B; course 104 recommended. Freezing of model systems and food with emphasis on physicochemical aspects. Consequences of food freezing and thawing. Modeling of freezing for predictive purposes. Visualization and characterization of frozen materials. Offered in alternate years.

159. New Food Product Ideas (2) I. Haard
Lecture/discussion—2 hours. Prerequisite: upper division standing with background course work in food science (course 50 or 100A), biological sciences (Biological Sciences 1A, 1B, 1C), or the physical sciences (Physics 5A, 5B, 5C or Chemistry 2A, 2B, 2C). Course will familiarize students with initial stages of food product development, including definition and articulation of a problem, generation of ideas to solve the problem, screening of ideas, and the formal presentation of a new product concept.

160. Food Product Development (4) II. Haard
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: upper division standing with background course work in food science (course 50 or 100A), biological sciences (Biological Sciences 1A, 1B, 1C), or the physical sciences (Physics 5A, 5B, 5C or Chemistry 2A, 2B, 2C). Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development.

***180. Integrated Food Processing** (4) III. M. McCarthy
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100C, 101A, 104, 110B. Recent advances in food processing are examined in terms of their effects on the various physical properties of the raw material. Pilot plant exercises will be employed to identify and illustrate common principles among apparently diverse processes.

190. Senior Seminar (1) I. Shoemaker
Seminar—1 hour. Prerequisite: senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities.

192. Internship for Advanced Undergraduates (1-12) I, II, III. The Staff (Shoemaker in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science.(P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Shoemaker in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Shoemaker in charge)
(P/NP grading only.)

Graduate Courses

201. Food Chemistry and Biochemistry (3) I. Shoemaker
Lecture—3 hours. Prerequisite: Biological Sciences 103. Topics on enzymes, proteins, pigments, lipids, and vitamins. Biochemical principles and methods related to food composition, preservation, and processing. Research proposals and group problem solving.

202. Chemical and Physical Changes in Food (4) II. Reid, Dungan
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103; Chemistry 107B. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials.

203. Food Processing (3) II. M. McCarthy
Lecture—3 hours. Prerequisite: course 110A, Physics 5C or 7C, Chemistry 107B, and one undergraduate food processing course. Principles of food engineer-

ing applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods.

204. Advanced Food Microbiology (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1C, 103, course 104 or a course in microbiology. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentations.

***205. Industrial Microbiology** (3) I. Ogrydziak
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 102, 103; Microbiology 130A-130B or Biological Sciences 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Offered in alternate years.

***207. Advanced Sensory-Instrumental Analyses** (3) III. Noble (Viticulture and Enology)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Offered in alternate years.

210. Proteins: Functional Activities and Interactions (3) II. G. Smith, Hutchens
Lecture—3 hours. Prerequisite: Biological Sciences 103. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

211. Lipids: Chemistry and Nutrition (3) I. German
Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 128B. Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.

217. Advanced Food Sensory Science (2) I. O'Mahony
Lecture—2 hours. Prerequisite: course 107A (may be taken concurrently). Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food.

227. Food Perception and the Chemical Senses (2) II. Guinard
Lecture—2 hours. Prerequisite: course 107B (may be taken concurrently), consent of instructor. Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal senses) and how they are involved in the perception of food and food intake.

250. Chromatographic and Electrophoretic Methods (4) III. Hopmans
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 2A-2B-2C, 8A-8B, 107A-107B; Biological Sciences 102 and 103 or consent of instructor. Theory and practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems and recovery of purified sample components.

250L. Chromatographic and Electrophoretic Methods Laboratory (1) III. Hopmans
Laboratory—3 hours. Prerequisite: course 250 concurrently. Practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems, and recovery of purified sample components.

290. Seminar (1) I, II. The Staff
Seminar—1 hour. (S/U grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Shoemaker in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.)

291. Advanced Food Science Seminar (1) III. Dungan
Seminar—1 hour. Prerequisite: completion of at least one quarter of course 290. Oral presentation of student's original research, discussion, and critical evaluation. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Shoemaker in charge)

299. Research (1-12) I, II, III. The Staff (Shoemaker in charge)
Prerequisite: graduate standing. (S/U grading only.)

Food Service Management

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Nutrition.

The Major Program and Graduate Study

Food Service Management is incorporated within the major in Dietetics. If you are interested in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, or contract food services, as well as in public or private institutions such as hospitals, correctional institutions, schools, or colleges, consult the Department of Nutrition.

Related Courses. See Food Science and Technology, and Nutrition.

Courses in Food Service Management (FSM)

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising Office, 1202E Meyer Hall (916-752-2512).

Upper Division Courses

120. Principles of Quantity Food Production (3) III. Prophet
Lecture—3 hours. Prerequisite: Food Science and Technology 100B and 101B. Fundamental principles of food service management including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

120L. Quantity Food Production Laboratory (2) I, II. Prophet
Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

121. Institutional Food Purchasing and Sanitation (3) I. The Staff
Lecture—1 hour; discussion—2 hours. Prerequisite: Biological Sciences 1A; course 120. Principles of quantity food purchasing and sanitation.

122. Food Service Systems Management (3) II. Prophet
Lecture—3 hours. Prerequisite: Agricultural and Resource Economics 112, courses 120, 120L, 121. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.

123. Personnel Management (3) III. The Staff
Lecture—3 hours. Prerequisite: a basic course in general psychology. Major personnel management functions; legal constraints and requirements; procedures in solving personnel problems faced by supervisors.

192. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: one upper division course in Food Service Management and consent of instructor. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (P/NP grading only.)

197T. Tutoring in Food Service Management (1-2) I, II, III. The Staff (Prophet in charge)
Discussion/laboratory—3 or 6 hours. Prerequisite: Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Prophet in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Prophet in charge)
(P/NP grading only.)

French

(College of Letters and Science)

————, Ph.D., Chairperson of the Department

Department Office (French and Italian), 522 Sproul Hall (916-752-0830)

Faculty

Marc E. Blanchard, Agrégé de Lettres, Professor *(French, Comparative Literature)*
Simone Clay, Ph.D., Lecturer
Elizabeth Constable, Ph.D., Assistant Professor
Manfred Kusch, Ph.D., Senior Lecturer *(French, Comparative Literature)*
Maria I. Manoliu, Ph.D., Professor
Michèle Praeger, Ph.D., Associate Professor
Georges Van Den Abbeele, Ph.D., Professor
Jerome Wagnild, Ph.D., Lecturer

Emeriti Faculty

Claude Abraham, Ph.D., Professor Emeritus
Max Bach, Ph.D., Professor Emeritus
Edward M. Bloomberg, Ph.D., Professor Emeritus
Ruby Cohn, Ph.D., Professor Emerita
Gerald Herman, Ph.D., Senior Lecturer Emeritus
Margo R. Kaufman, M.A., Senior Lecturer Emerita
Marshall Lindsay, Ph.D., Professor Emeritus
Ruth B. York, Ph.D., Senior Lecturer Emerita

The Major Program

The major program assures proficiency in all four of the language skills—speaking, understanding, reading, and writing—and acquaints students with the intellectual and cultural contributions of the French-speaking world through the study of its literature, traditions, and institutions.

The Program. The department is strongly committed to undergraduate education. It encourages its students to work closely with the academic adviser in designing a major tailored to their needs and interests within the broad requirements prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty. The department sponsors an active French Club and a chapter of Pi Delta Phi, the National French Honor Society. Each year, a substantial number of students with a good preparation in French participate in the university's very popular Education Abroad Program, which maintains centers at seven French universities.

*Course not offered this academic year.

Career Alternatives. Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, an anesthesiologist, a law professor, translators, a senior applications programmer, travel agents, independent business owners, a senior museum preparator, nurses, financial managers, stock brokers, and an industrial attaché for a French Trade Commission, all graduated with an A.B. in French from UC Davis and represent only a small fraction of the career choices documented in a recent survey of department graduates.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**19-36**
French 1, 2, 3 (or the equivalent)	0-15
French 20, 21, 22, 23	17
Linguistics 1	4
Depth Subject Matter	**44**
French 100, 101, 102, 103,104	20
Two additional upper division French literature courses	8
Elective courses in French literature, language, or civilization to be chosen in consultation with undergraduate adviser	16
Total Units for the Major	**63-80**

Recommended
French 101, 102, 103, 104, 107, and 160 plus other upper division courses for a total of 45 units for students interested in obtaining a "single subject" teaching credential in California.

Major Adviser. E. Constable.

Minor Program Requirements:

	UNITS
French	**24**
French 100	4
Two courses from French 101, 102 or 103	8
Three elective courses in French language, literature, or civilization one of which must be either French 107N or 108	12

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson only.

Honors Program. Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in French 194H (3 units) and French 195H (3 units). Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.5 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in French are in addition to the regular requirements for the major in French.

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French.

Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in either Critical Theory or Feminist Theory and Research, which are offered by the Program in Critical Theory and The Women's Studies Program, respectively. Detailed information may be obtained from the graduate advisers or the department chairperson.

Graduate Advisers. M.I. Manoliu (M.A., Ph.D degrees—French Linguistics); M. Blanchard (M.A., Ph.D. degrees—French Literature).

Teaching Credential Subject Representative. J. Wagnild. See also under the Teacher Education Program.

Courses in French (FRE)

Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement. Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 21.

Lower Division Courses

1. Elementary French (5) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Students who have successfully completed French 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.

1G. French for Graduate Students (5) III. The Staff (Chairperson in charge)
Lecture/discussion—5 hours. A course designed to prepare students for the graduate reading examination in French. (P/NP grading only.)

2. Elementary French (5) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.

3. Elementary French (5) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.

8. French Conversation (2) I, II, III. The Staff
Recitation—3 hours. Prerequisite: course 3 or the equivalent. Practice in initiating and maintaining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

20. Practical Phonetics (2) II, III. The Staff
Lecture/laboratory—3 hours. Prerequisite: course 3 or the equivalent. Practically oriented presentation of French sounds and intonational patterns. Laboratory drills with emphasis on phonetic features specific to contemporary spoken French. Students will use the international phonetic alphabet. Not open for credit to students who have completed course 5. (Former course 5.)

21. Intermediate French (5) I, II, III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 3. Grammar, oral practice, composition. Initiation to French institutions; reading and discussion of short literary texts.

22. Intermediate French (5) I, II, III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 21. Continuation of course 21. Grammar, oral practice, composition. Contemporary French culture; reading and discussion of a play.

23. Intermediate French (5) I, II, III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 22. Continuation of course 22. Grammar, oral practice, composition. Current topics in French politics and culture; reading and discussion of a novel.

***25. Introduction to French Literature in Translation** (3) II. The Staff
Discussion—3 hours. Introductory study of outstanding works of French drama and prose. Topics include major authors, genres, literary periods/movements. Study of literary techniques, structure, and meaning to foster better understanding of creative processes in French cultural context. Intended for the non-major. GE credit: ArtHum, Wrt.

***35. Explication and Dissertation** (2) III. The Staff (Chairperson in charge)
Lecture/discussion—2 hours. Prerequisite: course 22. Theory and practice of French *explication de texte* and *dissertation.* Especially recommended for those students planning to study abroad in French universities.

38. Intermediate French Conversation (2) I, II, III. The Staff
Recitation—3 hours. Prerequisite: course 8 or the equivalent. Continued practice in initiating and maintaining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

50. French Film (4) III. Van Den Abbeele
Lecture—1 hour; discussion—2 hours; term paper. Introduction to the tradition of French cinema from its invention by Méliès and the Lumière brothers through New Wave (especially the works of Truffaut and Godard) and more recent developments in French and Francophone film. Taught in English. Offered in alternate years. GE credit: ArtHum, Wrt.

***98. Directed Group Study** (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Composition in French (4) I, II, III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 23; course 20 strongly recommended. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building.

101. Introduction to French Poetry (4) I, II, III. The Staff
Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry. Study of French poetic conventions and versification. GE credit: ArtHum.

102. Introduction to French Drama (4) I, II, III. The Staff
Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of plays representing the main types of French drama, with emphasis on dramatic structure and techniques. GE credit: ArtHum.

103. Introduction to French Prose (4) I, II, III. The Staff
Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing main types of French prose, with emphasis on narrative structure and techniques. GE credit: ArtHum.

104. Translation (4) I, II. The Staff
Lecture—3 hours; numerous short in-class translations; frequent supplementary outside reading. Prerequisite: course 100 or the equivalent. Practice in English-to-French translation using a variety of non-literary materials, illustrating different problems and styles. Not open to students who have spent an academic year as an EAP student in a Francophone country or who have completed course 138.

106. French in Business and the Professions (4) I. The Staff
Lecture—1 hour; discussion—2 hours; frequent written assignments. Prerequisite: course 100 or consent of instructor. The French language as used in the commercial sphere. Emphasis on proper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business.

107N. The Making of Modern France (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to French culture through a historical approach to topics such as the citizen and the state (politics, justice, social security), the nation and centralization, the rise of public education, colonization, class and social relationships. Offered in alternate years. GE credit: ArtHum.

108. Contemporary French Culture (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Study of contemporary French culture through focus on specific topics such as women and French culture, decolonization and modernization, the politics of education, immigration in France, Francophone cultures. Offered in alternate years. GE credit: ArtHum.

110. Stylistics and Creative Composition (4) II. Manoliu
Lecture—3 hours; frequent papers. Prerequisite: course 100 or consent of instructor. Intensive course in creative composition using a variety of techniques and literary styles, patterned on Queneau's *Exercices de style*. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry.

***112. Masterpieces of French Drama in Translation** (3) II. The Staff
Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Plays in translation representing the main types of French drama with emphasis on dramatic structure and techniques. Consideration of this genre within French social and cultural context. Intended for the nonmajor. GE credit: ArtHum, Wrt.

***113. Masterpieces of French Novel in Translation** (3) III. The Staff
Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Novels in translation representing works from the seventeenth century to the present. Study of broad generic, theoretical, and historical contexts in France. Analysis of structure and techniques of the genre. Intended for the nonmajor. GE credit: ArtHum, Wrt.

***114. French Philosophical Literature in Translation** (3) III. The Staff
Discussion—3 hours. Prerequisite: course 25 or consent of instructor. French philosophical literature, with works analyzed within broad philosophic, moral, and historical contexts. Focus on such topics as stoicism, classicism, libertinism, naturalism, existentialism, absurdism. Literary techniques and styles analyzed. GE credit: ArtHum, Wrt.

***115. Medieval French Literature and Society** (4) I. Van Den Abbeele
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The social and cultural life of medieval France as studied through its representation in such literary works as *La Chanson de Roland*, courtly love lyric, the Arthurian romances of Chretien de Troyes, *Aucassin et Nicolette*, selected fabliaux and farces. Offered in alternate years. GE credit: ArtHum.

116. The French Renaissance (4) III. Van Den Abbeele
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Overview of major works and writers with particular attention to the historical context of the turbulent 16th century. Writers to be read may include Rabelais, Marot, Ronsard, Du Bellay, Labe, Marguerite de Navarre, Montaigne, and D'Aubigne. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

117A. Baroque and Preclassicism (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The literature and intellectual culture of the period between the Renaissance and French classicism. Offered in alternate years. GE credit: ArtHum.

117B. The Classical Moment (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Literature, culture, and politics in the "Age of Louis XIV." May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

118A. The Age of Reason and Revolution (4) II. Kusch
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Literature and philosophy of the French Enlightenment. Readings from such authors as Bayle, Fontenelle, Montesquieu, Voltaire, Rousseau and Diderot. Offered in alternate years. GE credit: ArtHum.

***118B. Private Lives and Public Secrets: The Early French Novel** (4) II. Kusch
Lecture/discussion—3 hours; term paper. Prerequisite: course 103. History of the French *roman* from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th century. Offered in alternate years. GE credit: ArtHum.

***119A. The Romantic Imaginary** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolution, individualism, nature, the *mal du siecle,* Romantic irony, the creative imagination, the cult of ruin. Offered in alternate years. GE credit: ArtHum.

119B. Realism, History and the Novel (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Investigation of the narrative and historical codes of French realist fiction, with emphasis on the representation of history in the realist novel, its depiction of social "realities" such as class and gender, and its relation to the historical situation of post-revolutionary society. Offered in alternate years. GE credit: ArtHum.

119C. From Baudelaire to Surrealism (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101. Study of the main poets and poetic movements from the mid-19th to the early 20th century, including Baudelaire, the Symbolists, and the Surrealists. Offered in alternate years. GE credit: ArtHum.

120. Modern French Thought (4) I. Praeger
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Overview of post-Second World War French intellectual currents from existentialism to structuralism and deconstructionism. Readings will include Sartre and de Beauvoir, Camus, Levi-Strauss, Lacan, Barthes, Foucault, Derrida, Kristeva, Sollers, Cixous, and Irigaray. Offered in alternate years. GE credit: ArtHum.

121. Twentieth Century French Novel (4) II. Praeger
Lecture/discussion—3 hours; term paper. Prerequisite: course 103. Novels and theories of the novel, from Proust to the Nouveau Roman and beyond. Readings from among Gide, Sartre, de Beauvoir, Camus, Breton, Beckett, Robbe-Grillet, Sarraute, Simon, Barthes, Duras, Tournier, Perec, Modiano, Guibert, Toussaint. Offered in alternate years. GE credit: ArtHum.

124. Post-Colonialist and Francophone Literature (4) III. Praeger
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Introduction to Post-Independence Black African and/or Caribbean and/or North African literatures written in French. Selected topics include: identity and subjectivity, the role of the intellectual, women's voices, languages and oral literatures, cultural syncretism, theories of post-colonialism. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div.

***125. French Literature and Other Arts** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The relationship between French literature and other arts—painting, music, cinema, architecture, opera—from different periods. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

127. Paris: Modernity and Metropolitan Culture (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Study of the representation of Paris in 19th and 20th century texts and its importance in defining the experience and art of modernity. Offered in alternate years. GE credit: ArtHum.

***130. From Page to Stage: Theatre and Theatricality** (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 102. French theater as literature and performance. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

133. Gender and Politics in French Literature and Culture (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Examination of the thematic, theoretical and political tendencies in contemporary French fiction. Barthes, Foucault, Duras, Guibert, considered in terms of their writing on identity and gender. Offered in alternate years. GE credit: ArtHum, Div.

***138. Advanced Literary Translation** (4) II. The Staff
Lecture—3 hours; numerous short in-class translations; frequent supplementary outside assignments. Prerequisite: course 100 or the equivalent, course 104 or the equivalent (such as one academic year as an EAP student in a Francophone country). English-to-French translation of a variety of modern literary texts.

***140. Study of a Major Writer** (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 100 and course 101, 102, or 103 as appropriate to selected topic, or consent of instructor. Concentrated study of works of a single author. May be repeated once for credit as author-subject changes.

141. Selected Topics in French Literature (4) II. The Staff
Lecture—3 hours; term paper or short papers. Prerequisite: courses 100 and 101 or 102 or 103 as appropriate to the selected topic or consent of instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, etc. May be repeated twice for credit when topic differs.

***160. Topics in French Morphosemantics** (4) III. Manoliu
Lecture/discussion—3 hours; term paper. Prerequisite: course 100 and Linguistics 1. Analysis of controversial grammatical phenomena with emphasis on the semantic content and the pragmatic function of such categories as tense, mood and gender. Offered in alternate years.

***161. Modern French Syntax** (4) III. Manoliu
Lecture—3 hours; short papers. Prerequisite: course 160. Presentation of basic concepts of contemporary approaches to French syntax. Consideration of new explanations of so-called "irregular" phenomena in current language models.

***162. History of French Language** (4) II. Manoliu
Lecture—3 hours; term paper. Prerequisite: course 160. Main periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language. GE credit: ArtHum.

192. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (P/NP grading only.)

194H. Special Study for Honors Students (3) I, II, III. The Staff (Chairperson in charge)
Independent study—3 hours. Prerequisite: open only to French majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in French literature, civilization, or language studies. (P/NP grading only.)

195H. Honors Thesis (3) I, II, III. The Staff (Chairperson in charge)
Independent study—3 hours. Prerequisite: course 194H. Writing of an honors thesis on a topic in French literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.)

197T. Tutoring in French (1-4) I, II, III. The Staff
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in undergraduate courses including

leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Tutoring in the Community (2-4) I, II, III. The Staff
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

***198. Directed Group Study** (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200. Literary Analysis (4) I. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing. Basic principles of applied literary theory. Concepts and methods of the critical analysis of literature and literary texts. Basic principles of bibliographic research will be covered at the beginning of the course.

***201. History of French: Phonology and Morphosyntax** (4) III. Manoliu
Seminar—3 hours; term paper. Prerequisite: courses 159, 160, 250A, or consent of instructor. Presentation of the main changes in the phonematic and grammatical structures of French, from Latin to contemporary spoken aspects.

***205A. Sixteenth-Century Literature: The Humanists** (4) I. The Staff
Seminar—3 hours. French humanism in its most varied forms. Although at different times Rabelais and Montaigne will be primarily studied, other leading intellectuals and religious writers will also receive attention. May be repeated for credit when different topic is studied.

***206A. Seventeenth-Century Literature: Theater** (4) II. The Staff
Seminar—3 hours. Works of Corneille, Racine, Molière, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.

206B. Seventeenth-Century Literature: Prose (4) I. The Staff
Seminar—3 hours; term paper and/or exposé. Works of authors such as Pascal, Descartes, Mme de Lafayette. One or more authors may be covered. May be repeated for credit with consent of instructor as different topics are studied from quarter to quarter.

***206C. Seventeenth-Century Literature: Poetry** (4) III. The Staff
Seminar—3 hours; term paper and/or exposé. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor.

***207A. Eighteenth-Century Literature: Philosophies** (4) II. Kusch
Seminar—3 hours; term paper and/or exposé. Not a course in philosophy, but an examination of the role of philosophy in the design and context of literary works. Study of one or more authors. May be repeated for credit.

***207B. Eighteenth-Century Literature: Novel** (4) III. The Staff
Seminar—3 hours. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and new literary values. Course may treat one or more novelists of the period. May be repeated for credit when different topics are studied.

208A. Nineteenth-Century Literature: Fiction (4) I. The Staff
Seminar—3 hours. Study of the works of one or several novelists and/or short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied.

***208B. Nineteenth-Century Literature: Poetry** (4) III. Blanchard
Seminar—3 hours. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are studied.

209A. Twentieth-Century: Prose (4) II. The Staff
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several writers of the period.

***209B. Twentieth-Century: Theater** (4) II. The Staff
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.

***209C. Twentieth-Century: Poetry** (4) III. The Staff
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.

210. Studies in Narrative Fiction (4) I. Praeger
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

211. Studies in Criticism (4) II. Blanchard
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

***212. Studies in the Theater** (4) I. The Staff
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

***213. Studies in Poetry** (4) II. The Staff
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

214. Study of a Literary Movement (4) III. The Staff
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

***238. Advanced Literary Translation** (4) III. The Staff
Seminar—3 hours; significant amounts of translation of texts. Designed to acquaint students with the basic principles of applied translation theory. Translation of texts chosen for their theoretical interest. Open to native French speakers only with consent of instructor.

250A. French Linguistics: Morphematics (4) I. Manoliu
Seminar—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar, with emphasis on morphematics, i.e., a semantic analysis of grammatical categories, as well as of their paradigmatic and syntactic relations.

***250B. French Linguistics: Transformational Syntax** (4) I. Manoliu
Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectivization, passivization, relativization) focusing on the most recent developments in the field (i.e., case grammars, generative semantics, trace theory).

251. Trends in French Contemporary Linguistics (4) I. Manoliu
Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Issues in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc. Intended for students in French linguistics or those interested in applying linguistic models to literature. May be repeated once for credit with consent of instructor when topic differs.

***261. Current Issues in Modern French Syntax** (4) II. Manoliu
Seminar—3 hours; term paper. Prerequisite: course 161. Presentation of contemporary approaches to French syntax. Explanations of various less regular phenomena, with reference to on-going changes in modern spoken French. May be repeated for credit with consent of instructor when topic differs. Offered in alternate years.

297. Individual Study (1-5) I, II, III. The Staff (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1-5 hours. May be repeated for credit with consent of instructor.

299. Research (1-12) I, II, III. The Staff (S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
(S/U grading only.)

Professional Courses

***300. Teaching of a Modern Foreign Language** (3) III. The Staff
Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

390A. The Teaching of French in College (2) I. Wagnild
Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. May be repeated for credit with consent of instructor. (S/U grading only.)

390B. The Teaching of French in College (2) II. Wagnild
Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)

390C. The Teaching of French in College (2) III. Wagnild
Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)

Freshman Seminar Program

Francisco J. Samaniego, Ph.D., Program Director
Program Office, 17 Wellman (Teaching Resources Center) (916-752-6050)

Committee in Charge

Masako Darrough, Ph.D. *(Graduate School of Management)*
Marina Estabrook, M.A. *(Teaching Resources Center)*
William Hornof, D.V.M., Ph.D. *(School of Veterinary Medicine)*
Alan Jackman, Ph.D. *(College of Engineering)*
Annie King, Ph.D. *(College of Agricultural and Environmental Sciences)*
Nora McGuinness, Ph.D. *(Integrated Studies, Davis Honors Challenge)*
Rex Perschbacher, J.D. *(School of Law)*
Larry Stark, Ph.D. *(School of Medicine)*
John Vohs, M.A. *(Academic Senate Committee on Courses)*
Fred Wood, Ph.D. *(College of Letters and Science)*

Course in Freshman Seminar (FRS)

(Questions pertaining to the following course should be directed to the instructor or to the Teaching Resources Center.)

Lower Division Course

1A-Z. Freshman Seminar (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: open only to students who have completed fewer than 45 quarter units. Investigation of a special topic (A-Z) through shared readings, discussions, written assignments, and spe-

cial activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis upon student participation in learning.

Genetics

See Biological Sciences: Section of Molecular and Cellular Biology; and Genetics (A Graduate Group), below

Genetics (A Graduate Group)

Kenneth Burtis, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9092)

Faculty. Includes members drawn from the Colleges of Agricultural and Environmental Sciences, and Letters and Science, Division of Biological Sciences, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. The Group is subdivided into three affinity groups: molecular, animal, and plant. Each of these affinity groups provides broad training in genetics, combined with an emphasis specific to its area. Both model genetic organisms and agricultural species are studied using molecular and classical approaches. For additional information regarding the program, contact the group administrative assistant at 916-752-9092.

Graduate Adviser. Consult Genetics Graduate Group Office.

Courses in Genetics (GGG)

Graduate Courses

201A. Transmission Genetics (3) I. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 101, introductory statistics and calculus. Study of segregation, linkage, and mapping and the modifications of Mendel's original genetic model.

201B. Cytogenetics (3) II. Dvorak and Murray
Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Study of cytogenetics including meiosis, recombination, chromosomes, haploidy, aneuploidy, trisomics, monosomics, autopolyploids and intra- and interspecific manipulation.

201C. Molecular Genetics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Current topics in molecular genetics at a graduate level, with emphasis on the relationship between classical genetic studies and current molecular research, as well as on the molecular techniques used to develop the basic concepts of molecular genetics.

201D. Quantitative and Population Genetics (3) II. St. Clair, Famula, Shaw
Lecture—3 hours. Prerequisite: course 201A or consent of instructor. The basic concepts of quantitative and population genetics, including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation and evolution in populations, and experimental methodologies.

205. Molecular Genetics Laboratory (5) I, II, III. The Staff
Laboratory—15 hours. Prerequisite: Biological Sciences 101 (may be taken concurrently) or the equivalent, enrolled in Genetics Graduate Group. Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation. May be repeated up to three times for credit. (S/U grading only.)

207L. Research Methods in Plant Genetics Laboratory (2-5) I, II, III. The Staff
Laboratory—6-15 hours. Prerequisite: course 207 (may be taken concurrently). Working knowledge of contemporary methodologies in plant genetics is obtained by participating in research programs of the various Plant Genetics Affinity Group members. (S/U grading only.)

291. Seminar in History of Genetics (2) II. Griesemer (Philosophy)
Seminar—2 hours. Prerequisite: Biological Sciences 101. The development of modern genetic theories beginning with Mendel.

292A. Seminar in Cytogenetics (1-3) I. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the deletion, duplication and rearrangement of chromosome regions. Offered in alternate years.

292B. Seminar in Quantitative Genetics (1-3) II. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the inheritance of continuous characters. Offered in alternate years.

***292C. Seminar in Developmental Genetics** (1-3) I. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics in the area of cell-specific control of genes in development. Offered in alternate years.

***292D. Seminar in Population, Evolutionary and Ecological Genetics** (1-3) II. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the analysis and prediction of genetic changes in populations. Offered in alternate years.

293. Seminar in Animal Genetics (1-3) III. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals.

295. Seminar in Molecular Genetics (1-3) I. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the structure, modification and expression of genes.

296. Scientific Professionalism and Integrity (2) I. Yoder
Lecture—1 hour; seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Review of basic skills required of contemporary scientists. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Emphasis on responsibilities of scientists to factually and thoughtfully communicate results. (S/U grading only.)

297. Seminar in Plant Genetics (1-3) II. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Current topics in plant genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal and population genetics to address questions in plant biology will be emphasized.

298. Group Study (1-5) I, II, III. Members of the Group (Chairperson in charge)
Prerequisite: consent of instructor. Group study of selected topics in genetics. (S/U grading only.)

299. Research (1-12) I, II, III. Members of the Group (Chairperson in charge)
(S/U grading only.)

Geographic Information Systems

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Geographic Information Systems with an emphasis on spatial analysis. This minor is ideal for students interested in information processing of spatial data related to remote sensing, land information systems, marine cartography, thematic mapping, surface modeling, environmental modeling resources management, public utility planning, emergency response, geomarketing, geotechnics, archaeology, military exercises, and computer-aided design. Prerequisites include Mathematics 16A-16B, Statistics 13 or Agricultural Systems and Environment 120 or Civil and Environmental Engineering 114, and Agricultural Systems and Environment 21 or Computer Science Engineering 15.

Minor Program Requirements:

	UNITS
Geographic Information Systems	**18**
Applied Biological Systems Technology 180, 181	10
Select 8 or more units from the following courses: Agricultural Systems and Environment 121, Geography 105, 106, 107, Hydrologic Science 186.	8

Minor Advisers: R. Plant, W. Wallender.

Geography

Courses in Geography (GEO)

Lower Division Courses

1. Physical Geography (4) II. Jett
Lecture—3 hours; laboratory—2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

2. Introduction to Cultural Geography (3) I. Jett; III. Allan
Lecture—3 hours. Traditional systems of habitat use: their characteristics, origin, occurrence, ecology. Development of contemporary cultural patterns and patterns in man-land relationships. Emphasis on the nonindustrial world. GE credit: SocSci.

2G. Introduction to Cultural Geography: Discussion (1) I, III. The Staff
Discussion—1 hour; short papers. Prerequisite: course 2 concurrently. Small group discussion of topics and readings assigned for course 2. Preparation and discussion of short papers. GE credit with concurrent enrollment in course 2: Wrt.

***5. Introduction to Urban and Economic Geography** (3) I. The Staff
Lecture—3 hours. The location of economic and urban activities. Patterns and theories of spatial organization: resource development, agricultural and manufacturing regions, urban systems, and urban structure. GE credit: SocSci.

***5G. Economic and Urban Geography: Discussion** (1) I. The Staff
Discussion—1 hour; short papers. Prerequisite: course 5 concurrently. Small group discussion of topics and readings assigned for course 5. Preparation and discussion of short papers. GE credit with concurrent enrollment in course 5: Wrt.

10. The World's Regions (3) I. Jett; II. Dingemans; III. Allan
Lecture—3 hours. The major geographic regions of the world; their origins, physical environments, cul-

*Course not offered this academic year.

tures and economies; their interactions and global roles. Designed for non-majors.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Independent Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor, primarily for lower division students. (P/NP grading only.)

Upper Division Courses

***120. Deserts of California and the Southwest** (3) II. Jett
Lecture—3 hours. Prerequisite: courses 1 and 2 or the equivalent recommended. Physical and human geography of the Mojave, Sonoran, and Chihuahuan deserts of the U.S., the Colorado Plateau, and the southern Great Basin. Desert origins, climate, vegetation, and landforms. Cultures and histories of native tribes, Hispano-Americans, and Anglo-Americans. Offered in alternate years.

***121. North America** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and lifeways in the United States and Canada, and the ways in which physical and human forces have contributed to their variety. Regional stresses within and between the two countries.

123. Western Europe (3) I. Dingemans
Lecture—3 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social, and political problems of the countries of Western Europe.

***126. Southern Asia** (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia. Offered in alternate years.

***131. California** (4) III.
Lecture—3 hours; discussion—1 hour. The regional nature and variety of California: landforms, climates, vegetation, and soils; water, agriculture, and the cities. Ecological problems caused by increasing population and technological pressures on these environments.

143. Political Geography (4) III. Dingemans
Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.

***151. History of Geographic Thought** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

***155. Urban Geography** (4) I. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Geography of land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planning policy, transportation systems, and residential structure.

***156. The Urban Region** (4) III. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Location and functional interdependence of cities. Relations between city and hinterland, including labor shed, service area, and economic base. Role of urbanization in regional development.

***161. Conservation of Resources and Environment** (4) I. Jett
Lecture—4 hours. Principles of natural-resource and environmental-quality conservation. Land use conflicts between forestry, agricultural, mining, municipal, and recreational interests. Roles of industry, government, and society in creating and resolving resource and environmental problems.

170. Cultural Ecology (4) II. Jett
Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographic theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, cultivators, and urbanites; their environmental impacts; their domestic plants and animals.

***171. Cultural Geography** (4) III. Jett
Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Consideration of principal concepts and approaches in cultural geography in modern times, and links with, and parallels in, other disciplines.

192. Student Internship in Geography (2-4) I, II, III. The Staff
Internship—5-15 hours at employing agency; term paper. Prerequisite: consent of undergraduate Geography major adviser and consent of instructor. Supervised program of student internships with public agencies dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Geography (A Graduate Group)

Michael G. Barbour, Ph.D., Chairperson of the Group

Group Office, 152 Walker Hall (916-752-4119)

Faculty. Includes approximately 50 members drawn from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, the Division of Biological Sciences, and the Schools of Medicine and Veterinary Medicine.

Graduate study. The Graduate Group in Geography offers programs of study and research leading to the M.A. and Ph.D. degrees. Faculty and students share a common interest in spatial interaction between humans and the biophysical environment. Areas of thematic emphasis include biogeography, cultural-human geography, medical-nutritional geography, and physical-environmental geography. Research is international in location; current projects are located in the Caribbean, South America, Europe, the Middle East, Asia, and the United States (especially in the southwest).

Preparation. Most students considered for admission will have completed an undergraduate major in geography or a closely related field. They normally will have completed a course in any three of the following areas: field methods in geography, cartography, remote sensing, statistics, GIS, geographic theory. They usually will have completed one course each in human geography, physical geography, and a geographic region.

Graduate adviser. J.R. Lund.

Courses in Geography (GEO)

Graduate Courses

200. Research Trends in Geography (1)
The Staff
Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.)

200C. Theory and Practice of Geography (4) II. Momsen
Lecture—3 hours; term paper. Prerequisite: graduate standing. Development of geographical theory; key concepts and theories; their chronology, and application to the practice of geography. Analytical background to geographical theory; application of theory to geographical practice and research projects.

200D. Field Research and Methodology (4) III. Allan
Lecture/discussion—2 hours; fieldwork—3 hours; term paper. Prerequisite: graduate standing. Methods and tools of geographic research; emphasis on research design, primary and secondary data collection; data analysis; organization and structure of research proposals; proposal preparation.

***201. Sources and General Literature of Geography** (4) I, II, III. The Staff
Discussion—4 hours. Prerequisite: graduate standing in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

***202. Arctic and Alpine Environments** (4) III. The Staff
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 118 or consent of instructor. Analysis of cold climate processes in high latitudes and high altitudes. Interdisciplinary evaluation of arctic and alpine environments; including glaciation and permafrost, vegetation development and landscape change through time; effects of climatic change. Offered in alternate years.

***290. Seminar: Selected Regions** (4) III. The Staff
Seminar—3 hours. Region to be announced annually.

***291. Seminar in Cultural Geography** (4) III. Jett
Seminar—3 hours.

***292. Seminar in Plant Geography** (4) I. Bahre
Seminar—3 hours; seminar paper. Prerequisite: graduate standing. Examination of that aspect of cultural plant geography dealing with human impacts and vegetation change in the earth's major biomes. Particular emphasis on the New World's savannas, deserts, and grasslands. Offered in alternate years.

***294. Seminar in Climatology** (4) II. The Staff
Seminar—3 hours.

295. Seminar in Urban Geography (4) II. Dingemans
Seminar—3 hours.

***296. Seminar in Agricultural Geography** (4) II. The Staff
Seminar—3 hours.

297. Graduate Group in Geography Seminar (2) I, II, III. The Staff
Lecture/discussion—1 hour; term paper. Prerequisite: graduate standing. Seminars by UC Davis faculty and prominent national and international scholars; research presentations by Graduate Group in Geography Ph.D. candidates. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Individual Study (1-12) I, II, III. The Staff
Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only.)

Geology

(College of Letters and Science)

Jeffrey F. Mount, Ph.D., Chairperson of the Department

Department Office, 174 Physics/Geology Building (916-752-0350)

Faculty

Roland Bürgmann, Ph.D., Assistant Professor
Sandra J. Carlson, Ph.D., Associate Professor
William H. Casey, Ph.D., Professor *(Land, Air and Water Resources)*
Richard Cowen, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*

Howard W. Day, Ph.D., Professor
James A. Doyle, Ph.D., Professor *(Evolution and Ecology)*
Graham E. Fogg, Ph.D., Professor *(Land, Air, and Water Resources)*
Louise H. Kellogg, Ph.D., Associate Professor
Charles E. Lesher, Ph.D. Associate Professor
James S. McClain, Ph.D., Associate Professor
Eldridge M. Moores, Ph.D., Professor
Jeffrey F. Mount, Ph.D., Professor
Peter Schiffman, Ph.D., Professor
Howard J. Spero. Ph.D., Associate Professor
Dawn Y. Sumner, Ph.D., Assistant Professor
Robert J. Twiss, Ph.D., Professor
Geerat J. Vermeij, Ph.D., Professor
Kenneth L. Verosub, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Robert A. Zierenberg, Ph.D., Professor

Emeriti Faculty

Charles G. Higgins, Ph.D., Professor Emeritus
Robert A. Matthews, A.B., Senior Lecturer Emeritus

The Major Programs

"Civilization exists by geological consent—subject to change without notice."

Will Durant

Geology is the study of the Earth, and in particular the history, the structure, the evolution of life, and the processes that have molded the Earth and its inhabitants. The coming of the space age has also extended the field to include the solid planets of the solar system. Although often attracted to the study of geology by an aesthetic appreciation and enjoyment of the earth, geologists commonly approach their studies from an interest either in the academic or the applied aspects of the science.

The academic aspects include the study of the history of life, the Earth, and the planets, and of the processes that drive the historical evolution. The study of historical evolution through "deep time" is what fundamentally distinguishes geology from most of the other physical sciences. The study of the processes that drive this evolution can involve the application of any of the physical or life sciences to understanding the Earth. In this sense, geology is truly an interdisciplinary science.

The applied aspects of the science generally involve the interaction between humans and the earth. Applied studies include the study of mineral resources including oil and water; identification and mitigation of Earth hazards such as earthquakes, landslides, and volcanic eruptions; identification and mitigation of polluted ground water; and land use planning.

The Program. Students interested in becoming professional geologists or continuing their geological studies at the graduate level should elect the Bachelor of Science degree program. The Bachelor of Arts program is for students interested in an interdisciplinary program of study, or who plan to go into pre-college teaching. Both programs allow students to emphasize an aspect of the field of particular interest to them. The upper division electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study. Transfer students should have completed as much as possible of the preparatory subject matter listed below. High school preparation for either program should include high school chemistry and four years of mathematics or the equivalent.

Internships and Career Alternatives. The largest employer of geologists has traditionally been the oil industry, although recently more opportunities have been available in environmental geology with consulting firms and government agencies. Government organizations and research laboratories also employ geologists in a variety of other capacities. There is a growing need for earth science teachers at all pre-college levels, and colleges and universities provide opportunities in teaching and research. Entry level positions are available with a Bachelor's degree. A Master's degree is the usual professional level degree, and a Ph.D. is generally required for research and academic positions. Internships during undergraduate training are a means of exploring potential career opportunities and can lead to positions after graduation. UC Davis students have interned at the California Division of Mines and Geology, the State Department of Water Resources, and various consulting firms.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 41-44
Geology 3, 3L, 50, 50L, 60, 60L.....14
Mathematics 16A-16B or 21A-21B 6-8
Chemistry 2A-2B 10
Physics 7A-7B 8
Statistics 13 or 13AT or 32 or 102 3-4

Depth Subject Matter 36
Geology 100, 100L, 101, 101L, 103, 107, 107L, 108N, 109, 109L.....24
Additional upper division electives chosen from upper division courses in geology. Upper division courses in related fields may satisfy this requirement if approved *in advance* by the major adviser.....12

Total Units for the Major 77-80

Recommended
Chemistry 2C or Hydrologic Science 134, Physics 7C.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 54-57
Geology 3, 3L, 50, 50L, 60, 60L.....14
Mathematics 21A-21B-21C 12
Chemistry 2A-2B, Hydrologic Science 134 or Chemistry 2C 13-15
Physics 7A-7B-7C or 9A-9B-9C 12
Statistics 32 or 102.....3-4

Depth Subject Matter 54
Geology 100, 100L, 101, 101L, 102N, 103, 105N, 106N, 107, 107L, 108N, 109, 109L, 110 42
Additional upper division electives chosen from Geology 130–190 courses, Hydrologic Science 145A, 145B and related fields approved *in advance* by major adviser. No more than 3 units upper division elective credit for Geology 115–129 courses. Maximum of 6 units upper division elective credit for Geology 194A-194B or 194HA-194HB. 12

Total Units for the Major 108-111

Recommended
One or more of the following courses, depending upon emphasis in geology: Mathematics 21D, 22A, 22B, Statistics 104, 106, 108, 110, Chemistry 2C, 110A.

Major Advisers. A.B. degree: R. Cowen; B.S. degree: R. Cowen, L.H. Kellogg, R.J. Twiss.

Minor Program Requirements:

Students in other disciplines may elect to complete a minor in Geology by choosing a geological subject emphasis listed below. On transcripts the minor will appear as a minor in *Geology*.

UNITS

Geology.....18-24
Select one of the five emphases below.

General Geology emphasis.....**19**
Geology 50 and 50L (or 1 and 1L).....5
Geology 100, 101, 109 and either 107 or 108N.....11
Geology 116 or 134 or 135 3

Minor Advisers. R. Cowen, R.J. Twiss.

Engineering Geology emphasis **19-22**
Geology 50 and 50L.....5
Civil Engineering 171, 171L 5
Three courses chosen from Geology 134, 161, 162N, 163, 170, Hydrologic Science 103, 145, Soil Science 118, 120 9-12

Minor Adviser. R.J. Twiss

Geochemistry emphasis **18-20**
Geology 60, 60L, 129, 146N 9
Chemistry 110A, 110C 6
(Chemistry majors may substitute one of the elective courses for Chemistry 110C.)
One elective course chosen from Chemical Engineering 151, Engineering 130, 134, Geology 150A, Hydrologic Science 134, Soil Science 102.....3-5

Minor Adviser. R.J. Twiss.

Oceanography emphasis **21-24**
Geology 108N, 116, 150A, 150B, 150C....16
Two courses chosen from Environmental Studies 100, 151, Geology 109, 151, 152N, Hydrologic Science 136.....5-8

Minor Adviser. H.J. Spero.

Paleobiology emphasis **20-21**
Geology 107 and 107L, 108N 8
Geology 151 or 152N 4
At least eight additional units from the following: Anthropology 151 or 152, Evolution and Ecology 100, 101, 102, 105, 112-112L, 140, 149, Geology 109, 150C...8-9

Minor Adviser. R. Cowen.

Interdisciplinary minors. The Geology Department administers two interdisciplinary minor programs, **Environmental Geology** and **Geophysics,** which may be completed by students majoring in any discipline, including Geology. Programs for these minors are listed separately in this catalog in alphabetical order. For Geology majors, one course at most from these minor programs can be counted toward satisfaction of the Geology degree requirements.

Integrated Science Teaching Credential. Students wishing to prepare for the teaching credential in Integrated Science with a concentration in Geoscience may do so by satisfying the requirements for the A.B. degree in Geology (77-80 units) and 36-37 additional units of science as outlined below. Students may also prepare for the science credential by taking the B.S. degree in Geology (108-111 units) and an additional 30-32 units as indicated by the asterisk (*) below.

Biological Sciences 1A-1B-1C*.....15
Chemistry 2C.....5
Physics 7C 4
Geology 36* 4
Geology 116-116G* 5
Atmospheric Science 60* or 100*.....3-4

Students are advised to take the following courses as upper division electives in the A.B. program:

Geology 105, 106N, and 134* or 135*...12-13

Teaching Credential Subject Representative. H.W. Day. See also under Education—Teacher Education.

Graduate Study. The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Graduate Advisers. J.F. Mount, J.S. McClain, S.J. Carlson.

Courses in Geology (GEL)

Lower Division Courses

1. The Earth (4) I, II. Cowen; III. Verosub
Lecture—3 hours; discussion—1 hour. Introduction to study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. GE credit: SciEng.

1L. Earth Laboratory (1) I, II. Cowen; III. Verosub
Laboratory—3 hours. Prerequisite: course 1 (preferably taken concurrently). Introduction to Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and the processes that form them. Not open for credit to students who have taken course 50L.

*Course not offered this academic year.

3. History of Life (3) II. Cowen
Lecture—3 hours. Prerequisite: course 1 recommended. The history of life during the three and one-half billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SciEng.

3G. History of Life: Discussion (1) II. Cowen
Discussion—1 hour. Prerequisite: course 3 concurrently. Small group discussion and preparation of short papers for course 3. GE credit with concurrent enrollment in course 3: Wrt.

3L. History of Life Laboratory (1) II. Cowen
Laboratory—3 hours. Prerequisite: course 3 concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution.

4. Evolution: Science and World View (3) II. Vermeij
Lecture—2 hours; discussion—1 hour. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SciEng.

12. Evolution and Paleobiology of Dinosaurs (2) III. Carlson
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies.

17. Earthquakes and Other Earth Hazards (2) I. Verosub
Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and floods on Man, his structures and his environment. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.

20. Geology of California (2) II. Moores
Lecture—2 hours; demonstration—1 hour. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. GE credit: Wrt.

32. Volcanoes (4) I. Schiffman
Lecture—3 hours; discussion/laboratory—1.5 hours. Study of how volcanoes, their eruptions, and their eruptive products shape our planet's surface, influence its environment, and provide essential human resources. (Former course 120.) GE credit: SciEng, Wrt.

36. The Solar System (4) III. Verosub
Lecture—3 hours; discussion—1 hour. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system. Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SciEng, Wrt.

***43. Form, Function, and Evolution: The Molluscan Shell** (3) III. Vermeij
Lecture/discussion—2 hours; term paper. Prerequisite: course 1, 3, or Biological Sciences 10. Evolutionary principles relating form, function, and environment are explained through the study of shells of living and fossil molluscs. Topics include shell geometry, mechanical design, adaptation to enemies, and the distribution of shell architectural types in space and time. GE credit: SciEng, Wrt.

50. Physical Geology (3) I. Zierenberg
Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for course 1 or the equivalent may receive only 2 units for course 50.

50L. Physical Geology Laboratory (2) I. Zierenberg
Laboratory—6 hours; one or two one-day field trips. Prerequisite: course 50 (preferably taken concurrently). Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L.

60. General Mineralogy (3) I. Day
Lecture—3 hours. Prerequisite: Chemistry 2A or 2AH. Crystallography; physical and chemical structure and properties of minerals; mineral genesis.

60L. General Mineralogy Laboratory (2) I. Day
Laboratory—6 hours. Prerequisite: course 60 (preferably taken concurrently). Morphological crystallography; stereographic projection; identification of the common rock-forming minerals.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

100. Earth Dynamics I: Extensional and Translational Processes (3) I. Twiss
Lecture—3 hours. Prerequisite: courses 50-50L, Mathematics 21A or 16A (may be taken concurrently); or consent of instructor. The structure of the Earth. General tectonics and structural features on the Earth. Geophysical and structural signatures of extensional and translational tectonics. Seismicity and focal mechanisms. Mid-ocean ridges and continental rifting. Strike-slip faulting. Application to California tectonics. Not open for credit to students who have completed course 105. GE credit: SciEng.

100L. Earth Dynamics I: Structure/Tectonics Laboratory (1) I. Twiss
Laboratory—3 hours; two one-day field trips required. Prerequisite: course 50L and course 100 (may be taken concurrently); or consent of instructor. Introduction to three-dimensional analysis of geologic structures; introduction to field techniques; interpretation of topographic and geologic maps; tectonic analysis of extensional and strike-slip terranes. Not open for credit to students who have completed course 105L. GE credit with concurrent enrollment in course 100: Wrt.

101. Earth Dynamics II: Convergent and Collisional Processes (3) II. Moores/Twiss
Lecture—3 hours. Prerequisite: courses 50-50L, 100, Mathematics 21B or 16B (may be taken concurrently), Physics 5A or 7A or 9A (may be taken concurrently); or consent of instructor. Geophysical and structural signatures of convergent tectonics, subduction zones, plate collisions and mountain belts. Topics include ductile deformation, folds, seismic Benioff zones, gravity and isostacy. Examples of collisions and resulting mountain belts. Examples drawn from western North America. Not open for credit to students who have completed course 105. GE credit: SciEng.

101L. Earth Dynamics II: Structure/Tectonics Laboratory (2) II. Moores/Twiss
Laboratory and fieldwork—6 hours; six days of field trips on four separate weekends required. Prerequisite: courses 50L, 100L, and 101 (may be taken concurrently); or consent of instructor. Continuation of Geology 100L. Analysis of three-dimensional geologic structures; introduction to field techniques; field-mapping projects; interpretation of topographic and geologic maps; tectonic analysis of convergent and collisional terranes. Not open for credit to students who have completed course 105L. GE credit with concurrent enrollment in course 101: Wrt.

102N. Earth Dynamics III: Plate Kinematics and Dynamics (2) III. Bürgmann
Lecture—2 hours. Prerequisite: course 101, Mathematics 21C or 16C (may be taken concurrently), Physics 5B or 7B or 9B (may be taken concurrently); or consent of instructor. Geodynamics and the workings of plate tectonics. Kinetics of plate motions and interactions between plates. Frames of reference and hotspots. Paleomagnetism and geodesy. Dynamics of plate motion, plate driving forces, thermal structure of the Earth, thermal convection in the Earth. Not open for credit to students who have completed course 108.

103. Field Geology (3) III. Twiss
Fieldwork and laboratory—9 hours; 7-8 days on weekends during quarter. Prerequisite: course 101L or consent of instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. Not open for credit to students who have completed course 102.

105N. Earth Materials: Igneous Rocks (4) II. Schiffman
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 60-60L, Mathematics 16A or 21A, Chemistry 2B (may be taken concurrently). Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. Not open for credit to students who have completed course 123. GE credit: SciEng, Wrt.

106N. Earth Materials: Metamorphic Rocks (4) III. Day
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105N, Chemistry 2B, Mathematics 16A or 21A. Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. Not open for credit to students who have completed course 125. GE credit: SciEng, Wrt.

107. Earth History: Paleobiology (3) III. Vermeij
Lecture—3 hours. Prerequisite: courses 3-3L or Biological Sciences 1B. The evolution and ecological structure of the biosphere from the origin of life to the present.

107L. Earth History: Paleobiology Laboratory (2) III. Vermeij
Laboratory—6 hours. Prerequisite: courses 3-3L or Biological Sciences 1B; course 107 (may be taken concurrently). Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.

108N. Earth History: Paleoclimates (3) I. Spero
Lecture—3 hours. Prerequisite: course 1 or Geology/Environmental Studies 116; and Chemistry 2A; or consent of instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. Not open for credit to students who have completed course 114. GE credit: SciEng, Wrt.

109. Earth History: Sediments and Strata (2) II. Mount
Lecture—2 hours. Prerequisite: courses 50-50L. Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. Not open for credit to students who have completed course 106. GE credit with concurrent enrollment in course 109L: SciEng.

109L. Earth History: Sediments and Strata Laboratory (2) II. Mount
Laboratory—6 hours (includes four 1-day field trips). Prerequisite: course 109 (may be taken concurrently). Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. Not open for credit to students who have completed course 106. GE credit with concurrent enrollment in course 100: Wrt.

110. Summer Field Geology (8) Summer Extra Session. The Staff
Fieldwork—8 hours/day, 6 days/week for six weeks. Prerequisite: courses 103, 109; course 105N recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. Not open for credit to students who have completed course 118. GE credit: SciEng, Wrt.

115N. Earth Science, History, and People (4) III. Cowen
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 1. Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. (Former course 131.) GE credit: SciEng or SocSci, Wrt.

116. The Oceans (3) I. Cowen/Sumner; II. Spero
Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents, geological history, and the sea's biota; and utilization of marine resources. (Same course as Environmental Studies 116.) GE credit: SciEng.

116G. The Oceans: Discussion (2) I. Cowen/Sumner; II. Spero
Discussion—2 hours. Prerequisite: course 116/Environmental Studies 116 concurrently. Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of papers. (Same course as Environmental Studies 116G.) GE credit with concurrent enrollment in course 116: Wrt.

129. Sample Preparation and Techniques for Petrology (1) II. Winter
Laboratory—3 hours. Prerequisite: courses 60-60L. Introduction to petrographic laboratory techniques for petrographers. Topics covered may include thin and polished section preparation, rock crushing/grinding, mineral separation, staining, and photomicroscopy. (Former course 180.) (P/NP grading only.)

130. Non-Renewable Natural Resources (3) II. Zierenberg
Lecture—3 hours. Prerequisite: course 1. Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects.

134. Environmental Geology and Land Use Planning (3) III. Moores
Lecture—3 hours. Prerequisite: one course in Geology, preferably course 50 or 1, or consent of instructor. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SciEng, Wrt.

135. Rivers of California (3) III. Mount
Lecture—3 hours. Prerequisite: course 1. Analysis of the conflict between land use practices and river processes within California's watersheds. Survey of fluvial processes, climate and geology. Evaluation of impacts of logging, mining, agriculture, urbanization, flood control and water supply. GE credit: SciEng.

135G. Rivers of California: Laboratory/Discussion (1) III. Mount
Laboratory/discussion—2 hours; fieldwork—two 10-hour trips. Prerequisite: course 135 concurrently. Discussion of issues presented in course 135. Analysis of selected Sierran watershed. Two raft trips on Sierran rivers. GE credit with concurrent enrollment in course 135: Wrt.

***143. Advanced Igneous Petrology** (5) III. Lesher
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 105N, Mathematics 16C or 21C, Chemistry 2C. Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. Not open for credit to students who have completed course 123. GE credit: SciEng, Wrt.

144N. Sedimentary Petrology and Geochemistry (5) I. Sumner
Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 105N, 106N, 109. Petrography and geochemistry of sediments and sedimentary rocks. Textural, mineralogical, and geochemical evolution of sediments during burial. Ground water-rock interactions and resulting influence on petrographic textures and geochemistry of pore fluids. Not open for credit to students who have completed course 124. GE credit: SciEng, Wrt.

145N. Advanced Metamorphic Petrology (5) II. Day
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106N; Hydrologic Science 134 or Chemistry 2C; Mathematics 16C or 21C. Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered in alternate years. Not open for credit to students who have completed course 125. GE credit: SciEng, Wrt.

***146N. Isotope Geochemistry** (3) II. Day
Lecture—3 hours. Prerequisite: Chemistry 2C or consent of instructor. Principles and applications of nuclear chemistry to geology. Methods of determining geologic ages using K-Ar, Rb-Sr, Nd-Sm, and U-Pb isotopes. The interpretation of apparent ages determined by isotopic methods. The age and origin of the earth. Offered in alternate years.

***150A. Physical and Chemical Oceanography** (4) I. McClain, Spero
Lecture—3 hours; discussion—1 hour. Prerequisite: course 116 or Environmental Studies 116; Physics 9B; Mathematics 21D; Chemistry 2C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. Offered in alternate years. (Same course as Environmental Studies 150A.)

150B. Geological Oceanography (3) II. McClain
Lecture—3 hours. Prerequisite: course 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Environmental Studies 150B.)

150C. Biological Oceanography (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea, and plankton communities. Existing knowledge and contemporary issues in research will be equally stressed. A portion of the course will be devoted to man's use of and impact on the ocean. Offered in alternate years. (Same course as Environmental Studies 150C.)

***151. Paleobiology of Invertebrata** (4) I.
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 107, 107L. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates. Offered in alternate years. Not open for credit to students who have completed course 111A.

***152N. Paleobiology of Protista** (4) II.
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 107 or Biological Sciences 1A or consent of instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered in alternate years. Not open for credit to students who have completed course 111B.

161. Exploration Geophysics and Seismology (3) III. Bürgmann
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C; or consent of instructor. Principles of exploration geophysics and seismology. Use of gravity, magnetic, electrical resistivity, electromagnetic, and seismic measurements to determine structure of the Earth's crust. Interpretation of data using computers. Survey of well-logging techniques. Seismology and earthquakes. Not open for credit to students who have completed course 117A.

***162N. Geophysics of the Solid Earth** (3) II. Kellogg
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C; or consent of instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Not open for credit to students who have completed course 117B.

***163. Fluid Flow of the Earth** (3) I.
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C; or consent of instructor. Principles of fluid flow as applied to problems in geological sciences. Flow in volcanic pipes and artesian springs. Porous flow in natural systems. Thermal convection. Convection in the Earth's mantle and in the oceans. Not open for credit to students who have completed course 117C.

***170. Fracture and Flow of Rocks** (3) III. Twiss
Lecture—3 hours. Prerequisite: courses 101, 101L; Mathematics 21B or 16B; Physics 5A or 7A or 9A; or consent of instructor. Examination of the origin of structures in rocks associated with brittle and ductile deformation on the basis of continuum mechanics and experiment. Emphasis on interpretation of the structures in terms of the deformational processes that occur in the Earth. Offered in alternate years.

175. Advanced Field Geology (1-6) I, II, III.
Fieldwork—3-18 hours. Prerequisite: course 110 or graduate standing in Geology. Advanced problems and methods in geologic field studies. Preparation of a geologic report. May be repeated up to a total of six units when topic differs, including units received for course 185.

190. Seminar in Geology (1) I. Bürgmann; II. The Staff; III. Vermeij
Discussion—1 hour; seminar—1 hour; written abstracts. Prerequisite: major in Geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (P/NP grading only.)

192. Internship in Geology (1-12) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. (P/NP grading only.)

194A-194B. Senior Thesis (3-3) I-II-III. The Staff (Chairperson in charge)
Prerequisite: open to Geology majors who have completed 135 units and who do not qualify for the honors program. Guided independent study of a selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of course sequence.)

194HA-194HB. Senior Honors Project (3-3) I, II, III. The Staff (Chairperson in charge)
Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: senior standing in Geology or consent of instructor.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

206. Stratigraphic Analysis (3) III. Mount
Lecture—3 hours. Prerequisite: courses 109, 109L or consent of instructor; course 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. May be repeated for credit when topic differs. Offered in alternate years.

214. Active Tectonics (3) II. Bürgmann
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System

(GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation.

***215N. Stable Isotope Geochemistry** (3) II.
Lecture—3 hours. Prerequisite: Chemistry 110A, Mathematics 22B; or consent of instructor. Principles of equilibrium and kinetic isotope fractionation and material balance with special application to the distribution of oxygen and hydrogen isotopes in natural systems. Topics include isotope hydrology geothermometry and paleotemperatures, igneous rocks and materials, and fluid-rock interaction. Offered in alternate years. (Former course 215B.)

***216. Tectonics** (3) I. Moores
Lecture/discussion—3 hours. Prerequisite: course 101 or consent of instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered in alternate years.

***217. Topics in Geophysics** (3) II. Bürgmann
Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit.

***218N. Analysis of Structures in Deformed Rocks** (3) II. Twiss
Seminar—3 hours. Prerequisite: courses 100, 100L, 101, 101L, 170; or consent of instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered in alternate years. (Former course 218A.)

***220. Mechanics of Geologic Structures** (3) II. Twiss
Lecture—3 hours. Prerequisite: course 170, Mathematics 21C, Physics 9A or 5A, or consent of instructor; Mathematics 21D and 22A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations, and boudinage. Offered in alternate years.

226. Advanced Sedimentary Petrology (3) II. Sumner
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 144 or consent of instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. May be repeated for credit when topic differs.

227. Stable Isotope Biogeochemistry (3) III. Spero
Lecture—3 hours, Prerequisite: graduate standing or consent of instructor. Application of stable isotope techniques to paleoclimatic, paleontologic, paleoceanographic, ecological and anthropological research problems. Emphasis on carbon, oxygen, nitrogen, hydrogen and sulfur stable isotopes.

***228. Marine Geology** (3) III.
Lecture—3 hours. Prerequisite: courses 106, 116, 150B, or consent of instructor. Critical discussions and review of selected topics in marine geology such as paleoceanography, biostratigraphy of the ocean basins, evolution of ocean basins and margins, and sea-bed mineral resources. Topics vary yearly. May be repeated twice for credit.

***230. Advanced Mineralogy** (3) II.
Lecture—3 hours. Prerequisite: introductory mineralogy and differential equations or consent of instructor. Crystallography and crystal chemistry of rock-forming mineral and high pressure phases. Mechanism of phase transformations, with emphasis on pressure-induced polymorphism. Effect of kinetics and diffusion on mineral behavior. Processes of exsolution, order/disorder, and crystallization. Offered in alternate years.

236. Inverse Theory in Geology and Geophysics (3) III. McClain
Lecture—3 hours. Prerequisite: consent of instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered in alternate years.

***238. Theoretical Seismology** (3) III. McClain
Lecture—3 hours. Prerequisite: consent of instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. Offered in alternate years. (P/NP grading only.)

***240. Geophysics of the Earth** (3) I. Kellogg
Lecture—3 hours. Prerequisite: Earth Sciences and Resources 201, Physics 9B, Mathematics 22B. Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered in alternate years.

241. Geomagnetism (3) I. Verosub
Lecture—3 hours. Prerequisite: graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered in alternate years.

***242. Paleomagnetism** (3) I. Verosub
Lecture—3 hours. Prerequisite: graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered in alternate years.

***246. Physical Chemistry of Metamorphic Processes** (3) II. Day
Lecture—3 hours. Prerequisite: course 145, Chemistry 110A, or consent of instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in alternate years.

***247. Metamorphic Petrology Seminar** (3) II. Day
Seminar—3 hours. Prerequisite: course 145 or consent of instructor; course 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). May be repeated for credit when topic differs. Offered in alternate years. (S/U grading only.)

250. Advanced Geochemistry Seminar (3) III. Zierenberg
Seminar—3 hours. Prerequisite: course 146N or consent of instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.

***253. Current Topics in Igneous Petrology** (3) I. Lesher
Seminar—3 hours. Prerequisite: graduate standing in Geology; course 143 or consent of instructor. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. (S/U grading only.)

***254. Physical Chemistry of Igneous Processes** (3) III. Lesher
Lecture—3 hours. Prerequisite: course 143 or consent of instructor; Chemistry 110A required; Chemistry 110B and 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered in alternate years.

***255. Experimental Petrology** (3) III. Lesher
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 143 or consent of instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered in alternate years.

260. Paleontology (3) I. Vermeij; II. Carlson
Seminar—3 hours. Prerequisite: graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. May be repeated for credit when topic differs.

***269. Evolutionary Biology of Protista** (3) II. The Staff
Seminar—3 hours. Prerequisite: course 152N. Analysis and discussion of selected topics on the evolution of single-celled organisms with emphasis on their fossil record and biology. Offered in alternate years.

282. Geological X-Ray Spectrometric Analysis (4) III. Schiffman
Lecture—3 hours; laboratory—3-4 hours. Prerequisite: course 60-60L, Chemistry 2C, Physics 9C, and graduate standing in Geology. Theory of generation and detection of x-rays as applied to analytical chemistry of rocks and minerals. Laboratory sessions on use of the x-ray fluorescence spectrometer, electron microprobe, and x-ray diffractometer.

290. Seminar in Geology (1) I. Bürgmann; II. The Staff; III. Vermeij
Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.)

291. Geology of the Sierra Nevada (1) III. Day
Seminar—one day-long session. Prerequisite: consent of instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. (S/U grading only.)

294. Structure/Tectonics Forum (1) I, II, III. Twiss
Seminar—1 hour. Prerequisite: graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.)

***295. Advanced Problems in Geodynamics** (3) III. Twiss
Seminar—3 hours. Prerequisite: courses 100 and 101 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., ductile deformation mechanisms, brittle fracture, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature. May be repeated for credit when topic differs. Offered in alternate years. (S/U grading only.)

296. Advanced Problems in Tectonics (3) I. Moores
Seminar—3 hours. Prerequisite: course 101 or consent of instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. May be repeated for credit. Offered in alternate years. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

390. Methods of Teaching Geology (1) I. Carlson
Discussion—1 hour. Prerequisite: graduate student standing in Geology. Discussion of methods and problems of teaching geology. Topics include departmental facilities, grading efficiency/effectiveness,

Teaching Assistant/student interaction, and teaching techniques for lecturing, discussions, and labs. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.)

***391. Ethical Issues in Earth Sciences** (1) I. Kellogg
Seminar—1 hour. Prerequisite: graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. Offered in alternate years. (S/U grading only.)

Geophysics

(College of Letters and Science)

Geophysics is study of the physical properties and processes within and surrounding the Earth. Many problems in the Earth Sciences require geophysical techniques for study. The interdisciplinary minor in geophysics is for students with backgrounds in the physical sciences, engineering and other fields who are interested in pursuing a graduate or professional career in geophysics, or who require a significant knowledge in the field. The curriculum reflects the need for such students to have a firm foundation of geophysics classes, as well as courses from the vast diversity of subdisciplines from many departments that are included in geophysics.

The minor is sponsored by the Department of Geology, 174 Physics/Geology Building.

Minor Program Requirements:

UNITS

Geophysics.....21-24
Engineering 5 3
Geology 161, 162N 6
Applied Science Engineering 115 3
One course sequence chosen from the following:.....9-12
a. Atmospheric Science 120, 121A, 121B;
b. Geology 100, 100L, 101, 101L;
c. Mathematics 118A, 118B, 118C;
d. Physics 104A, 104B, 105C.

Minor adviser. J.S. McClain, Department of Geology, 275A Physics/Geology, 752-7093.

German

(College of Letters and Science)

John F. Fetzer, Ph.D., Chairperson of the Department

Department Office (German and Russian), 616 Sproul Hall (916-752-4999)

Faculty

Clifford A. Bernd, Dr.Phil., Professor
Gail Finney, Ph.D., Professor
Ingeborg Henderson, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*
Anna K. Kuhn, Ph.D., Professor
Winder McConnell, Ph.D., Professor
Karl R. Menges, Dr.Phil., Professor
Peter M. Schaeffer, Ph.D., Professor

Emeriti Faculty

John F. Fetzer, Ph.D., Professor Emeritus
Roland W. Hoermann, Ph.D., Professor Emeritus
H. Guenther Nerjes, Ph.D., Professor Emeritus
Fritz Sammern-Frankenegg, Dr.Phil., Lecturer Emeritus

The Major Program

The German major explores in depth the literature, language, and culture of the German-speaking world. The *General Program* accommodates specifically those students whose interest lies in literary studies, while the *Area Studies Emphasis* addresses the needs of students wishing to obtain a broader knowledge of the contributions of the German-speaking world to fields such as music, art, history, philosophy, and economics.

The Program. The department' s primary emphasis on literary figures, movements and themes finds expression in the common core of upper division literature electives characterizing both programs. Majors desiring maximum practice in spoken and written German, as well as in listening comprehension, will find opportunities for such exposure in any of the upper division courses that are offered in German.

Career Alternatives. Completion of the major will prepare the student for graduate study in German. Both programs *(general* and *area studies)* prepare students for career opportunities in fields such as international relations, business, the sciences, and the arts, as well as permitting admission to such professional curricula as law and medicine.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....16-27
German 1-2-3 (or the equivalent).....0-15
German 20, 21, 22 12

Depth Subject Matter.....44

General Program
German 101A, 101B, 103.....12
German 120 4
Three courses chosen from upper division literature offerings taught in German....12
Four additional upper division courses selected from 104–109 and 121–198, upon the explicit advance approval of the undergraduate major adviser 16
The above category may be satisfied in part by one or more courses in Comparative Literature, in another national literature, or from German literature-in-translation offerings (110–119, 140–142C) upon consultation with, and advance approval of, the undergraduate major adviser.

German Area Studies Emphasis
German 101A, 101B, 103.....12
German 120 4
Two courses chosen from upper division literature courses that are taught in German 8
History 144 4
Four elective courses in accordance with the student's interest chosen from at least two of the following three areas after consultation with and approval of the adviser ..16
Humanities:
History 143, Philosophy 170, 175, 176, 177.
Social Sciences:
Economics 174, Geography 123, Political Science 117, 137.
Fine Arts:
Art 176C, 177A, 177B, Music 110A, 110C, 110D.
Special consideration is also given to such courses in Comparative Literature as the 164 series, where pan-European movements influential upon German literature are at issue.

Total Units for the Major.....60-71

Minor Program Requirements:

The Department offers a German Language and Literature minor. In addition, individualized minor programs may be designed upon consultation with the undergraduate adviser.

Students are particularly encouraged to consider a minor that combines a coherent group of courses to emphasize area studies in German (i.e., German philosophy, the arts, history, political science, as well as literature). The purpose of the minor is to provide students with the opportunity to augment their training in other fields by acquiring proficiency in the German language and exposure to German literature and culture.

UNITS

German Language and/or Literature.....20-24
Choose courses numbered from German 100 through 109B and literature courses that are taught in German.....20-24
One lower division course from German 47 on may be counted.

Major Adviser. P. Schaeffer.

Prerequisite Credit. Credit normally will not be given on the lower division level for a course that is the prerequisite of a course already successfully completed.

Honors and Honors Program. The honors program comprises two quarters of study under course 194A-194B, which will include a research paper. See also the University and College requirements.

Teaching Credential Subject Representative. I. Henderson. See also under the Teacher Education Program.

Graduate Study. The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German Literature. Additional degree options for a *designated emphasis* are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, and Feminist Theory. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

Graduate Adviser. Staff.

Courses in German (GER)

Lower Division Courses

Course Placement: Students with two years of high school German normally continue in German 2; those with three years, German 3; those with four years, German 20.

1. Elementary German (5) I, II, III. Henderson in charge
Discussion—5 hours; laboratory—two 1/2-hour sessions. Introduction to German grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed German 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary German (5) I, II, III. Henderson in charge
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

3. Elementary German (5) I, II, III. Henderson in charge
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

6. Conversational German (3) I, II, III. Henderson
Discussion—3 hours. Prerequisite: course 3. Designed to develop intermediate language skills with special emphasis on communication and grammatical accuracy. Course 6 may be taken concurrently with course 20.

***10. Basic Reading German** (3) I. The Staff
Discussion—3 hours. Intensive course for non-majors, providing reading proficiency of texts containing basic sentence patterns and standard general vocabulary. Outside preparation will focus on developing translation techniques with general texts.

***11. Intermediate Reading German** (3) II. McConnell
Discussion—3 hours. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10. Study of advanced reading grammar to gain proficiency with texts of intermediate difficulty. (P/NP grading only.)

***12. Advanced Reading German** (3) III. McConnell
Discussion—3 hours. Prerequisite: successful completion of course 11 or the equivalent. Continuation of course 11, with specialized focus for upper-division and graduate students on individualized translation projects within each student's field of academic specialization. Systematic review of reading grammar in terms of advanced reading texts. (P/NP grading only.)

20. Intermediate German (4) I, II, III. The Staff
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 3. May be taken concurrently with course 6. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. Not open for credit to students who have completed course 4. (Former course 4.)

21. Composition and Conversation (4) I, II, III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 20 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts. Not open for credit to students who have completed course 101. (Former course 101.)

22. Composition and Conversation (4) I, II, III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 21 or consent of instructor. Practice in short essay writing with an aim toward refinement and expansion of vocabulary. Discussion based on readings in a variety of German texts. Not open for credit to students who have completed course 102. (Former course 102.)

***47. Erasmus and Christian Humanism** (4) II. Schaeffer
Lecture/discussion—3 hours; term paper. Erasmus is studied as a protagonist of contemporary ideas such as the equality of men and women, individual human dignity, peace and disarmament, pluralistic society and tolerance, in the context of Renaissance Europe, and his influence in the following centuries. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

48. Myth and Saga in the Germanic Cultures (4) I. The Staff
Lecture—3 hours; term paper. Knowledge of German not required. Reading in English translation from the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total artwork" concept and *The Ring of the Nibelung* cycle. May not be counted toward major in German. GE credit: ArtHum, Wrt.

***49. Freshman Colloquium** (2) II. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: open only to students who have completed 40 or fewer quarter units of transferable college-level work. Readings, discussion and written projects treating topics such as communist–capitalist tension in German literary culture; masculine "versus" feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; exorcising post-holocaust national guilt and individual frustration—Germany's new European "mission."

50. Survey of German Culture (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Characteristic themes in the mainstream of German culture, from medieval intellectual and artistic achievements to the modern period. Study of major developments in the arts and literature. Frequent short written reports and in-class expository presentations. GE credit: ArtHum, Wrt.

***51. Introduction to Literary Analysis** (4) I. Finney
Lecture/discussion—4 hours. Prerequisite: course 22. Introductory study of various genres of German literature with emphasis on the interrelationship between form and content and the impact on contemporary literary appreciation.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

***100. Intensive Conversational German** (4) III. The Staff
Discussion—4 hours. Prerequisite: course 20. Intensive conversational practice to achieve accurate pronunciation and language fluency.

101A. Survey of German Literature, 800–1800 (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 51. Introduction to various periods of German literature from the Middle Ages to Romanticism (800-1800) with an emphasis on providing an overview of major "movements" and authors prevalent throughout this period.

101B. Survey of German Literature, 1800–Present (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 51. Introduction to various periods of German literature from the age of Romanticism (1800) to the present with an emphasis on providing an overview of major "movements" and authors prevalent throughout this period.

103. Writing Skills in German (4) I. Henderson
Lecture—3 hours; term paper. Prerequisite: course 22. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts.

***104A. Translation** (4) I. Schaeffer
Discussion—3 hours; written reports. Prerequisite: course 22 or the equivalent. Exercises in German to English translation using literary and non-literary texts of different styles and linguistic difficulty.

***104B. Advanced Translation** (4) II. McConnell
Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German to English translation of literary and non-literary texts.

***105. The Modern German Language** (4) I. Benware
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 20; Linguistics 1 recommended. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations.

***106. History of the German Language** (4) II. Benware
Discussion—3 hours; written reports. Prerequisite: course 22; course 105 or Linguistics 1 recommended. Survey of the development of the German language and the study of its structure in historical perspective.

***107. Modern German Syntax** (4) III. Benware
Discussion—3 hours; term paper. Prerequisite: course 22 or the equivalent; Linguistics 1 recommended. Examination of the major problems in describing modern German sentence structure.

***108. Varieties of Contemporary German** (4) I. Benware
Lecture—3 hours; laboratory and/or individual/ group consultation on projects. Prerequisite: courses 22, 105. Study of relations between the standard language, *Umgangssprachen,* and dialects. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the contiguous German-speaking area of Europe.

109A. Business German (4) II. Henderson
Lecture/discussion—4 hours. Prerequisite: course 22 or consent of instructor. Specialized advanced language course using business-oriented information and publications as the basis for discussions, role-play, reports, compositions and translations.

109B. Advanced Business German (4) III. Henderson
Lecture/discussion—3 hours; laboratory/discussion—1 hour. Prerequisite: course 109A or consent of instructor. Specialized advanced language course designed as a sequel to German 109A. Expands on previously introduced materials and features new topics such as the EC, the European Currency System, German company forms and the stock market. Offered in alternate years.

***110. Older German Literature in English** (4) I. McConnell
Lecture—3 hours; discussion—1 hour. Prerequisite: sophomore standing; course 50 recommended. Knowledge of German not required. Analyses in English of German literature from the Middle Ages through the Reformation *(Nibelungenlied,* Gottfried's *Tristan und Isolde* or Wolfram's *Parzival,* lyric poetry, selections from Johann von Tepl, Conrad Celtes, Sebastian Brant, Erasmus, Luther). GE credit: ArtHum, Wrt.

***111A-H. Major Writers in Translation** (4) II. The Staff
Lecture—2 hours; discussion—1 hour; term paper. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement in each case: **(A)** Goethe; **(B)** E.T.A. Hoffmann; **(C)** Thomas Mann; **(D)** Franz Kafka; **(E)** Bertolt Brecht; **(F)** Christa Wolf; **(G)** Günter Grass; **(H)** Friedrich Schiller. GE credit: ArtHum, Wrt.

***112A-C. Topics in German Literature** (4) I. Kuhn
Discussion—3 hours; term paper. Investigation of significant themes and issues within their European context: **(A)** Women in Literature; **(B)** Anti-Hero Figures in Literature; **(C)** Literary Fairytales. Knowledge of German not required. May be repeated in different subject area. GE credit for 112A: ArtHum, Div, Wrt. GE credit for 112B: ArtHum, Wrt.

113. Goethe's *Faust (4) II. Bernd, Schaeffer
Discussion—3 hours; term paper. Intensive study of one of the great works of world literature: Parts I and II. Discussions and readings in English; reading the text in the original is encouraged. GE credit: ArtHum, Wrt.

***114. The *Faust* Tradition Before and After Goethe** (4) I. The Staff
Lecture—3 hours; term paper. Examines predecessors of Goethe's *Faust* (the German chapbook of 1587, Marlowe's *Tragical History of Dr. Faustus* of 1592), and some successors (Mann's novel of 1947) in order to underscore key variations of this provocative and pervasive theme. Knowledge of German not required. Offered in alternate years. GE credit: ArtHum, Wrt.

***115A. German Literature Since 1945** (4) I. Menges
Lecture—3 hours; written reports. Knowledge of German not required. Reading of major writers including the post-war generation of Austria, Switzerland and West Germany. Discussion of novelists like Böll, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrenmatt and Hochhuth, and poets like Celan, Enzensberger, and Aichinger. GE credit: ArtHum, Wrt.

***115B. German Literature since 1945** (4) II. Kuhn
Lecture—3 hours; written reports. Knowledge of German not required. Reading and discussion of the literature of the German Democratic Republic (East Germany), the theory of literature in the socialist world, the practice of this literature as exemplified in such authors as Strittmatter, Seghers, Wolf, Kant, Hacks.

***116. From Goethe's *Werther* to Today's Werthers** (4) II. The Staff
Lecture—3 hours; discussion—1 hour; written reports. Comparison of Germany's first international best-seller, Goethe`s *The Sufferings of Young Werther* (1774) with its later counterparts, culminating in Plenzdorf's novel of 1973 *The New Sufferings of Young W.* GE credit: ArtHum, Wrt.

***117A. The Tristan Tradition: Medieval, Musical, Modern** (4) III. McConnell
Lecture—3 hours; term paper. Three different modes of the Tristan and Isolde legend: the medieval epic poem of Gottfried von Strassburg (1210), the music drama of Wagner (1859) and Thomas Mann's parodistic novella (1903) in their intellectual environment and interrelationship. GE credit: ArtHum, Wrt.

***117B. The Nibelungen Tradition: Medieval, Musical, and Modern** (4) II. McConnell
Lecture—3 hours; term paper. Knowledge of German not required. Three modes of the Nibelungen legend: the Medieval epic poem *Nibelungenlied,* the Scandinavian *Volsunga Saga,* Wagner's music drama *Ring of the Nibelungen,* and Thomas Mann's *Blood of the Walsungs* in their intellectual environment and interrelationship. GE credit: ArtHum, Wrt.

***117C. Parzival Tradition: Medieval, Musical, Modern** (4) III. McConnell
Lecture—3 hours; term paper. Three modes of the Parzival legend: the medieval epic, *Parzival*, Wagner's music drama *Parsifal* and Thomas Mann's *The Magic Mountain* in their intellectual environment and interrelationship. Knowledge of German not required. GE credit: ArtHum, Wrt.

***118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire)** (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Cultural ferment in Vienna, capital of the multinational Habsburg empire, at the turn of the century, with consideration of innovations in literature, music, graphic arts, architecture, philosophy, and psychology, heralding European modernism. Offered in alternate years. GE credit: ArtHum, Wrt.

***118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism** (4) III. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Expressionism in graphic arts, literature, film, New Objectivity, Brecht, and Bauhaus considered in the context of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. Offered in alternate years. GE credit: ArtHum, Wrt.

***118C. Germany Under the Third Reich** (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Background in European history helpful. Interdisciplinary study of German politics, society, and culture during the Third Reich (1933-45). Historical, literary, psychological, philosophical readings; study of architecture, graphic arts, cinema; fascist aesthetic. Everyday life in Hitler's Germany: consent, dissent, opposition, and resistance; Jews in Germany; the Holocaust. GE credit: ArtHum, Wrt.

***118D. Germany Between 1949 and 1989: Division and Restoration** (4) II. Menges
Lecture/discussion—3 hours; term paper. Survey of German history as a divided country. Associated cultural phenomena such as the so-called Economic Miracle, the Student Movement, the Historian's Debate through a variety of theoretical and aesthetics texts and films. Offered in alternate years.

***118E. Contemporary German Culture** (4) II. Menges
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50. Thorough introduction into the political, economic, social and cultural scene of Germany today (Austria and Switzerland marginally included). Historical background and comparative perspectives. Readings from a variety of sources, films and videotapes. Knowledge of German not required. Offered in alternate years. GE credit: ArtHum, Wrt.

***119. From German Fiction to German Film** (4) II. The Staff
Lecture—3 hours; discussion—1 hour; term paper. Examines a number of film adaptations of major German prose works and plays to ascertain the types of changes involved in the shift in medium and the positive and negative effects achieved by such transferences. GE credit: ArtHum, Wrt.

120. Survey of German Culture (4) III. Fetzer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 22. Major developments in such areas of German life as the arts, philosophical thought, social institutions, and political history.

***121. The Medieval Period in German Literature** (4) I. McConnell
Discussion—3 hours; term paper. Prerequisite: course 22. Literary-philosophical profile of the *Mittelhochdeutsche Blütezeit* in terms of the significant epics, romances, and lyric poetry. Readings in modern German.

***122A. Humanism and Reformation** (4) I. Schaeffer
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Exemplary literary works of the sixteenth century tracing the principal lines of development and showing the reflection in literature of the social scene.

***122B. The Literary Baroque** (4) II. Schaeffer
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Exemplary literary works of the seventeenth century tracing the principal lines of development and showing the reflection in literature of the social scene.

123. Literature of the Classical Age (4) I. Bernd
Discussion—3 hours; term paper. Prerequisite: course 22. A critical assessment of principal works of Goethe and Schiller in their development from *Sturm und Drang* individualism and rebellion to the balanced harmony of the classical period.

***124A-D. Major Movements in German Literature** (4) I, II, III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 22 or the equivalent. Examination of significant movements and schools, with particular emphasis on the broader cultural dynamics and ideologies as these apply to individual literary works: **(A)** Sturm und Drang; **(B)** Romantik; **(C)** Naturalismus; **(D)** Expressionismus.

***125. Short Fiction Around 1900** (4) III. Schaeffer
Lecture—3 hours; term paper. Prerequisite: course 22. Representative short German fiction in the fin-de-siècle period, to attain conversance with various prose styles and the cultural currents they reflect.

126. Modern German Literature (4) I. Menges
Discussion—3 hours; term paper. Prerequisite: course 22. Selections from the significant works of major twentieth-century writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated for credit with consent of Undergraduate Major Adviser.

127A-G. Studies in Major Writers (4) III. The Staff
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 22 or the equivalent; course 120 recommended. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement in each case: **(A)** Lessing; **(B)** Goethe; **(C)** Kafka; **(D)** Rilke, George, and Hofmannsthal; **(E)** Brecht; **(F)** Schiller; **(G)** Kleist. Course presentation in German. May be repeated for credit when subject area differs.

***128A-128B. Topics in German Literature** (4) I. Kuhn
Discussion—3 hours; term paper. Prerequisite: course 22 or the equivalent. Investigation of significant themes and issues within their European context: **(A)** *Frauen in der Literatur;* **(B**) *Der Künstler als literarischer Held und Anti-Held.*

***129. Postwar Women Writers** (4) III. Finney
Discussion—3 hours; term paper. Prerequisite: course 22. Survey of major women writing in German since 1945. Considers such issues as the existence of "feminine writing" and of a feminist aesthetics. Writers include Seghers, Bachmann, Wolf, Kirsch, Morgner, Wohmann, Stefan, and Schwaiger.

***130. Modernity and its Discontents: the Tradition of German Cultural Critique** (4) I. Menges
Lecture—2 hours; discussion—1 hour; four short papers. Prerequisite: History 4B or 4C. Philosophical and aesthetic tradition of *Kulturkritik,* from Romanticism to present. Authors include Herder, Schiller, Novalis, Hegel, Marx, Nietzsche, Freud, Spengler, Klages, Heidegger, Gehlen, The Frankfurt School. Illustrations from landscape and city representations. Knowledge of German not required. Offered in alternate years. GE credit: ArtHum, Wrt.

131. German Lyric Poetry (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 22. Study of the genre of lyric poetry from the late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period.

132. The German *Novelle* (4) I. Bernd
Lecture—3 hours; written reports. Prerequisite: course 22. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka.

***133. The German Drama** (4) III. Bernd
Lecture—3 hours; term paper. Prerequisite: course 22. Readings in the works of Germany's leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Hebbel, Hauptmann, Brecht.

***134. Topics in German Intellectual History** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Topics in German intellectual history with materials from a number of periods, genres, and disciplines. May be repeated twice for credit when topic differs. Offered in alternate years.

***140. German Political Literature from the Middle Ages to the Present** (4) II. McConnell
Lecture—3 hours; discussion—1 hour. Prerequisite: English 3 or 4 or French 25; course 51 recommended. Examination of the relationship of art to politics in German literary history from the time of Walther von der Vogelweide in the Middle Ages, through the Reformation, the period of Romanticism, and the Twentieth Century. GE credit: ArtHum, Wrt.

141. The Holocaust and its Literary Representation (4) I. Menges
Lecture—2 hours; discussion—1 hour; term paper. Knowledge of German not required. Aesthetic representation and metaphorical transformation of the holocaust in its human and historical perspectives. Offered in alternate years. GE credit: ArtHum, Wrt.

***142C. New German Cinema: From Oberhausen to the Present** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. A survey of representative works of the most influential filmmakers of the New German Cinema: Alexander Kluge, Volker Schlöndorff, Rainer Werner Fassbinder, Werner Herzog, Hans-Jürgen Syberberg, Wim Wenders, Margarethe von Trotta, Helke Sander, Helma Sanders-Brahms, and Jutta Brückner.

***143. Contemporary German Press** (4) I. Schaeffer
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Study of contemporary German-language newspapers and magazines for insight into political and cultural developments in German-speaking countries. Discussion of contents. Critical approaches. Writing of summaries, rebuttals, and comments.

144. Marx, Nietzsche, Freud (4) I. Finney
Lecture/discussion—3 hours; term paper. Study of major texts of these thinkers, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. Taught in English. Offered in alternate years.

***145. The Literature of Deviance: Mann, Hesse, Kafka** (4) II. Finney
Lecture/discussion—3 hours; term paper. Close study of selected prose works as representative of modernism's fascination with social, sexual, and psychological alienation. Attention to the nuanced portrayal of deviance through formal innovations in fiction. Taught in English. Offered in alternate years.

***150. Contemporary German Literature** (4) I. Kuhn
Discussion—3 hours; term paper. Prerequisite: course 103 or the equivalent. Readings in contemporary liter-

ature, including texts by Christa Wolf, Helga Königsdorf, Monika Maron, Günter Grass, Peter Schneider, Günter de Bruyn. Offered in alternate years.

***160. Love in the Middle Ages** (4) I. McConnell
Lecture—3 hours; discussion—1 hour. Prerequisite: course 22. Analysis of the phenomenon of love in selected medieval lyrical poems and romances of the twelfth and thirteenth century *Blütezeit*. Origins of courtly love, love and individualism, love and the Church, love and adultery.

***165. The German Epigram** (4) I. Schaeffer
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Survey of the German epigram from its beginnings to the present, tracing the origins and development of the genre, its place in European literature, and its function as a mirror of the history of ideas.

***166. Die Meistersinger** (4) III. Schaeffer
Lecture/discussion—3 hours; listening—1 hour. Prerequisite: course 22. Wagner's music-drama *Die Meistersinger von Nürnberg* against the background of the city's cultural history, the practice of Meistersang and the historical Hans Sachs, to show the relationship of words to music, and the resulting music-drama as an eminently humanistic work. Offered in alternate years.

167. Ribaldry in German Literature (4) III. Schaeffer
Lecture/discussion—3 hours; term paper. Prerequisite: completion of course 22 or consent of instructor. Survey of German Literature from late Middle Ages to Age of Goethe, focusing on ribaldry, i.e., earthy humor close to everyday life, sometimes for its own sake, more often as social satire or the promotion of causes such as the Reformation. Offered in alternate years.

***168. Multiculturalism in German Literature** (4) II. Schaeffer
Lecture/discussion—3 hours; term paper/discussion—1 hour. Prerequisite: course 21 or consent of instructor. Examples of German literature in which "encounter with the other" is thematic. Going from the High Middle Ages to mid-20th century, these examples reflect contact with people of color, different beliefs and cultures and inner-German minorities. Offered in alternate years.

***176. The *Kunstmärchen* in German Literature** (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 22 and either 110 or 120; Comparative Literature 5 or 168A strongly recommended. Development of the literary "fairy," or magical, tale—beginning with Grimmelshausen and Goethe's epoch-making *Das Märchen*, focusing on Romanticism's poet figure as hero-messiah in the *Erlösungsmärchen* format, and ending with modern variants as in Hofmannsthal, Kafka, and Brecht.

***185. The Age of Bismarck** (4) III. Bernd
Discussion—3 hours; term paper. Prerequisite: course 22. Study of notable literary repercussions that took place when Germany's international status reached its peak during the age of the Iron Chancellor. The poetry of Storm, the prose of Fontane, the drama of Hauptmann.

192. Field Work in German (1-12) I, II, III. Henderson
Internship—3-36 hours. Prerequisite: course 109A. Internship with several German companies. Participation in various business activities where expertise in German is expected and further developed. (P/NP grading only.)

194HA-194HB. Honors Program (3-3) I-II. The Staff (Chairperson in charge)
Independent study—2 hours; term paper. Prerequisite: open only to majors with a 3.5 minimum GPA in at least 135 graduation units. (A) Research of an integrative nature (in either "General" or "Area Studies Emphasis" fields of major), guided by thesis advisor chosen by student; (B) Writing of Honors Thesis on topic selected by student in consultation with thesis advisor. (P/NP grading only. Deferred grading only, pending completion of course sequence.)

197T. Tutoring German (2-4) I. Henderson
Lecture—2-4 hours; term paper. Prerequisite: course 22. Tutoring and leading of special discussion sections in first-year language classes. Offers teaching opportunities under guidance of staff after initial observation period. Exposes course participants to all phases of language teaching; instant feedback and discussion. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***202. Middle High German** (4) II. McConnell
Discussion—3 hours; lecture—1 hour. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry.

***210. Techniques of Literary Scholarship** (4) I. The Staff
Seminar—3 hours; term paper. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.

***211. Concepts in Literary Theory** (4) II. Menges
Seminar—3 hours; written reports. Advanced course in concepts of literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German.

***212. Contemporary Approaches to Literary Theory** (4) III. Finney
Seminar—3 hours; term paper. Study of contemporary theoretical approaches such as structuralism, deconstruction, feminism, Marxism/Frankfurt School, and reception theory in conjunction with the works of major authors.

239. Narrative and Narrative Theory (4) I. Finney
Seminar—3 hours; term paper. Studies, in a theoretical and literary historical context, major elements of 19th- and 20th-century narrative, such as techniques of framing, refraction, and montage; narrative perspective; mimesis; and self-consciousness. Focuses on paradigmatic prose texts alongside a spectrum of critical approaches. Offered in alternate years.

***240. Forms of German Verse** (4) II. Bernd
Seminar—3 hours; term paper. The development of German verse from the Middle Ages to the present, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor. Offered in alternate years.

***241. The German Drama** (4) I. Finney
Seminar—3 hours; term paper. The major forms of German drama from its origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.

242. The German *Novelle* (4) II. Bernd
Seminar—3 hours; term paper. The major German *Novellisten,* with particular emphasis on the flowering of this genre in the nineteenth century. May be repeated for credit with consent of instructor.

***243. Fontane and the Rise of the Modern German Novel** (4) II. Bernd
Seminar—3 hours; term paper. Fontane, the father of the modern German novel and the chief German representative of the European novel at its greatest, in the context of the nineteenth-century European political and social scene.

***244. Gender and Comedy** (4) III. Finney
Seminar—3 hours; term paper. Studies of genre and gender in German-language comedy by male and female writers from the 18th century to the present. Authors treated include Lessing, Kleist, Büchner, Ebner-Eschenbach, Hauptmann, Hofmannsthal, Frisch, Langner, and Jelinek. Offered in alternate years.

***252. The Writings of Lessing** (4) I. The Staff
Seminar—3 hours; term paper. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama.

***253. Goethe** (4) I. Bernd
Seminar—3 hours; term paper. Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works.

***254. Schiller** (4) III. The Staff
Seminar—3 hours; term paper. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries.

***255. Aesthetics in the Age of Goethe** (4) I. Menges
Seminar—3 hours; term paper. Prerequisite: German 200A, 200B, 200C. Focuses on the emergence of aesthetic autonomy from eighteenth century normative poetics during the Age of Goethe. This involves the shift from a model based on the imitation of nature (and the Ancients) to a new concept grounded in the individuality of aesthetic experience.

***257. Heinrich von Kleist** (4) III. Bernd
Seminar—3 hours; term paper. Kleist's important dramatic and prose works; special attention will be given to the peculiar hermeneutic problems in modern German, French, and Anglo-American Kleist criticism.

258. The Novels of Thomas Mann (4) II. Menges
Seminar—3 hours; term paper. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany.

***259. Studies in Kafka** (4) II. The Staff
Seminar—3 hours; term paper. Study of Kafka's narrative techniques with special emphasis in the shorter works on the existential development from its roots in expressionism.

***260. The Poetry of Rilke** (4) I. Menges
Seminar—3 hours; term paper. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke.

261. Brecht and the Epic Theater (4) III. Menges
Seminar—3 hours; term paper. A reading of Brecht's works with emphasis on the ideas which impelled the development of new literary forms and concepts.

***262. Studies in Turn-of-the-Century Culture** (4) II. Finney
Seminar—3 hours; term paper. Investigates literary currents in turn-of-the-century Germany and Austria against the background of contemporaneous developments in psychology, the visual arts, philosophy, and music. Authors treated include Hauptmann, Holz and Schlaf, Schnitzler, T. Mann, Wedekind, Musil, Hofmannsthal. Offered in alternate years.

270A. Research in a Period or Topic (4) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; term paper. Individually guided research, under the supervision of a faculty member, in the specialized study of a period or problem that holds promise of yielding dissertation topics, culminating in a term paper. Recommended for Ph.D. candidates prior to the Qualifying Examination.

270B. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge)
Individual instruction from a faculty member—1 hour. Prerequisite: course 270A. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliography) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

270C. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge)
Individual instruction from a faculty member—1 hour. Prerequisite: course 270B. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliography) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

***285. Middle High German Literature** (4) III. McConnell
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Extensive reading of Middle High German texts in the original language. Examines linguistic and literary problems. May be repeated for credit when topic differs and with consent of instructor.

***288. The Renaissance and Reformation in German Literature** (4) I. Schaeffer
Seminar—3 hours; term paper. The parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.

***289. German Literature of the Baroque** (4) I. Schaeffer
Seminar—3 hours; term paper. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

***290. The Enlightenment in German Literature** (4) I. The Staff
Seminar—3 hours; term paper. Revolt against the concept of the "Elegantiaideal," and evolution of a new literature based on reason and wit. May be repeated for credit with consent of instructor.

292. Sentimentality and "Sturm und Drang" in German Literature (4) III. Menges
Seminar—3 hours; written reports. Reaction to overemphasis on Reason: theories of Hamann and Herder and works of poets such as Lenz, Leisewitz, the early Goethe and Schiller. May be repeated for credit with consent of instructor.

***293. The Classical Age of German Literature** (4) III. Bernd
Seminar—3 hours; term paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor.

***294. The Romantic Period in German Literature** (4) I. Menges
Seminar—3 hours; term paper. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

***295. Poetic Realism in German Literature** (4) I. Bernd
Seminar—3 hours; term paper. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. May be repeated for credit with consent of instructor.

***296. Twentieth-Century German Literature** (4) I. Kuhn
Seminar—3 hours; term paper. Considers the revolt of the Hauptmann generation, symbolism, expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor.

297. Special Topics in German Literature (4) I, II, III. The Staff
Seminar—3 hours; term paper. Various special topics in German literature, which may cut across the more usual period and genre rubrics. May be repeated for credit when topic differs.

298. Group Study
(1-5) I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

390A. The Teaching of German (2) I. Henderson
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)

390B. The Teaching of German (2) II. Henderson
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)

390C. The Teaching of German (2) III. Henderson
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)

391. Teaching Practicum and Coaching Conference (1) I, II, III. Henderson
Conference—1 hour. Prerequisite: appointment as Teaching Assistant; course 390A, 390B, 390C. Ongoing consultation with Language Teaching Supervisor concerning application of technique and innovations within Teaching Assistant's classroom responsibility. Required of all Teaching Assistants after first year of appointment. May be repeated for credit. (S/U grading only.)

Professional Course

400. Tutorial and Instructional Internship (1-3) I, II, III. The Staff (Chairperson in charge)
Discussion—1-3 hours. Prerequisite: graduate standing. Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions; intern leadership of discussion sections under staff supervision. May be repeated for credit.

Greek

See Classics

Hebrew

See Religious Studies

History

(College of Letters and Science)

Ted W. Margadant, Ph.D., Chairperson of the Department

Department Office, 2216 Social Sciences and Humanities Building (916-752-0776)

Faculty

Lucy Barber, Ph.D., Assistant Professor
Arnold J. Bauer, Ph.D., Professor
Robert Borgen, Ph.D., Professor
Cynthia L. Brantley, Ph.D., Associate Professor
Beverly Bossler, Ph.D., Assistant Professor
Daniel R. Brower, Jr., Ph.D., Professor
Joan Cadden, Ph.D., Professor
Steven Deyle, Ph.D., Assistant Professor
William W. Hagen, Ph.D., Professor
Karen Halttunen, Ph.D., Professor
Phyllis G. Jestice, Ph.D., Assistant Professor
Catherine J. Kudlick, Ph.D., Assistant Professor
Norma B. Landau, Ph.D., Professor
Susan L. Mann, Ph.D., Professor
Roland Marchand, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Ted W. Margadant, Ph.D., Professor
Barbara Metcalf, Ph.D., Professor
Lorena Oropeza, Ph.D., Assistant Professor
Don C. Price, Ph.D., Professor
Ruth E. Rosen, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Michael Saler, Ph.D., Assistant Professor
Michael L. Smith, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Stylianos Spyridakis, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Kathleen Stuart, Ph.D., Assistant Professor
Alan S. Taylor, Ph.D., Professor
Charles Walker, Ph.D., Assistant Professor
Clarence E. Walker, Ph.D., Professor

Emeriti Faculty

William M. Bowsky, Ph.D., Professor Emeritus
David Brody, Ph.D., Professor Emeritus
Daniel H. Calhoun, Ph.D., Professor Emeritus
Robert O. Crummey, Ph.D., Professor Emeritus
Manfred P. Fleischer, Ph.D., Professor Emeritus
W. Turrentine Jackson, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
David L. Jacobson, Ph.D., Professor Emeritus
Kwang-Ching Liu, Ph.D., Professor Emeritus
Rollie E. Poppino, Ph.D., Professor Emeritus
Morton Rothstein, Ph.D., Professor Emeritus
Richard N. Schwab, Ph.D., Professor Emeritus
Morgan B. Sherwood, Ph.D., Professor Emeritus
James H. Shideler, Ph.D., Professor Emeritus
Wilson Smith, Ph.D., Professor Emeritus
F. Roy Willis, Ph.D., Professor Emeritus, *UC Davis Prize for Teaching and Scholarly Achievement*

The Major Program

The history major develops critical intelligence and fosters an understanding of ourselves and our world through the study of the past—both remote and recent.

The Program. A student electing a major in History may complete Plan I or Plan II. *Plan I* enables students to receive a broad education in histories of several geographic areas. *Plan II* encourages interested students, including those preparing for graduate work in history, to enroll in a seminar, to undertake independent work, and to study the history of historical thought as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II.

Career Alternatives. A degree in history is excellent preparation for a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter (Plan I or II).....20
Five lower division courses, including at least two from each of two of the following fields.....20
- *(a) Western Civilization:* History 3, 4A, 4B, 4C, 10, 30
- *(b) Asian Civilization:* History 8, 9A, 9B
- *(c) United States and Latin America:* History 17A, 17B, 72A, 72B, 85, 86
- *(d) Africa:* History 15

Depth Subject Matter—Plan I.....40-41
Four upper division courses from one of the fields of concentration listed below 16
Three upper division courses from one of the other fields of concentration listed below 12
Two upper division courses from a field or fields other than those chosen to satisfy the two preceding requirements 8
One course from the following: History 101 or 102 or 103 (in field of concentration) ...4-5
Total Units for the Major, Plan I.....60-61

Depth Subject Matter—Plan II.....42
Four upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses 16

*Course not offered this academic year.

Three upper division courses from one of the other fields listed.....12
History 101.....5
History 102 in field of concentration (in exceptional circumstances, a student may with the permission of an adviser, take the seminar in another field).....5
History 103 in field of concentration.....4

Total Units for the Major, Plan II.....62

Fields of Concentration

a. Pre-Industrial Europe: History 102A, 102B, 102C, 102D, 102P, 111A, 111B, 111C, 121A, 121B, 121C, 122, 125, 130A, 130B, 130C, 131A, 131B, 131C, 133, 135A, 136, 139A, 144A, 148A, 151A, 151B.

b. Modern Europe: History 102E, 102F, 102I, 134A, 135B, 138A, 138B, 138C, 139B, 141, 142, 143, 144B, 145, 146A, 146B, 147A, 147B, 147C, 148B, 151C, 151D.

c. United States History: History 102K, 102L, 102M, 169A, 169B, 170A, 170B, 170C, 171, 173, 174A, 174B, 174C, 174D, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 178, 180A, 180B, 180C, 181, 183A, 183B, 185A, 185B, 187A, 187B, 188A, 188B, 189A, 189B, 189C.

d. Asian History: History 102G, 102H, 102N, 102Q, 102R, 110, 191A, 191B, 191C, 191D, 191E, 191F, 194A, 194B, 194C, 194D, 194E, 196A, 196B.

e. African History: History 102O, 110, 115A, 115B, 115C, 116.

f. Latin American History: History 102J, 110, 161A, 161B, 162, 163A, 163B, 165, 166A, 166B, 168, 169A, 169B.

g. Within broad fields, a student may wish to concentrate some of the courses on a particular area or period, such as China or Great Britain or Medieval Europe. Special approval is not required.

History and Philosophy of Science

Courses from the History and Philosophy of Science program may count toward the History major. History and Philosophy of Science 130A fulfills upper division requirements in the field of pre-industrial Europe. History and Philosophy of Science 130B, 150, and 180 fulfill upper division requirements in either the U.S. or Modern Europe field.

Students can create a field in the History of Science upon consultation with a faculty adviser. They may draw upon the relevant History courses (History 85, 86, 135A, 135B, 185A, and 185B) as well as History and Philosphy of Science offerings to do so.

Consult the History and Philosophy of Science program for a more detailed description of course offerings this area and the minor in History and Philosophy of Science.

Major Advisers. L. Barber, C.L. Brantley, S. Deyle, P.G. Jestice, C.J. Kudlick, L. Oropeza, D. Price, R.E. Rosen, M. Saler, M. Smith, S. Spyridakis, K. Stuart, Ch. Walker.

Minor Program Requirements:

The minor in History consists of five upper division courses chosen so that at least three courses are in one field and at least one course is in another field. The two fields shall be chosen from among those defined in the catalog for the major. However, students may also, in consultation with and with the authorization of a faculty adviser, define other thematic fields.

UNITS

History.....20

At least 20 units of upper division history courses.....20
Examples of minor with thematic emphasis: Pre-Law (British and American Political and Constitutional Development); The Twentieth Century; The History of Ideas in Society.

Minor Advisers. Same as major advisers.

Honors and Honors Program. A student becomes eligible for graduation with honors by meeting the minimum GPA (usually 3.5) and course requirements established by the College of Letters and Science. To qualify for History honors, high or highest honors, students must also complete the History Department honors program with a GPA of 3.5 or above and write a thesis that meets the criteria for high or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, interviews, and faculty recommendations. Students admitted to the program must complete the History 104A, 104B, 104C sequence of honors courses, which demands the completion of a senior honors thesis. Students who anticipate seeking admission to the honors program are urged to complete at least one History 102 (undergraduate seminar) before the end of their junior year. When applying for admission to the honors program, a student should indicate the research project he or she intends to pursue and should consult with a faculty member about the project. Students may follow either Plan I or Plan II described above, and may substitute History 104 in their program (though they may not substitute it for History 102).

Students who anticipate pursuing graduate work in history or a teaching credential, and who do not wish to opt for the research emphasis embodied in the honors program, are encouraged to select Plan II of the major.

Study Abroad and the History Major. The department strongly encourages interested students to pursue their studies abroad. While there are no specific required courses or prerequisites, students are urged to take at least one history course that touches upon the geographic area where they plan to study abroad before departing. To receive a history degree from UC Davis, students must complete at least 18 upper division units in the history major at UC Davis (which can include History 101, 102, 103). The remaining major requirements can be fulfilled abroad provided that *(a)* the course should be evaluated as at least four UC Davis units by the Office of the Registrar, *(b)* the course should be considered upper division by the standards set forth by the Education Abroad Program, *(c)* the student presents copies of the course work, syllabus, and writing assignments to the department's liaison person with the EAP office for approval. Note: students who wish to receive credit for courses taken abroad under programs other than EAP may petition the Undergraduate Program Committee to do so.

Teaching Credential Subject Representative. See also the section on the Teacher Education Program.

Waiver Program for Single-Subject Teaching Credential in History. The Department of History offers a program of study for students seeking a secondary teaching credential in history. The program can be accommodated within the requirements for the major in History, but does require some specific course work. A list of current course requirements is available in the Advising Office, Division of Education, 174 Kerr Hall.

Graduate Study. The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.

Graduate Advisers. A.J. Bauer, B. Bossler, W. Hagen, R. Marchand, C.E. Walker.

American History and Institutions. This University requirement can be satisfied by passing any one of the following courses in History: 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 180A, 180B, 183A, 183B. The upper division courses may be used only with the consent of the instructor. (See also under University requirements.)

Courses in History (HIS)

Lower Division Courses

***3. Cities: A Survey of Western Civilization** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Survey of western civilization, focusing on nine cities, at the period of their greatest creativity: Athens, Rome, Constantinople, Paris, Florence, Amsterdam, London, Berlin, Moscow. Illustrated with slides, music, and optional films. GE credit: ArtHum.

4A. History of Western Civilization (4) I. Jestice
Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. GE credit: ArtHum, Wrt.

4B. History of Western Civilization (4) I, II, III. Margadant, Saler
Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. GE credit: ArtHum, Wrt.

4C. History of Western Civilization (4) I, II, III. Landau, Stuart
Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. GE credit: ArtHum, Wrt.

8. History of Indian Civilization (4) II. Metcalf Margadant, Saler
Lecture—3 hours; discussion—1 hour; written reports. Survey of Indian civilization from the rise of cities (ca. 2000 B.C.) to the present, emphasizing themes in religion, social and political organization, and art and literature that reflect cultural interaction and change. GE credit: ArtHum, Div.

9A. History of East Asian Civilization (4) I, II. Bossler, Mann, Price
Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided. GE credit: ArtHum, Div, Wrt.

9B. History of East Asian Civilization (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Surveys traditional Japanese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided. GE credit: ArtHum, Div, Wrt.

10. World History of the Twentieth Century (4) III. Brower
Lecture—3 hours; discussion—1 hour. Survey of major events and trends of the twentieth-century world, emphasizing global political, economic, and social topics. GE credit: ArtHum.

15. Introduction to African History (4) I. Brantley
Lecture—3 hours; discussion—1 hour. Examination of the long-range historical context as background to current conditions in Africa. Includes the early development of African civilizations, the slave trade and its abolition, 20th century colonization, and African independent states. GE credit: ArtHum, Div, Wrt.

17A. History of the United States (4) I, III. Halttunen, Taylor
Lecture—3 hours; discussion—1 hour. The experience of the American people from the Colonial Era to the Civil War. GE credit: ArtHum, Div, Wrt.

17B. History of the United States (4) II, III. Barber, Marchand
Lecture—3 hours; discussion—1 hour. The experience of the American people from the Civil War to the end of the Cold War. Not open for credit to students who have completed course 17C. GE credit: ArtHum, Div, Wrt.

***25. Thematic History Seminar** (4) The Staff
Seminar—3 hours; term paper. Prerequisite: freshman or sophomore standing. Explores in-depth a historical topic related to the research interests of the instructor. Addresses historical questions, controversies, methodology, and interpretations.

30. Russian Cultural History (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Survey of Russia's history over the last thousand years as reflected in the lives of her political leaders, artists, and rebels. Lectures will use the biographies of Russian political leaders, intellectuals and artists to illustrate the general currents of the country's political, social, and cultural development. GE credit: ArtHum.

72A. Social History of American Women and the Family (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles and the family from colonial America until the late nineteenth century emphasizing changes resulting from the secularization, commercialization, and industrialization of American society. GE credit: ArtHum, Div, Wrt.

72B. Social History of American Women and the Family (4) III. Rosen
Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family in twentieth-century America, emphasizing female reformers and revolutionaries, working class women, consumerism, the role of media, the "feminine mystique," changes in family life, and the emergent women's movement. GE credit: ArtHum, Div, Wrt.

***85. Nature, Man, and the Machine in America** (4) Smith
Seminar—4 hours; term paper. Prerequisite: consent of instructor. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. Limited enrollment. GE credit: ArtHum.

***86. Quackery and Pseudoscience in America** (4)
Lecture—3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in America: witchcraft, medical quackery, spiritualism, science hoaxes, technological frauds, literary and artistic forgeries, UFOs, pyramidology, astrology, psychic phenomena. Emphasis upon explanations for the existence of deception and pseudoscience.

98. Directed Group Study (1-5) The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

101. Introduction to Historical Thought and Writing (5) III. The Staff
Lecture/discussion—4 hours; term paper. Prerequisite: consent of instructor. Study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing.

102A-R, X. Undergraduate Proseminar in History (5) I, II, III. The Staff
Seminar—3 hours; term paper. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. **(A)** Ancient; **(B)** Medieval; **(C)** Renaissance and Reformation; **(D)** Modern Europe to 1815; **(E)** Europe since 1815; **(F)** Russia; **(G)** China to 1800; **(H)** China since 1800; **(I)** Britain; **(J)** Latin America since 1810; **(K)** American History to 1787; **(L)** United States, 1787-1896; **(M)** United States since 1896; **(N)** Japan; **(O)** Africa; **(P)** Christianity and Culture in Europe, 50-1850; **(Q)** India; **(R)** Muslim Societies; **(X)** Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. May be repeated for credit. Limited enrollment.

103. Topics in Historical Research (4) The Staff (Chairperson in charge)
Discussion—3 hours; individual consultation with instructor; term paper. Prerequisite: consent of instructor. Individual research resulting in a research paper on a specific topic in one of various fields of history. May be repeated for credit.

104A. Introduction to Historical Research and Interpretation (4) I. The Staff
Seminar—3 hours; term paper. Prerequisite: acceptance into History Department Honors Program. Directed reading and research aimed at preparing students to select appropriate topics and methodologies for a senior honors essay and to situate their topics within a meaningful, broad context of historical interpretations. Culminates in the submission of a full prospectus for an honors essay.

104B. Honors Tutorial (4) The Staff
Tutorial—4 hours. Prerequisite: course 104A. Research in preparation of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)

104C. Honors Tutorial (4) The Staff
Tutorial—4 hours. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty adviser.

***110. Themes in World History** (4) The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; at least 8 units in history. Issues in world history from 1400 to the present. Topics will emphasize the interaction of diverse regions of the world as well as common patterns of historical change. Offered in alternate years. GE credit: ArtHum.

111A. Ancient History (4) II. Spyridakis
Lecture—3 hours; discussion or paper (student option). History of ancient empires of the Near East and of their historical legacy to the Western world. GE credit: ArtHum, Wrt.

111B. Ancient History (4) III. Spyridakis
Lecture—3 hours; discussion or paper (student option). Political, cultural and intellectual study of the Greek world from Minoan-Mycenaean period to end of Hellenistic Age. GE credit: ArtHum, Wrt.

111C. Ancient History (4) I. Spyridakis
Lecture—3 hours; discussion or paper (student option). Development of Rome from earliest times. Rise and fall of the Roman Republic; the Empire to 476 A.D. GE credit: ArtHum, Wrt.

112A. Topics in Pre-Modern Jewish History (4) I. The Staff
Lecture—3 hours; term paper. Topics in the history of Jews from the Biblical era to the eras of Jewish emancipation. Topics can be framed chronologically (eg., medieval Jewry) or thematically (eg., trade and Jewish communities). May be repeated once for credit. GE credit: ArtHum, Div, Wrt.

112B. Topics in Modern Jewish History (4) I. The Staff
Lecture—3 hours; term paper. Topics in the history of Jews from the era of Jewish emancipation to the present. Topics can be framed chronologically or thematically (eg. Zionism, assimilation, the post Holocaust Diaspora). May be repeated once for credit. GE credit: ArtHum, Div, Wrt.

115A. History of West Africa (4) I. Brantley
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 4C recommended. Introductory survey of the history of West Africa and the Congo region from the earliest times to the present. GE credit: ArtHum, Div, Wrt.

115B. History of East and Central Africa (4) II. Brantley
Lecture—3 hours; written reports. Prerequisite: course 115A recommended. Introductory survey of the history of east and central Africa from 1000 to the present. This course is a part of an interdisciplinary East African sequence which includes History 115B (winter) and Political Science 138. GE credit: ArtHum, Div, Wrt.

***115C. History of Southern Africa, Swaziland, Lesotho, and Botswana from 1500 to the Present** (4) III. Brantley
Lecture—3 hours; written reports. Prerequisite: courses 115A and 115B recommended. Introductory survey of the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1500 to the present. GE credit: ArtHum, Div, Wrt.

***116. African History: Special Themes** (4) Brantley
Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B recommended. Themes of African history, such as African states and empires, slave trade, relationship of Egypt to rest of Africa, Bantu origins and migrations, and French policy of Assimilation and Association. GE credit: ArtHum.

***121A. Medieval History** (4) Jestice
Lecture/discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century. GE credit: ArtHum, Wrt.

121B. Medieval History (4) III. Jestice
Lecture/discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century. GE credit: ArtHum, Wrt.

***121C. Medieval History** (4) Jestice
Lecture/discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance. GE credit: ArtHum, Wrt.

***122. Selected Themes in Medieval History** (4) Jestice
Lecture—3 hours; term paper. Each offering will focus on single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings include original sources in English translation and modern works. May be repeated for credit. GE credit: ArtHum.

***125. Topics in Early Modern European History** (4) Stuart
Laboratory/discussion—3 hours; term paper. Prerequisite: course 4B recommended. Social and cultural history, 1300-1800. Topics such as medieval and Renaissance Italy, early modern Italy, Ancien Regime France, family and sexuality, and material culture and daily life. May be repeated for credit. GE credit: ArtHum, Wrt.

130A. Christianity and Culture in Europe: 50-1450 (4) II. Jestice
Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics. GE credit: ArtHum, Div, Wrt.

***130B. Christianity and Culture in Europe: 1450-1600** (4) II. The Staff
Lecture—3 hours; written report or research paper. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformations as foundation stones of a new culture in Europe, with special attention to the interconnections between the revival of antiquity and the different reform movements. GE credit: ArtHum.

***130C. Christianity and Culture in Europe: 1600-1850** (4) The Staff
Lecture—3 hours; written report or research paper. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism. GE credit: ArtHum.

***131A. Early Modern European History** (4) Stuart
Lecture—3 hours; written reports. Prerequisite: courses 4A and 4B recommended. Western European history from about 1350 to about 1500. GE credit: ArtHum.

131B. Early Modern European History (4) III. Stuart
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1500 to about 1650. GE credit: ArtHum, Wrt.

***131C. Early Modern European History** (4) II. Stuart
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131B recommended. Western European history from about 1650 to about 1789. GE credit: ArtHum, Wrt.

*Course not offered this academic year.

132. Crime and Punishment in Early Modern Europe (4) I. Stuart
Lecture—3 hours; term paper. Deviance and crime in early modern Europe, contrasting imaginary crimes, e.g. witchcraft, with "real" crimes such as highway robbery and infanticide. Examines impact of gender, sexual orientation, ethnicity, and class in processes of criminalization. GE credit: SocSci, Div, Wrt.

***133. The Age of Ideas** (4) The Staff
Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century. GE credit: ArtHum.

***134A. The Age of Revolution** (4) I. The Staff
Lecture—3 hours; written reports. Ideas and institutions during the French Revolution and the Napoleonic era. GE credit: ArtHum.

***135A. History of Science to the 18th Century** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Survey of the historical development of science, technology, and medicine from the ancient world to the eighteenth century, with special emphasis on Isaac Newton as the culmination of the seventeenth century scientific revolution. GE credit: ArtHum.

135B. History of Science, 18th to 20th Centuries (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Survey of the historical development of scientific thought in geology, biology, chemistry, physics, and cosmology from the eighteenth to the twentieth century, with special emphasis on emergence of broad explanatory principles that serve more than one science. GE credit: ArtHum.

136. Scientific Revolution (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 135A or 135B recommended. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Versalius, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory. GE credit: ArtHum, Wrt.

138A. Russian History: The Rise of the First Empire, 1500-1881 (4) II. Brower
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. Expansion of the Russian state in Muscovite and imperial era. Emphasis on autocratic rule, the incorporation of non-Russian peoples, and emergence of Russia as a Great Power. Only two units of credit will be allowed to students who have completed former course 137B. GE credit: ArtHum, Wrt.

138B. Russian History: The Russian Revolution, 1880-1917 (4) III. Brower
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. History of the fall of the Russian Empire and of the Revolution of 1917. Not open for credit to students who have received credit for former course 138. GE credit: ArtHum, Wrt.

***138C. Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present** (4) III. Brower
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. The emergence of the Soviet Union as a socialist system and a Great Power; the decline and collapse of the Soviet Union and the formation of independent nation states in its place. Not open for credit to students who have completed former course 137C. GE credit: ArtHum, Wrt.

***139A. Medieval and Renaissance Medicine** (4) Cadden
Laboratory/discussion—3 hours; term paper. The history of medicine, circa 1000-1700. Revival of ancient medicine; role of the universities; development of anatomy, chemistry and natural history; ideas about the body; cultural understanding of disease; hospital and the public health system. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt.

***139B. Medicine, Society, and Culture in Modern Europe** (4) III. Kudlick
Lecture—2 hours; discussion—1 hour; term paper. History of European medicine, 18th to 20th centuries, by examining the development of medical knowledge in epidemiology and anatomy; function of this knowledge, how it changed with technological breakthroughs and professionalization; and role of medicine in attitudes toward poverty, women, race, disease. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt.

***140. The Rise of Capitalism in Europe** (4) III. Hagen
Lecture—3 hours; term paper. Prerequisite: course 4B or 4C. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1815; the transition to modern capitalism via industrial revolution. Interplay of social, political, cultural, and economic history. Offered in alternate years. GE credit: SocSci.

***141. France Since 1815** (4) Margadant
Lecture—3 hours; term paper. GE credit: ArtHum, Wrt.

142. Why the Holocaust? (4) I. The Staff
Lecture—3 hours; term paper. Long- and short-term causes of the Holocaust; the emancipation of European Jewry; the rise of modern antisemitism; nationality question in central Europe; antisemitism and German politics; Naziism and mass murder; responses by victims and bystanders. GE credit: ArtHum, Div.

143. History of Eastern Europe and the Balkans (4) II. Hagen
Lecture—3 hours; essays. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the twentieth century, including an analysis of the contemporary scene. GE credit: ArtHum, Div, Wrt.

***144A. History of Germany, 1450 to 1789** (4) I. Stuart
Lecture—3 hours; extensive writing. Survey of early modern Germany, 1450 to 1789, covering the theology and social history of the Reformation, the Peasants War of 1525, religious warfare, state building and absolutism, the rise of Prussia, Austro-Prussian dualism, and the German Enlightenment.

144B. History of Germany since 1789 (4) II. Hagen
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 144A recommended. History of the German lands in the age of the French Revolution; 19th-century liberalism, nationalism, and industrialization; the World Wars, National Socialism, and the Holocaust; east and west Germany in the Cold War; the post-reunification scene. (Not open for credit to students who have completed former course 144.) GE credit: ArtHum, Div, Wrt.

145. War and Revolution in Europe, 1789-1918 (4) II. Margadant
Lecture—3 hours; term paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I. GE credit: ArtHum, Wrt.

146A. Europe in the Twentieth Century (4) II. The Staff
Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939. GE credit: ArtHum, Wrt.

146B. Europe in the Twentieth Century (4) III. The Staff
Lecture—3 hours; term paper. Survey of the history of Europe since 1939. GE credit: ArtHum, Wrt.

147A. European Intellectual History, 1800-1870 (4) II. Saler
Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to scientism; liberal and socialist reactions to social change. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and Flaubert. GE credit: ArtHum or SocSci, Wrt.

147B. European Intellectual History, 1870-1920 (4) III. Saler
Lecture—3 hours; term paper. Cultural and intellectual watershed of the late nineteenth and early twentieth centuries. Emergence of modern art and literature; psychoanalysis and the new social sciences. Focus on the work of Baudelaire, Wagner, Nietzsche, Freud, Weber and Kafka. GE credit: ArtHum or SocSci, Wrt.

***147C. European Intellectual History, 1920-1970** (4) Saler
Lecture—3 hours; term paper. European thought and culture since World War I. Coverage includes: literature and politics; Communism and Western Marxism; Fascism; Existentialism; Structuralism; Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woolf and de Beauvoir. GE credit: ArtHum or SocSci, Div, Wrt.

***148A. Women and Society in Europe: 1500-1789** (4) Kudlick
Lecture—3 hours; term paper. Prerequisite: course 4B recommended. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and social commentators. GE credit: ArtHum, Div, Wrt.

***148B. Women and Society in Europe: 1789-1920** (4) II. Kudlick
Lecture—3 hours; term paper. Prerequisite: course 4C and 148A recommended. Roles and perceptions of women from the French Revolution to World War I, primarily in France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework. GE credit: ArtHum, Div, Wrt.

***151A. England: The Middle Ages** (4) III. Jestice
Lecture—3 hours; term paper. Prerequisite: course 4A recommended. Origins of England to the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wyclif. GE credit: ArtHum, Wrt.

***151B. England: The Early Modern Centuries** (4) The Staff
Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B; course 151A recommended. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton. GE credit: ArtHum, Wrt.

***151C. Eighteenth-Century England** (4) Landau
Lecture—3 hours; term paper. English history from the Glorious Revolution to the French Revolution. Examination of the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which provided an environment fit to engender the industrial revolution. GE credit: ArtHum, Wrt.

***151D. Industrial England** (4) Landau
Lecture—3 hours; term paper. English history from Waterloo to the Battle of Britain; the rise and continuance of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Bloomsbury, empire to commonwealth. GE credit: ArtHum, Div, Wrt.

161A. History of Colonial Spanish America (4) I. Bauer
Lecture/discussion—3 hours; written reports. Pre-Columbian civilizations of Middle America and the Andean region (mainly Aztec and Inca); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides. GE credit: ArtHum, Div, Wrt.

161B. Latin American History (4) II. Bauer
Lecture/discussion—3 hours; written reports. Evolution of modern Latin America: export economies; oligarchic rule; reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides. GE credit: ArtHum, Div, Wrt.

162. History of the Andean Region (4) II. C. Walker
Lecture/discussion—3 hours; written and/or oral reports. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present. GE credit: ArtHum, Div, Wrt.

***163A. History of Brazil** (4) III. The Staff
Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in alternate years. GE credit: ArtHum.

***163B. History of Brazil** (4) III. The Staff
Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in alternate years. GE credit: ArtHum.

***164. History of Chile** (4) II. Bauer
Lecture—3 hours; term paper. Prerequisite: course 161A, 161B, 165, or 168 recommended. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. Offered in alternate years. GE credit: ArtHum.

165. Latin American Social Revolutions (4) II. Bauer
Lecture—3 hours; written reports. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in cause, course, and consequence. GE credit: ArtHum.

***166A. History of Mexico to 1848** (4) III. Bauer
Lecture/discussion—3 hours; written and/or oral reports. Political, economic, and social development of pre-Columbian, colonial and national Mexico to 1848. Offered in alternate years. GE credit: ArtHum.

166B. History of Mexico Since 1848 (4) I. The Staff
Lecture/discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in alternate years. GE credit: ArtHum.

168. History of Inter-American Relations (4) III. The Staff
Lecture—3 hours; written reports. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America. GE credit: ArtHum.

169A. Mexican-American History (4) I. Oropeza
Lecture/discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. GE credit: ArtHum, Div, Wrt.

169B. Mexican-American History (4) II. Oropeza
Lecture/discussion—3 hours; written and/or oral reports. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture and society of the Southwestern United States since 1910. GE credit: ArtHum, Div, Wrt.

***170A. Colonial America** (4) Taylor
Lecture—3 hours; term paper. Colonial society from 1607 to the American Revolution, with emphasis on European expansion, political, social and economic foundations, colonial thought and culture, and imperial rivalry. GE credit: ArtHum, Div, Wrt.

***170B. The American Revolution** (4) Taylor
Lecture—3 hours; term paper. Analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period. GE credit: ArtHum, Div, Wrt.

***170C. The Early National Period, 1789-1815** (4) III. The Staff
Lecture—3 hours. Political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences. GE credit: ArtHum.

171A. The Jacksonian Era (4) II. Deyle
Lecture—3 hours. Political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850. GE credit: ArtHum, Div, Wrt.

171B. U.S. Civil War: Politics and Society (4) III. Deyle
Lecture/discussion—3 hours; term paper. Social crisis, 1848-1877: slavery and the West, new political parties, secession, mobilization and emancipation, economic nationalism and Reconstruction (for military aspects, see course 173). GE credit: ArtHum.

173. Becoming an American: Immigration and American Culture (4) II. Rosen
Lecture—3 hours; term paper. Prerequisite: course 17B or 72B recommended. An introduction to the wide range of immigrant experiences and cycles of nativism that have shaped American culture in the twentieth century. From novels, memoirs and films, students will explore how external and internal immigration has created a multicultural society. Offered alternate years. GE credit: ArtHum, Div, Wrt.

174A. The Emergence of Modern America, 1876-1914 (4) I. Barber
Lecture—3 hours; term paper. Rise of modern business and labor organizations, changing political institutions, the culmination and decline of Victorian culture, and the reaction of muckrakers, Populists, socialists, feminists and social reformers to industrialization and urbanization. GE credit: ArtHum, Div, Wrt.

174AD. Emergence of Modern America: Discussion (1) I. Barber, Marchand
Discussion—1 hour; short papers. Prerequisite: course 174A concurrently. Intensive discussion of topics and readings for course 174A. (P/NP grading only.)

174B. America in War, Prosperity and Depression, 1914-1945 (4) II. Marchand
Lecture—3 hours; term paper. America's emergence as a world power, the business culture of 1920s, the New Deal and World War II. Emphasis on such issues as government regulation of the economy, welfare capitalism, and class, racial, ethnic and gender conflicts. GE credit: ArtHum, Wrt.

174BD. America in War, Prosperity and Depression: Discussion (1) II. Marchand
Discussion—1 hour; short papers. Prerequisite: course 174B concurrently. Intensive discussion of topics and readings for course 174B. (P/NP grading only.)

174C. The United States Since World War II, 1945 to the Present (4) III. M. Smith
Lecture—3 hours; term paper. America's struggle to respond to new complexities in foreign relations, social tensions, family changes and media. Emphasis on such topics as: Cold War; anticommunist crusade; civil rights, feminist and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority. GE credit: ArtHum, Wrt.

174CD. The United States Since World War II: Discussion (1) III. Smith, Barber
Discussion—1 hour; short papers. Prerequisite: course 174C concurrently. Intensive discussion of topics and readings for course 174C. (P/NP grading only.)

174D. Selected Themes in 20th Century American History (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 17B or the equivalent. Interpretive overview of a single topic in the history of the United States in the 20th century with attention to the phases and processes of historical change. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

174DD. Selected Themes in 20th Century American History: Discussion (1) I, II, III. The Staff
Discussion—1 hour; short papers. Prerequisite: course 174D concurrently. Intensive discussion of topics and readings for course 174D. (P/NP grading only.)

***175A. Intellectual History of the United States** (4) The Staff
Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: course 17A or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American thought from the Puritans through the era of the American Enlightenment.

***175B. Intellectual History of the United States** (4) The Staff
Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820s to about 1900, emphasizing Transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

***175C. Intellectual History of the United States** (4) The Staff
Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in modern political theory, philosophy, American literature, or sociological theory. Twentieth-century American thought from about 1900 to the 1960s, emphasizing pragmatic liberalism, naturalism in law and literature, protestant liberalism and neo-orthodoxy, Freudian currents in social thought and social criticism of the 1960s.

176A. Cultural and Social History of the United States (4) III. Halttunen
Lecture—3 hours; term paper. Study of social and cultural forces in American society in the nineteenth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ArtHum.

***176B. Cultural and Social History of the United States** (4) III. Halttunen
Lecture—3 hours; term paper. Study of social and cultural forces in American society in the twentieth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ArtHum.

177A. History of Black People and American Race Relations (4) I. C.E. Walker
Lecture—3 hours; discussion—1 hour. Prerequisite: course 17A or 17B. History of black people in the United States from the African background to Reconstruction. GE credit: ArtHum, Div, Wrt.

***177B. History of Black People and American Race Relations** (4) C.E. Walker
Lecture—3 hours; discussion—1 hour. Prerequisite: course 17A or 17B. History of black people in the United States from the African background to Reconstruction. GE credit: ArtHum, Div, Wrt.

178. Race in America (5) II. C.L. Walker
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 17B, 177A, 177B recommended. Examination of the idea of race and how it has shaped American history and the interaction of blacks, whites, Latins, and Asians in the United States. (Offered in alternate years.) GE: ArtHum, Div, Wrt.

***180A. Growth of American Politics to 1815** (4) The Staff
Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlements to 1815 focusing on the distribution of power, its change over time and the ways power has been used. Examines political party development and the social and ideological dimensions of political behavior. GE credit: ArtHum.

180B. Growth of American Politics, 1815-1890 (4) III. The Staff
Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A. GE credit: ArtHum.

***180C. Growth of American Politics, 1890 to the Present** (4) The Staff
Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B. GE credit: ArtHum.

***181. Religion in American History to 1900** (4) The Staff
Lecture—2 hours; discussion—1 hour; oral and written reports. Religious ideas and institutions from the

Puritans to about 1900. Survey of the large-scale social changes associated with revivalism and the great awakenings and the movement from Protestant orthodoxy to pluralism in industrial America.

183A. The Frontier Experience: Trans-Mississippi West (4) I. Taylor
Lecture—3 hours; written and/or oral reports. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War. GE credit: ArtHum, Div, Wrt.

183B. The Frontier Experience: Trans-Mississippi West (4) II. Taylor
Lecture—3 hours; written and/or oral reports. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West. GE credit: ArtHum, Div, Wrt.

***185A. History of Science in America** (4) The Staff
Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial times to present. GE credit: ArtHum, Wrt.

***185B. History of Technology in America** (4) Smith
Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society from colonial times to present. GE credit: ArtHum, Wrt.

***187A. American Business History to the 1880s** (4) The Staff
Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the colonial period to the 1880s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

***187B. American Business History, 1880s to the Present** (4) The Staff
Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1880s to the present, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

***188A. History of Agriculture in the U.S. to 1900** (4) The Staff
Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policies, economic and social institutions. Offered in alternate years.

***188B. History of Agriculture in the U.S. Since 1900** (4) II. The Staff
Lecture—3 hours; term paper. Agricultural settlement and development in the U.S. with emphasis on government policies, economic and social institutions. Offered in alternate years.

***189A. History of California** (4) The Staff
Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission as a frontier institution; revolt of the Californios; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War. GE credit: ArtHum.

***189B. History of California** (4) The Staff
Lecture—3 hours; written and/or oral reports. State constitution; land grant and Indian policies; Gold Rush; vigilantes; railroad construction; the wheat era; changing economy; social and literary developments; Progressive reform. GE credit: ArtHum.

***189C. History of California** (4) The Staff
Lecture—3 hours; written and/or oral reports. Impact of World War I; conservative reaction of the 1920s; rise of organized labor; the automobile and moving picture industry; New Deal developments; changes with World War II; role of minorities; contemporary politics. GE credit: ArtHum, Wrt.

191A. Classical China (4) I, II. Price
Lecture—3 hours; term paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy, to the rise and fall of the First Empire. GE credit: ArtHum, Div, Wrt.

***191B. High Imperial China** (4) Bossler
Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of T'ang, Sung, and Ming with analysis of society, culture and thought. GE credit: ArtHum, Div, Wrt.

***191C. Late Imperial China** (4) Mann
Lecture—2 hours; discussion—1 hour; two long papers. Prerequisite: course 9A or upper division standing. Patterns and problems of Chinese life traced through the Ming and Ch'ing dynasties (c. 1500–1800), prior to the confrontation with the West in the Opium War. Readings include primary sources and novels portraying elite ethos as well as popular culture. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***191D. Nineteenth Century China: The Empire Confronts the West** (4) Bossler
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A, or upper division standing. The decline and fall of the Chinese Empire, with particular attention to the social and political crises of the 19th century, and the response of government officials, intellectuals, and ordinary people to the increasing pressures of Western imperialism. GE credit: ArtHum, Div, Wrt.

191E. The Chinese Revolution (4) I. Price
Lecture—2 hours; discussion—1 hour; extensive writing. Prerequisite: upper division standing. Analysis of China's cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolutionary strategy (to 1949), with some attention to its implications for post-revolutionary culture and politics. GE credit: ArtHum, Div, Wrt.

191F. History of the People's Republic of China (4) II. Mann
Lecture—2 hours; discussion—1 hour; extensive writing. Prerequisite: upper division standing. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Not open for credit to students who have completed course 190C. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

192. Internship in History (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: enrollment dependent on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.)

194A. Aristocratic and Feudal Japan (4) II. Borgen
Lecture—3 hours; term paper and/or discussion. Broad survey of the cultural, social, religious, and political aspects of Japanese history from mythological times through the sixteenth century emphasizing comparison of the organizations, values, and beliefs associated with the aristocratic and feudal periods. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

194B. Early Modern Japan (4) II. The Staff
Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization with which Japan met the challenge of the nineteenth-century Western expansionism. GE credit: ArtHum, Div.

194C. Modern Japan (4) III. The Staff
Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history in the twentieth century emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power. GE credit: ArtHum, Div.

***194D. Business and Labor in Modern Japan** (4) I. The Staff
Lecture—3 hours; term paper or papers. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in alternate years. GE credit: ArtHum.

***194E. Education and Technology in Modern Japan** (4) I. The Staff
Lecture—3 hours; term papers. Survey of education and technology in Japan from the mid-eighteenth century to the present. Offered in alternate years. GE credit: ArtHum.

***196A. Medieval India** (4) I. Metcalf
Lecture—3 hours; discussion—1 hour; written reports. Survey of history of India in the millenium preceding arrival of British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and on the changing nature of the state. GE credit: ArtHum, Div, Wrt.

***196B. Modern India** (4) Metcalf
Lecture—3 hours; discussion—1 hour; written reports. Survey of cultural, social, economic, and political aspects of South Asian history from arrival of the British in the eighteenth century to formation of new independent states—India, Bangladesh, and Pakistan—in the twentieth century. GE credit: SocSci, Div, Wrt.

***197T. Tutoring in History** (2) The Staff (Chairperson in charge)
Discussion—1 hour; laboratory—3 hours. Prerequisite: enrolled as a History major with senior standing and consent of department chairperson. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated once for credit. No final examination. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; upper division standing. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201A-T. Sources and General Literature of History (4) I, II, III. The Staff
Seminar—3 hours; term paper. Designed primarily for students preparing for higher degrees in history. **(A)** Ancient; **(B)** Medieval; **(C)** Renaissance and Reformation; **(D)** Early Modern Europe; **(E)** Europe since 1815; **(F)** China to 1880; **(G)** China since 1880; **(H)** Britain; **(I)** Latin America since 1810; **(J)** American History to 1787; **(K)** United States, 1787-1896; **(L)** United States since 1896; **(N)** Modern Japan; **(Q)** Cross-Cultural Women's History; **(S)** History of Science and Medicine; **(T)** Jewish History. May be repeated for credit when different subject area is studied.

202A-K. Major Issues in Historical Interpretation (4) I, II, III. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. **(A)** Ancient; **(B)** Medieval Europe; **(C)** Modern Europe; **(D)** India; **(E)** Africa; **(F)** China; **(G)** Japan; **(H)** United States; **(I)** Latin America; **(K)** Britain. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.

203. Seminar Research (4) II. The Staff (Chairperson in charge)
Seminar—3 hours. Prerequisite: consent of instructor. Designed primarily for students preparing for higher degrees in History. Individual research and analysis resulting in substantial research paper. May be repeated for credit.

204. Historiography (4) I. The Staff
Seminar—3 hours; term paper. Major issues in the philosophy and methodology of history.

***211. Ancient History** (4) The Staff
Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. Seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

***221. Medieval History** (4) The Staff
Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

***237. Russian History** (4) Brower
Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1856.

245. Modern European History (4) III. Margadant
Seminar—3 hours. Prerequisite: course 201E. Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit.

***261. Latin American History** (4) I, II, III. Bauer
Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.

271A-271B. United States History (4-4) II-III. The Staff
Seminar—3 hours; term paper. Prerequisite: course 201J-L or 202H. Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter.

***273A-273B. Research Seminar in the Comparative History of Women and the Family** (4-4) I-II. Rosen
Seminar—3 hours; paper. Research in literature, methods, and historical approaches to the area of women and the family culminating in each student completing a research paper in this field. (Deferred grading only, pending completion of sequence.)

***291A. Chinese History** (4) Price, Mann, Bossler
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Research on topics to be chosen by the students for the purpose of writing article-length papers. May be repeated for credit. (Deferred grading only, pending completion of sequence.)

***291B. Chinese History** (4) Price, Mann, Bossler
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Completion of article-length papers on topics chosen by students. May be repeated for credit. (Deferred grading only, pending completion of sequence.)

291C. Chinese History (4) Price, Mann, Bossler
Seminar—2 hours; tutorial—1 hour. Prerequisite: reading knowledge of Chinese. Readings in Chinese historical materials. Training in the use of Chinese reference works. May be repeated once for credit.

***292. College Teaching Internship** (4) I, II, III. The Staff
Internship—4 hours. Prerequisite: course 300 (may be taken concurrently). Student prepares and teaches one lower division history course in a nearby community college under the supervision of a UC Davis instructor and a community college instructor. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

***300. Teaching History in the Community College** (3) I. The Staff
Discussion/laboratory—3 hours. Prerequisite: graduate standing. Designed for MAT students. Methods for the presentation of history at the community college and secondary school level. (S/U grading only.)

389. Introductory Seminar for Teaching Assistants (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: must be enrolled in course 390. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (S/U grading only.)

390. Teaching History in College (2) I, II, III. The Staff
Discussion—2 hours. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)

History and Philosophy of Science

(College of Letters and Science)

Paul Teller, Ph.D., Program Director

Program Office, 106 Sproul Hall (916-752-9621)

Committee in Charge

Joan Cadden, Ph.D. *(History)*
Michael R. Dietrich, Ph.D. *(History and Philosophy of Science)*
James R. Griesemer, Ph.D. *(Philosophy)*
Kevin D. Hoover, D.Phil. *(Economics)*
Catherine J. Kudlick, Ph.D. *(History)*
Jay E. Mechling, Ph.D. *(American Studies)*
Benjamin S. Orlove, Ph.D. *(Environmental Studies)*
Michael Smith, Ph.D. *(History)*
John H. Stanfield, II, Ph.D. *(African American and African Studies, Sociology)*
Paul Teller, Ph.D. *(Philosophy)*

Minor Program Requirements:

The interdisciplinary minor in the history and philosophy of science invites students to examine historical and contemporary problems in a variety of scientific disciplines, and to explore concepts and procedures basic to science and how they have evolved. The minor is sponsored by the Program in the History and Philosophy of Science.

UNITS

History and Philosophy of Science 24
Philosophy 104.....4
History 135A or 135B 4
Four courses from those listed below. One course must be from each of three areas: *(a)* history, *(b)* philosophy, and *(c)* history and philosophy of science.....16
(a) History 102, 136, 139A, 139B, 185A, 185B, 188A, 188B;
(b) Philosophy 106, 107, 108, 109, 110, 111;
(c) History and Philosophy of Science 20, 130A, 130B, 150, 180.

Minor adviser. M. Dietrich, 234 Social Sciences and Humanites Building, 916-752-3709.

Courses in History and Philosophy of Science (HPS)

Lower Division Courses

***20. Cosmic Origins and Structures: Scientific and Non-Scientific Theories** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Broad cultural survey of cosmogonies and cosmologies from several societies. Non-technical study of developments in Western culture that produced the cosmologies of Plato, Newton, and Einstein; also cosmological schemes of astrologers, alchemists, Christian mystics, women, and Native Americans.

***90X. Lower Division Seminar** (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in History and Philosophy of Science through shared readings, discussions, written assignments, or special activities such as films, library work, archival work, etc. May be repeated once for credit when content differs. Limited enrollment.

Upper Division Courses

130A. From Natural History to the History of Nature (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: History 135A recommended. Evolution and demise of natural history as a discipline from Aristotle to Linnaeus. Considers ancient views of nature and its Renaissance rediscovery; the emergence of biology, botany, geology, and zoology; the history of taxonomy and classification. GE credit: ArtHum or SciEng, Wrt.

130B. History of Modern Biology (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 130A recommended. Development of modern biology from pre-Darwinian roots to the present. Considers emergence of modern biological specialities and consolidation of biological theory around evolutionary ideas. History of allied fields such as genetics, paleontology, embryology, ecology, systematics and molecular biology. GE credit: ArtHum or SciEng, Wrt.

131. Darwin (4) II. Griesemer
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Students will explore the life and times of Charles Darwin and will trace the development of evolutionary thinking before and after the *Origin of Species* to appreciate its place in Victorian society and in the corpus of Darwin's thought. GE credit: ArtHum or SciEng, Wrt.

***150. Gender and Science** (4) I. Dietrich
Lecture/discussion—3 hours; term paper. An interdisciplinary approach to the relations between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women as practitioners of science, and feminist approaches to science. GE credit: SocSci, Div, Wrt.

180. Topics in History and Philosophy of Science and Technology (4) III. The Staff
Seminar—3 hours; term paper. Prerequisite: course in History and Philosophy of Science or other course work relevant to the particular topic offering. In-depth treatment of selected topics in the history and philosophy of science. Possible topics include: history of modern physics, history of molecular biology, science and society, scientific explanation, technology and culture, theory testing.

198. Directed Group Study
(1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates
(1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

***250. History and Philosophy of Science** (4) III. Dietrich
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary seminar in the history and philosophy of science. Focuses on issues such as historiography, methodology, and the conceptual foundations of science. May be repeated for credit with consent of instructor.

298. Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Honors Challenge

Kenneth L. Verosub, Ph.D., Program Director

Program Office, 162 Kerr Hall (916-752-9797)

Honors Council

Amy M. Clarke, Ph.D. *(English)*
James R. Griesemer, Ph.D. *(Philosophy)*
G. J. Mattey, Ph.D. *(Philosophy)*

Douglas W. McColm, Ph.D. *(Physics)*
Nora A. McGuinness, Ph.D. *(Integrated Studies)*
Jay E. Mechling, Ph.D. *(American Studies)*
Ahmet N. Palazoglu, Ph.D. *(Chemical Engineering and Materials Science)*
Shrinivasa K. Upadhyaya, Ph.D. *(Biological and Agricultural Engineering)*
Kenneth L. Verosub, Ph.D., Chairperson *(Geology)*

The Program of Study

The Davis Honors Challenge (DHC) is a program for highly motivated students interested in enhancing their education through special courses, closer contact with faculty, and dynamic interaction with academic peers. Interested students apply in the spring quarter for places in the following year. At the lower division level, DHC participants take two honors courses or sections and one problem-oriented, interdisciplinary seminar per academic year. Students who successfully complete the program receive transcript notation.

Lower division departmental Honors courses, special DHC sections of regular courses, DHC seminars, and special studies opportunities constitute the course offerings of the Honors Challenge. A complete list of these courses, with course registration numbers, is made available to admitted students through the Davis Honors Challenge Office.

Eighteen lower division seminars are offered each year. The seminars are designed to foster critical thinking and analytic interpretation, improve oral and written communication skills, enhance research skills, provide experience with group dynamics and collaborative exploration of problems, and develop familiarity with electronic communication and visual presentations. Enrollment in each seminar is limited to 20 students. In 1997-98, approximately 120 first-year and 240 second-year students will be admitted to the Program. In addition, 60 third-year students will be admitted to a new upper division pilot program.

Students not admitted to the Program may not register for Davis Honors Challenge sections, seminars, or special study opportunities.

Integrated Studies is an invitational first-year honors residential program associated with the Davis Honors Challenge. For more information about Integrated Studies, see the section titled "Integrated Studies."

Courses in Davis Honors Challenge (HNR)

Lower Division Courses

90X. Honors Discussion Section (1) I, II, III. The Staff (Director in Charge)
Discussion—1 hour. Prerequisite: open only to student in the Davis Honors Challenge. Examination of special topics in selected lower division courses through additional readings, discussions, term papers, collaborative work, or special activities, including projects, field and laboratory experiences, computer simulations, creative works. May be repeated for credit.

92. Internship (1-12) I, II, III. The Staff (Director in Charge)
Internship—3-36 hours. Prerequisite: open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. (P/NP grading only.)

94. Honors Seminar (4) I, II, III. The Staff (Director in Charge)
Seminar—4 hours. Prerequisite: open only to students in the Davis Honors Challenge. Collaborative, multidisciplinary exploration of complex contemporary problem. Focus on critical thinking and analytical interpretation, on oral and written communication, and on the use of electronic media in gathering information. May be repeated for credit. GE credit: Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Director in Charge)
Discussion—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Independent study—1-5 hours. Prerequisite: student in the Davis Honors Challenge. (P/NP grading only.)

Upper Division Courses

190X. Honors Contract (1) I, II, III. The Staff (Director in Charge)
Independent study or discussion—3 hours. Prerequisite: open only to students in the Davis Honors Challenge. In-depth examination of material in an upper division course as defined in an Honors Contract Proposal submitted by the student. Contract must be approved by the instructor and the Honors Council of the Academic Senate. May be repeated for credit.

192. Internship (1-12) I, II, III. The Staff (Director in Charge)
Internship—3-36 hours. Prerequisite: open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. (P/NP grading only.)

194. Honors Seminar (3) I, II, III. The Staff (Director in Charge)
Seminar—3 hours. Prerequisite: open only to students in the Davis Honors Challenge. Collaborative exploration of a major scholarly topic from related disciplinary perspectives. Focus on critical thinking and analytical interpretation, on oral and written communication and on modern methods of scholarly research. May be repeated for credit.

195. Honors Thesis (1-3) I, II, III. The Staff (Director in Charge)
Independent study—3-9 hours. Prerequisite: open only to students in the Davis Honors Challenge. Guided independent study of a selected topic leading to the writing of a senior thesis. May be repeated for credit up to 9 units.

198. Directed Group Study (1-5) I, II, III. The Staff (Director in Charge)
Discussion—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in Charge)
Independent study—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

Horticulture (A Graduate Group)

M. Andrew Walker, Ph.D., Chairperson of the Group
Group Office, 140 Environmental Horticulture (916-752-7738)

Faculty. The faculty includes departmental members of Environmental Design, Environmental Horticulture, Entomology, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

Graduate Study. The Graduate Group in Horticulture offers programs of study leading to the M.S. degree. The programs provide opportunities for specialized study of the production, management, and utilization of horticultural plants and the postharvest handling of horticultural commodities. Areas of specialization include floriculture, nursery production, landscape horticulture, pomology, vegetable crops, and viticulture. Research may be conducted on an applied or basic problem having a physiological, genetic, or ecological emphasis.

Preparation. A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes course work in general botany, chemistry, physics, statistics, genetics and introductory plant physiology. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail and may be obtained from the Group Office.

Graduate Advisers. Consult the Group Office.

Courses in Horticulture (HRT)

Graduate Courses

203. Research Perspectives in Horticulture (3) I. Weinbaum (Pomology), DeJong (Pomology)
Lecture—1 hour; lecture/discussion—2 hours. Prerequisite: Plant Biology 111 and 112, or Environmental Horticulture 102 or the equivalent. Following lectures/discussions of scientific methodology, students develop research proposals aided by classroom discussions and individual interactions with instructors. Lectures and critiques of "classical papers" provide a sense of the evolution of the current concepts in perennial plant biology. Not open for credit to students who have taken Pomology 203. Offered in alternate years.

251. Modeling Horticultural Systems (3) II. Lieth (Environmental Horticulture)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Biology 142, calculus, or consent of instructor. Introduces students to systems modeling. Primary emphasis on physiological and ecological models with examples drawn from areas of interest to class participants. Applications to horticultural systems will be explored. Students will receive hands-on experience.

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing at UCD. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (S/U grading only.)

Human Anatomy

See Cell Biology and Human Anatomy (in Medicine, School of)

Human and Community Development

(College of Agricultural and Environmental Sciences)
Lawrence V. Harper, Ph.D., Chairperson of the Department
Stephen B. Brush, Ph.D., Associate Chairperson of the Department
Department Advising Office, 1303 Hart Hall (916-752-2244)
Community Studies and Development, Human Development and Family Studies, and International Agricultural Development (916-752-0770)

Faculty—Community Studies and Development

Ted Bradshaw, Ph.D., Assistant Professor
Stephen B. Brush, Ph.D., Professor
Luis E. Guarnizo, Ph.D., Assistant Professor
Frank Hirtz, Ph.D., Assistant Professor
Martin F. Kenney, Ph.D., Professor
Janet Momsen, Ph.D., Professor
Michael P. Smith, Ph.D., Professor
Miriam J. Wells, Ph.D., Professor

Emeriti Faculty

Isao Fujimoto, M.A., Senior Lecturer Emeritus
Orville E. Thompson, Ph.D., Professor Emeritus

Affiliated Faculty

Barbara G. Goldman, Ph.D., Lecturer
Laurie Lippin, Ph.D., Lecturer
Charlie Moore, Ph.D., Lecturer
Harland Padfield, Ph.D., Lecturer
Bernadette Tarallo, Ph.D., Lecturer
Al Sokolow, Ph.D., Cooperative Extension Specialist
Joan Wright, Ph.D., Cooperative Extension Specialist

Faculty—Human Development and Family Studies

Carolyn Aldwin, Ph.D., Associate Professor
Keith Barton, Ph.D., Professor
Brenda K. Bryant, Ph.D., Professor
Xiaojia Ge, Ph.D., Assistant Professor
Lawrence V. Harper, Ph.D., Professor
Rosemarie Kraft, Ph.D., Associate Professor
Beth Ober, Ph.D., Associate Professor
Carol Rodning, Ph.D., Associate Professor

Emeriti Faculty

Glenn R. Hawkes, Ph.D., Professor Emeritus
Emmy E. Werner, Ph.D., Professor Emeritus

Affiliated Faculty

Curtis R. Acredolo, Ph.D., Adjunct Associate Professor
Marc Braverman, Ph.D., 4-H Cooperative Extension Specialist
Kay Jeanne Gaedeke (Stockman), M.S., Lecturer
Richard Ponzio, Ph.D., 4-H Cooperative Extension Specialist

Faculty—International Agricultural Development

Faculty includes members from various departments across colleges.

Major Programs. See Community and Regional Development (formerly Applied Behavioral Sciences), Human Development, and International Agricultural Development.

Human Development

(College of Agricultural and Environmental Sciences)

Faculty. See Department of Human and Community Dvelopment.

The Major Program

Human development explores the developmental process in humans throughout the life cycle. Cognitive and personality/social development are studied from various perspectives.

The Program. Human development majors complete a group of preparatory courses in anthropology, biological sciences, genetics, nutrition, physiology, psychology, statistics, and human development. Upper division students can design their programs in consultation with a faculty member to emphasize a particular interest. For instance, students can study the social and the biological aspects of human development while emphasizing child or adult development.

Internships and Career Alternatives. At least one practicum course is required. A second practicum or supervised internship can be used to fulfill the requirements for the major. In addition, students can intern in schools, early childhood education centers, hospitals, rehabilitation centers, probation offices, group foster homes, mental health clinics, or as tutors for handicapped or bilingual students. Human development graduates fill a wide variety of positions in preschools, elementary and special educational settings, as well as governmental jobs related to social welfare and recreation. Those who emphasize the biological aspect of human development can apply to medical school or pursue training for positions in the health sciences. Human development prepares students to pursue advanced degrees in the behavioral sciences, education, child guidance, social welfare, health sciences, or further research in human development.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

	UNITS
English Composition Requirement	**4-12**
See College requirement	0-8
Additional English (choose from English 101, 102, 104A, 104B, 104C, 104D, 104E)	3-4
Preparatory Subject Matter	**38-44**
Anthropology 1, 2, and 15	13
Biological sciences (Biological Sciences 1A† or 10)	4-5
† *Chemistry 2A is recommended prerequisite for Biological Sciences 1A. Biological Sciences 1A is prerequisite for Biological Sciences 1B.*	
Genetics (Molecular and Cellular Biology 10 or Biological Sciences 101)	4
Human development (Human Development 30)	4
Nutrition (Nutrition 10 or 101)	3-5
Physiology (Neurobiology, Physiology and Behavior 10 or 101)	4-5
Psychology (Psychology 1)	4
Statistics (Education 114, Psychology 41, Sociology 46A and 46B, or Statistics 13)	4
Breadth/General Education	**24-32**
Satisfaction of General Education requirement	16-24
American history/American government (History 17A, 17B, 72A, 72B, and Political Science 1 are recommended courses)	8
Depth Subject Matter	**52-53**
Human Development 100A, 100B, 100C, 110	16
Social-cultural processes (Human Development 102 or 103)	4
Assessment (Human Development 120 or 121)	4
Cognitive processes (Human Development 101 or 132)	4
Exceptional children (Human Development 130 or 131)	4
Practicum (Human Development 140-140L, or 141 or 142 or 143)	4-5
Four additional upper division courses chosen from the Human Development courses or from a list of restricted electives (in consultation with faculty adviser)	16
Unrestricted Electives	**39-72**
Total Units for the Degree	**180**

Major Adviser. K. Barton.

Related Major Program. See the major in Community and Regional Development (formerly Applied Behavioral Sciences.

Minor Program Requirements:

The Department of Human and Community Development offers two minors.

	UNITS
Aging and Adult Development	**21-27**
Human Development 100C, 160, 191	8
Community Health 180	3
Human Development 110, Community and Regional Development 173	8
Practicum, 2 units minimum	2-8

Minor Adviser. C. Aldwin, B. Ober.

	UNITS
Human Development	**20**
Human Development 100A	4
Human Development 100B or 100C	4
Human Development 110 or 103 or 151	4
Two courses from Human Development 101, 102, 130, 131, or 132	8

Minor Adviser. L. Harper.

Graduate Study. Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree in human development. Refer to the Graduate Studies section in this catalog.

Courses in Human Development (HDE)

Questions pertaining to the following courses should be directed to the instructor or to the Human and Community Development Advising Office, 1303 Hart Hall (916-752-2244).

Lower Division Courses

***12. Human Sexuality** (2) I, II, III. The Staff
Lecture—2 hours. Vocabulary; structure and function of genital system; sexual response; menstruation; fertility; birth control; pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communication; attitudes and values; sexual dysfunctions; lovemaking. (P/NP grading only.)

***13. Parenting** (4) III. Bryant
Lecture/discussion—4 hours. Provides the basis for understanding the nature of the parenting process. Consideration of aspects of parenting that begin before conception and develop throughout the life of the child and parent. GE credit: SocSci.

***15. Family and the Life Cycle** (4) I. The Staff
Lecture—4 hours. Prerequisite: Psychology 1, or 15 and 16. Socialization in families throughout the life cycle. Impact of alcoholism and abuse. Sources of strength and help. Not open for credit to students who have completed courses 100A, 100B, 110 and/or Psychology 112, 114, and 115. GE credit: SocSci.

19. Life Cycles, Kinship, and Growth in Human Populations (4) II. Carey
Lecture—3 hours; discussion—1 hour. Human populations at different levels of organization; including life course, family life cycle, race, ethnicity, genealogy, and population traits and changes. GE credit: SciEng.

30. Observation Techniques in Human Development (4) I, II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: Psychology 1 and consent of instructor. Observational techniques used in the study of human behavior and development, with focus on ages six months to five years; analysis and use of observational data. *To enroll, students must sign up for laboratory time at the Child and Family Study Center.*

98. Directed Group Study for Undergraduates (1-5) I, II. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100A. Infancy and Early Childhood (4) I. Harper; II. The Staff
Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Analysis of the biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six.

100B. Middle Childhood and Adolescence (4) II. Ge; III. The Staff
Lecture—4 hours; three brief observations of school-age children. Prerequisite: course 100A or the equivalent; introductory biology. Analysis of the interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence.

100C. Adulthood and Aging (4) III. Ober
Lecture—4 hours. Prerequisite: Psychology 1 or 15. Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging."

101. Cognitive Development (4) I. The Staff
Lecture—4 hours. Prerequisite: courses 100A and 100B, or Psychology 112. Theories of cognitive devel-

opment including developmental views of perception, learning, memory, concept formation, and language.

102. Social and Personality Development (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory psychology; course 100B or the equivalent. Theories of development of a child's personality through interactions with children and adults; development of interpersonal and culturally valued skills.

103. Cross-Cultural Study of Children (4) II. The Staff
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S. GE credit: Div.

110. Contemporary American Family (4) III. Ge
Lecture—4 hours. Prerequisite: introductory psychology. Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.

120. Research Methods in Human Development (4) II. Barton
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: courses 100A and 100B; elementary statistics. Research methods in selected areas of human development (e.g., infancy, learning, cognition, personality).

121. Psychological Assessment (4) I. Barton; III. The Staff
Lecture—4 hours. Prerequisite: courses 100A-100B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.

130. Emotionally Disturbed Children (4) I. Bryant
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.

131. Developmental Disabilities (4) II. Rodning
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities, etiology, diagnosis, education and socialization. Introduction to community resources.

132. Individual Differences in Giftedness (4) III. Kraft
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Conceptualization, identification and education of the intelligent, the creative, and the talented, gifted individual.

140. Communication and Interaction with Young Children (2) I, II, III. Gaedeke
Lecture—2 hours. Prerequisite: courses 30A, 100A, and 140L (concurrent enrollment recommended). Theory and practice in the area of effective interaction with young children. Humanistic, child-centered approaches; awareness of goals, beliefs, and values as these affect interactions. *To enroll, students must sign up for laboratory time at the Child and Family Studies Center.*

140L. Laboratory in Early Childhood (3-6) I, II, III. Gaedeke
Discussion—3 hours; laboratory—6-15 hours. Prerequisite: course 140 (may be taken concurrently). Application of theories of learning and development to interaction with children six months to five years at Early Childhood Laboratory. Applied skills in communication, discipline and curriculum. May be repeated for credit for a total of 12 units. (P/NP grading only.)

141. Field Studies with Children and Adolescents (4-6) II. Kraft; III. Ponzio
Discussion—2 hours, field study—6-12 hours. Prerequisite: course 100B or the equivalent and consent of instructor. Study of children's affective, cognitive and social development within the context of family/school environments, hospitals and foster group homes. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

142. Field Studies with Exceptional Children (4-6) I. Bryant
Discussion—1.5 hours; field study—6-12 hours. Prerequisite: consent of instructor and one course from courses 130, 131, or 132 (may be taken concurrently). Field study with children who are identified as developmentally disabled, emotionally distressed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

143. Field Studies of the Elderly (4-6) II. Ober/Aldwin
Discussion—2 hours; field work—6-12 hours. Prerequisite: course 100C or 160 may be taken concurrently. To apply theory and research on adult development and aging, to work with older adults in a variety of settings, and to develop skills relevant to that application. Students will also develop a small research project.

***151. Shared Child Care** (4) III. Werner
Lecture—4 hours. Prerequisite: course 100A or 110, Psychology 112, or Anthropology 131. Examines roles of caregivers other than parents in contemporary society, and the impact of grandparents, siblings, family day care providers, foster parents, church- and employer-sponsored child care on children's development. Reviews child care legislation and social policy issues.

160. Social Aspects of Aging (4) II. Aldwin
Lecture—4 hours. Prerequisite: course 100C or Psychology 115. How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class projects. GE credit: Div.

162. Issues in Aging (3) I. Ober/Aldwin
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 100C or 160. Research and policy issues concerning the elderly and aging in contemporary society.

190C. Introductory Research Conference (1) I, II. The Staff
Discussion—1 hour. Prerequisite: involvement in ongoing research. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship off and on campus, in community, and institutional settings. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200A. Early Development (4) I. Rodning
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology; one upper division course in psychology or a related field; one upper division or graduate course in developmental psychology (may be taken concurrently). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years.

200B. Middle Childhood and Adolescence (4) II. Bryant
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology, and at least two upper division or graduate-level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence.

200C. Development in Adulthood (4) III. Ober/Aldwin
Lecture/discussion—4 hours. Prerequisite: courses 200A and 200B. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change.

***201. Social-Emotional Development in Infancy** (4) II. Rodning
Lecture/discussion—4 hours. Prerequisite: course 200A. Analysis of theory, methods, and research on social-emotional development in infancy. Emphasizes the development of primary and secondary emotions, and the development of attachment. Other possible topics include infant temperament, sex differences, compliance, and self-regulation. Offered in alternte years.

***210. Theories of Behavioral Development** (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Offered in alternate years.

211. Physiological Correlates of Behavioral Development (3) I. Harper
Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals.

***212. Adaptation and Aging** (3) I. Aldwin
Lecture/discussion—3 hours. Prerequisite: course 200C. Interdisciplinary perspective of the ways biological, psychological, and sociocultural factors affect aging and adaptation in late life. Focus is on the ways in which stress, coping, and social support affect health and the factors which contribute to optimal aging. Offered in alternate years.

213. Cross-Cultural Study of Children (3) I. Pollitt
Lecture—2 hours; discussion—1 hour; field project or paper. Prerequisite: graduate standing in Human Development, Education, Anthropology, Psychology or Sociology. Current theory and research concerned with comparative child development. Introduction into the major issues and methods of cross-cultural research (e.g., biological, cognitive and social development of children in different cultures and subcultures in U.S.A.). Offered in alternate years.

217. Development of Cortical and Perceptual Laterality (3) I. Kraft
Seminar—3 hours. Prerequisite: graduate standing in child or human development or consent of instructor. Current theory and research regarding the development of human cortical and perceptual laterality — emphasizing the relationship of this development to thinking and behavior. Offered in alternate years.

220. Research Methods in Human Growth and Development (3) II. Barton
Lecture—3 hours. Prerequisite: Statistics 13 or the equivalent and at least two upper division courses in human biology or developmental psychology. Theory and research methods in biological growth, and cognitive and social/emotional development from prenatal period to death.

***221. Psychological Assessment of Children** (4) III. Pollitt
Lecture—2 hours; discussion—2 hours. Prerequisite: course 121 or consent of instructor. Study of children's behavior through examination, analysis and evaluation of perceptual-motor, cognitive, affective and social development. Problems in assessment of exceptional children considered. Assignments focus on preparation of a comprehensive report on one child.

222. Applied Research and Program Evaluation (3) II. Braverman
Lecture/discussion—3 hours. Prerequisite: graduate standing and consent of instructor. Focuses on the design and conduct of applied research and evaluation studies, especially with regard to programs serv-

ing children and their families. Offered in alternate years.

225. Behavioral Development and Food Intake (4) III. Pollitt
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development (and related fields) and Nutrition. Multidisciplinary view covering key theoretical and research issues in basic human development processes related to food intake.

***231. Issues in Cognitive and Linguistic Development** (3) III. Kraft
Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

232. Cognition and Aging (3) III. Ober
Lecture/discussion—3 hours. Prerequisite: course 200C. The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Offered in alternate years.

***237. Parent-Child Interaction** (3) III. Rodning
Seminar—3 hours. Prerequisite: consent of instructor; upper division course on the family recommended. Current theory and research. Emphasis on parental behavior in other animals and other cultures, childrearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, sex-role development, and moral development. Offered in alternate years.

***238. The Context of Individual Development** (3) II. Bryant
Lecture/discussion—3 hours. Prerequisite: graduate standing in Human Development, Child Development, Education, Psychology, Anthropology, Sociology, or consent of instructor. Analysis of human development within the context of daily life. Contextualizing theories and methods of developmental psychology will be distinguished from contextual theories and methods. Developmental psychology models will be distinguished from child psychology models. Offered in alternate years.

***241. Consultation Approaches to Child Development** (3) II. Bryant
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate standing; supervised field experience with children (e.g., course 140, 141, 142, may be taken concurrently); and consent of instructor. Analysis and application of theories and approaches of consultation and child development to facilitate delivery of child-related services (e.g., educational and mental health). Develop working knowledge of consultation skills for working with adults directly interacting with children and adolescents. Offered in alternate years.

***242. Adolescent Health Behavior: Theory and Programs** (2) II. Braverman
Lecture/discussion—2 hours. Prerequisite: graduate standing in child or human development, or consent of instructor; course 200B recommended. Theoretical conceptions relating to adolescent behaviors that have potential impact on health (e.g., use of tobacco, alcohol and other drugs; sexual behavior; accident prevention). Development and evaluation of programs that aim to influence adolescents' behaviors or attitudes in these areas. Offered in alternate years.

290. Seminar (3) I, II, III. The Staff
Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

290C. Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (S/U grading only.)

291. Research Issues in Human Development (3) I, II. The Staff
Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Human Development (A Graduate Group)

Carol Bruch, J.D., Chairperson of the Group

Group Office, 1303 Hart Hall (916-752-1926)

Faculty. Faculty are drawn from 12 departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Law and of Medicine.

Graduate Study. The interdisciplinary and interdepartmental Graduate Group in Human Development offers a program of study leading to the Ph.D. degree. The program provides lifespan study of human behavioral development, with a balance of emphasis on biological, cognitive, and socio-emotional development in context. Recipients of the degree will be prepared to teach, to conduct research, and to be actively involved in public service in human behavioral development.

Humanities

(College of Letters and Science)

————, Ph.D., Program Director

Program Office, 522 Sproul Hall (916-752-9934)

Committee in Charge

Marc E. Blanchard, Agrégé de lettres *(Comparative Literature, French)*
Naomi Janowitz, Ph.D. *(Religious Studies)*
Pablo Ortiz, Ph.D. *(Music)*
Sarah Projansky, Ph.D. *(Women's Studies)*
Janelle Reinelt, Ph,D. *(Dramatic Art)*
Michelle Yeh, Ph.D. (Chinese and Japanese)

The Program of Study

Courses in the Humanities Program provide instruction in interdisciplinary areas which do not fit readily into existing departments or programs.

Courses in Humanities (HUM)

Lower Division Courses

1. Humanities Forum (2) III. The Staff
Seminar—2 hours. Reading and discussion of a single work representative of a particular culture, historical period, or genre and significant for its ongoing cultural impact in the humanities, sciences, social sciences, technology, and popular arenas. Attention to provocative implications for contemporary society. May be repeated once for credit when topic differs.

10. Introduction to Film Studies (4) III. Projansky
Lecture—2 hours; discussion—1 hour; film viewing—3 hours. Introduction to the study of cinema. Exploration of the analysis of film form and examination of a variety of issues in film studies, including spectatorship and cultural context. Emphasis on critical thinking and an analytical outlook on culture, generally. GE credit: ArtHum, Div, Wrt.

20A. Privacy in the West (4) II. Murav
Lecture/discussion—3 hours; term paper. Interdisciplinary study of privacy in the West. History of privacy as a positive concept in American constitutional tradition. Supreme Court cases. Privacy as a negative concept in Western religious tradition and Marxism. Privacy and gender, e.g., Anita Hill and Clarence Thomas. GE credit: ArtHum, Wrt.

40. Introduction to Computing in the Humanities (4) II. Roddy
Lecture—3 hours; laboratory—3 hours. Survey of current approaches to use of computers in such fields as language, literature, history, art, music, and drama. Laboratory in text creation and analysis.

Upper Division Courses

110A. Interdisciplinary Approaches to Narrative (4) I. Blanchard
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Interdisciplinary approach to contemporary issues (abortion, AIDS, civil rights, war and peace, welfare state) around which individuals, communities and institutions define themselves in American society, by applying principles of narrative theory to the narratives where those issues are embedded. GE credit: ArtHum, Wrt.

120. Italian-American Cinema (4) I. Schiesari
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10. Analysis and discussion of the tradition of Italian-American filmmaking (Coppula, Scorsese, Cassavetes, Tarentino, etc.) within the context of the Italian-American experience. Offered in alternate years. GE credit: ArtHum, Wrt.

122. Cinema and the American Jewish Experience (4) I. Murav
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10 strongly recommended. Examination of American cinema to reveal how Jewish identity is expressed and submerged, tracing the relations between religion, identity, race, politics, and art. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

124. Special Topics in U.S. Film History (4) I. Projansky
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 10. Topics in U.S. film history in terms of its cultural, technological, institutional, political, and representational development. GE credit: ArtHum, Wrt.

125. Film Genres (4) III. Projansky
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 10. Genre theory, the historical specificity of particular genres, the structure of the film industry, and film's relationship to popular culture. GE credit: ArtHum, Wrt.

140. Advanced Computing in the Humanities (4) III. Roddy
Lecture—3 hours; laboratory—3 hours; research project. Prerequisite: course 40 or consent of instructor. The computer as support for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and data base management (design, application and evaluation, and search strategies).

180. Topics in the Humanities (4) I, II, III. The Staff
Lecture/discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics will vary. May be repeated once for credit. GE credit: ArtHum, Wrt.

198. Directed Group Study (1-4) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-4) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

250. Topics in the Humanities (4) I, II, III. The Staff (Program Director in charge)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit.

299. Individual Research (1-4) I, II, III. The Staff (Program Director in charge)
Individual research in the humanities resulting in a formal written research report. (S/U grading only.)

*Course not offered this academic year.

Hydrologic Sciences (A Graduate Group)

Graham E. Fogg, Ph.D., Chairperson of the Group

Group Office, 113 Veihmeyer Hall (916-752-0453)

Faculty. The Group consists of faculty members from the Departments of Chemical Engineering; Civil and Environmental Engineering; Environmental Studies; Geology; and Land, Air and Water Resources.

Graduate Study. The Graduate Group in Hydrologic Sciences is an interdisciplinary program offering M.S. and Ph.D. degrees. Course work is available from many programs, including Hydrologic Sciences, Civil and Environmental Engineering, Geology, and Soil Science. Education in the group broadens the skills and knowledge of the physical science or engineering student interested in the occurrence, distribution, circulation and properties of water on earth. Because of water's ubiquity and importance to physical, chemical and biological processes, hydrologic sciences involve the geologic, atmospheric and oceanic sciences, as well as engineering and other applied physical sciences. Basic to the program are core courses in fluid dynamics, hydrologic phenomena, hydrobiology, hydrogeochemistry, hydrologic techniques, and hydrologic policy. The program has degree options in Hydrobiology, Hydrogeochemistry and Hydrology. The Hydrology option includes specializations in surface hydrology, subsurface hydrology, irrigation and drainage, and water resources management. The subsurface hydrology specialization includes hydrogeology and vadose-zone hydrology.

Preparation. Applicants to the program are expected to have completed or to be in the process of completing an undergraduate degree in environmental or physical sciences, mathematics, or engineering. Undergraduate study must include one year of calculus, one year of physics with calculus, and one year of chemistry. Additional courses in applied statistics, computer programming, and geology are recommended.

Specialization. Each student will pursue an individual program of advanced study under the direction of a group of faculty members with similar interests but diverse backgrounds. Course work in addition to the above is typically taken in the most appropriate departments.

Graduate Adviser. M.E. Grismer, M.A. Mariño *(Land, Air and Water Resources).*

Courses in Hydrologic Sciences (HYD)

Graduate Courses

200. Survey of Hydrologic Sciences (1) I, II, III. Grismer
Seminar—1 hour; paper. Prerequisite: open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. (S/U grading only.)

210. Hydrologic Modeling of the Vadose Zone (3) III. Hopmans
Lecture—2 hours; discussion—1 hour. Prerequisite: Soil Science 107, Mathematics 22B, Programming Language. Principles and modeling of soil water, solute transport, heat and water flow, root water and nutrient uptake. Numerical techniques to incorporate soil heterogeneity. Not open for credit to students who have taken Water Science 200 or course 210. Offered in alternate years.

212. Evapotranspiration (3) III. Parlange
Lecture—3 hours. Prerequisite: course 103. Review of lower atmosphere properties; introduction to similarity theory; surface roughness parameterization, calculation of energy fluxes, local advection and turbulence measurements will be studied in the field. Not open for credit to students who have completed Water Science 202. Offered in alternate years.

236. Hydrochemical Models (3) II. Tanji
Lecture—2 hours; laboratory—3 hours. Prerequisite: background in applied chemistry and PC and mainframe computers; numerical analyses recommended. Application of mathematical and computer models to chemical problems. Emphasis on process level models (transport, rate and equilibrium) with same exposure to systems level models. Not open for credit to students who have completed Water Science 217.

243. Water Resource Planning and Management (3) I. Marino
Lecture—3 hours. Prerequisite: course 141 or Civil and Environmental Engineering 142. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Same course as Biological Systems Engineering 243.) Not open for credit to students who have completed Water Science 206. (Former course Water Science 206.)

264. Modeling of Hydrologic Processes (3) III. Puente
Lecture—3 hours. Prerequisite: course 141 or the equivalent and Statistics 102 or the equivalent. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Offered in alternate years. (Former course 254.)

269. Numerical Modeling of Groundwater Systems (3) III. Fogg
Lecture—3 hours. Prerequisite: course 145A or Civil Engineering 144 and course 145B, Mathematics 22B. Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics. Not open for credit to students who have completed course 220. (Former course 220.)

***273. Introduction to Geostatistics** (3) I. Fogg
Lecture—3 hours. Prerequisite: Statistics 130A and 130B, or the equivalent. Statistical treatment of spatial data with emphasis on hydrologic problems. Topics include theory of random functions, variogram analysis, Kriging, co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Demonstration and use of interactive geostatistical software included. Not open for credit to students who have completed course 230. Offered in alternate years.

275. Analysis of Spatial Processes (3) III. Puente
Lecture—3 hours. Prerequisite: Statistics 102 or the equivalent; course 273 or Statistics 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical applications. Not open for credit to students who have completed course 255 or Water Science 255. Offered in alternate years.

290. Seminar in Hydrologic Science (1) III. The Staff
Seminar—1 hour. Prerequisite: graduate standing and background in Hydrologic Science, consent of instructor. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

410. OSHA HAZWOPER Refresher Course (1) II. Grismer
Lecture—1 hour. Updates hazardous materials handling information of purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.)

440. Hazardous Waste Operations Training (3) III. Grismer
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous materials. (P/NP grading only.)

Hydrology

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Land, Air and Water Resources, Hydrologic Science Section.

The Major Program

Hydrology is the study of the occurrence, distribution, circulation, and behavior of water in the environment of Earth. It includes measurement and analysis of water phenomena in the subsurface, on the Earth's surface, and in the atmosphere for the purpose of understanding and addressing problems that affect sustainability of both water quantity and water quality.

The Program. Hydrologists generally need strong backgrounds in physics, mathematics, chemistry, biology, geology, field methods, and computer methods. Knowledge of biology and chemistry is important for understanding modulators of water quality. Geology is essential for those working in groundwater hydrology. Field methods are necessary for observing and measuring hydrologic phenomena, and computer methods and mathematics are routinely needed for collectively analyzing field data and forecasting future system behavior.

Contemporary hydrologic problems include more effiecient use and development of groundwater and surface water resources; pollution of subsurface and surface waters from such sources as urban runoff, leaky underground storage tanks, and agricultural drainage; water quality criteria for drinking water and for fish and aquatic life; acidic precipitation and its impact on the environment; and the role of water in natural disasters such as flooding, landslides, and land subsidence. Other contemporary concerns include artificial recharge of groundwater, remote sensing for water resources, risk analysis in the operation of surface water reservoirs, and hydrologic prediction under uncertainty. The resolution of these problems demands hydrologic scientists with the comprehensive, mulitdisplinary education embodied in this program.

Internships and Career Alternatives. Numerous opportunities for internships exist with state and federal agencies in the Greater Sacramento–Davis area. Career opportunities in hydrologic science are available in private consulting firms, environmental interest groups, and government agencies dealing with water resources, including the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricltural Research, Forest Service, and Soil Conservation Service), Environmental Protection Agency, national research laboratories (Lawrence Livermore National Laboratory, Oak Ridge National Laboratory), and California Departments of Water Resources, Water Resources Control Board, Regional Water Quality Control Boards, Conservation, Fish and Game, and Toxic Substances.The major is excellent preparation for advanced degrees in hydrologic science and related fields.

B.S. Major Requirements:

UNITS

Written/Oral Expression 0-8
See College requirement

Preparatory Subject Matter 72
Biological sciences, Biological Sciences 1A, 1B, 1C 15
Chemistry, Chemistry 2A, 2B, 2C 15
Physics, Physics 9A, 9B, 9C 12
Calculus, Mathematics 21A, 21B, 21C, 21D 16
Linear algebra, Mathematics 22A 3
Differential Equations, Mathematics 22B 3
Physical geology, Geology 50, 50L 5
Applications of computers, Engineering 5 or the equivalent 3

Breadth/General Education 18-24

Depth Subject Matter 44-54
Fluid mechanics, Engineering 103A and 103B, or Chemical Engineering 150A and 150B, or Civil and Environmental Engineering 141 and 141L 6-8
Hydrology, Hydrologic Science 126, 134, 141, 142, 143, 145, 146 28
Field and laboratory methods, Hydrologic Science 101A, 101B 6
Soil physics, Soil Science 107 4
Probability and statistics, Civil and Environmental Engineering 114 or Statistics 130A and 130B 4-6
Water policy and law, select one of Agricultural and Resource Economics 147, Environmental Studies 161, 166 3-4

Restricted Electives 16-26
Students select an area of concentration in consultation with the Master Adviser, and then obtain prior approval from the Master Adviser for courses used to satisfy the student's area of concentration. Areas of concentration include:

Surface hydrology (Atmospheric Science 115, 133, Environmental Studies 155, Environmental Studies /Geology 150A, Geology 135, Soil Science 118

Hydrogeology (Geology 60, 60L, 100, 100L, 101, 101L, 103, 109, 109L, 161, Soil Science 120, Applied Science Engineering 115)

Remote sensing (Applied Biological Systems Technology 180, 181, Environmental and Resource Sciences 180)

Water management (irrigation and drainage) Hydrologic Science 115, 117, 124, Environmental and Resource Sciences 110)

Water quality (Environmental and Resource Sciences 130, Environmental Toxicology 101, 112A, Environmental Studies 151, Soil Science 111, Hydrologic Science 122, Chemistry 8A-8B-8C, 128

Unrestricted Electives 6-20
(Including units earned from 192 and 199 courses.)

Total Units for the Degree.....180

Major Adviser. M. Grismer.

Graduate Study. See the Hydrologic Sciences Graduate Group.

Minor Program Requirements:

The Hydrology Section of the Department of Land, Air and Water Resources offers the minor in Hydrology for environmental or natural science students who have an interest in water/environmental issues. The interested student should have completed preparatory course work in calculus (Mathematics 16B), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 5A), and biology (Biological Sciences 1A). Course work in the minor provides fundamental skills and knowledge of the hydrologic sciences. The program is sufficiently flexible for students to pursue partiuclar water issues or problems of interest to them.

UNITS

Hydrology 19-21
Engineering 103A and Hydrologic Science 141; or Environmental and Resource Sciences 100 and 100L 6-7
Atmospheric Sciences 115, Environmental and Resource Sciences 130 6
Select two courses from Atmospheric Sciences 133, Environmental and Resource Sciences 110, 120, 180, Environmental Studies 150A, 151, Geology 135, Hydrologic Science 115, 126, 145A and 145B, Soil Science 107, 118 6-8

Courses in Hydrologic Science (HYD)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 111A Veihmeyer Hall or 122 Hoagland Hall (916-752-1669).

Lower Division Courses

21. Water Pollution (4) II. Knight
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A or the equivalent. Causes and nature of various types of pollution and their effects upon aquatic biota. Particular emphasis on biological effects of toxic compounds, inorganic compounds, suspended matter, organic matter, salts and heated water on aquatic life. Not open for credit to students who have completed Water Science 41. GE credit: SciEng, Wrt.

92. Hydrologic Science Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: lower division student, consent of instructor. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Principles of Hydrologic Science (5) I. Grismer
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Chemistry 2B, Physics 5A; Mathematics 16B recommended. Introduction to scientific principles as applied to water and water problems. Topics include hydrology (surface and ground water), flow through porous media, water in soil-plant-atmosphere continuum, water quality, flow through pipes and channels, and representative water-resource problems. Not open for credit to students who have completed Water Science 100. GE credit: SciEng, Wrt.

103. Introduction to Fluid Mechanics (3) I. Parlange
Lecture—3 hours. Prerequisite: Physics 5A and Mathematics 16B; course 100 recommended; or consent of instructor. An introductory course in fluid properties, fluid statics, conservation of mass, momentum and energy. Dimensional analysis and boundary layer flow phenomena will also be considered. Not open for credit to students who have completed Water Science 142.

110. Irrigation Principles and Practices (3) III. Schwankl
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 5A; Soil Science 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water movement and storage, plant responses to irrigation regimes, water use by crops; procedures for determining frequency and depth of irrigation, drainage. Not open for credit to students who have completed Water Science 110.

115. Irrigation and Drainage Systems (4) II. Wallender, Grismer, Hills
Lecture—4 hours. Prerequisite: Engineering 103A or course 103. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage will be emphasized. Not open for credit to students who have completed Water Science 145. (Same course as Biological Systems Engineering 145.)

117. Irrigation Water Management (3) III. Hopmans
Lecture—2 hours; discussion—1 hour. Prerequisite: course 110 or 124. Irrigation principles of soil-water and plant-water relations with irrigation system characteristics and other factors into an analytical framework for irrigation water management. Case studies discussed. Not open for credit to students who have completed Water Science 172.

122. Biology of Running Waters (3) I. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in biology and junior standing. The study of lotic aquatic animals and plants in relation to their environment; various factors affecting the distribution of freshwater plants and animals is emphasized in a manner particularly suitable for students of freshwater ecology, soil and water science, and renewable natural resources. Not open for credit to students who have completed Water Science 122.

122L. Biology of Running Waters Laboratory (2) I. The Staff
Laboratory—2 hours (including 2 or 3 weekend field trips). Prerequisite: introductory course in biology or consent of instructor and junior standing; course 122 (concurrently). Course allows interested students to obtain experience in sampling, processing, and synthesizing field data. Field trips will allow students to obtain an understanding of the structure and function of stream ecosystems. Not open for credit to students who have completed Water Science 122L.

124. Plant-Water-Soil Relationships (4) III. Hsiao
Lecture—3 hours; discussion—2 hours. Prerequisite: course 100; Soil Science 100 recommended, and one additional course in botany or plant physiology; or consent of instructor. Principles of plant interactions with soil and water environments and their applications in crop and environmental management. Includes nutrient and water uptake and transport; transpiration; soil processes affecting supplies; deficiencies and plant responses. Not open for credit to students who have completed Water Science 104.

134. Aqueous Geochemistry (4) III. Casey
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2B, upper division standing. Covers the dielectric properties of water; thermodynamic and mass-action relations; electrolyte activities; metal hydrolysis equilibria; metal coordination chemistry; solubility calculations; electron-exchange reactions; and rate laws.

141. Physical Hydrology (4) I. Puente
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9B, Mathematics 21B; course 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff.

142. Systems Hydrology (4) II. Puente
Lecture—3 hours; discussion—1 hour. Prerequisite: course 141 or Civil and Environmental Engineering 142. General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques.

143. Analytical Hydrology and Watershed Management (3) II. Parlange
Lecture—3 hours. Prerequisite: course 103 or Engineering 103A; working knowledge of FORTRAN. Introduction to watershed hydrology modeling. Techniques in precipitation, evaporation, infiltration, subsurface and overland flow, non-point source pollution, snowmelt, and their formulation in watershed model design and programming. (Same course as Biological Systems Engineering 143.)

145A. Groundwater Hydrology (3) I. Mariño
Lecture—3 hours. Prerequisite: course 100, 103 or Engineering 103A recommended. Occurrence, distribution, and movement of groundwater. Steady and transient groundwater flow systems. Aquifer tests. Well construction, operation, and maintenance. Groundwater exploration, quality, and contamination. Not open for credit to students who have completed Water Science 149A.

145B. Groundwater Hydrology (4) II. Fogg
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 145A or Civil and Environmental Engineering 144; course 100 recommended. Physical and chemical processes in contaminant transport, with emphasis on effects of aquifer complexity. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport modeling. Laboratory includes field pumping test and work with physical and computer models. Not open for credit to students who have completed Water Science 149B and 149L.

151A. Field Methods in Hydrology (3) II. Grismer
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142 and 145. Measurement methods and analysis associated with the evaluation of water movement in the field. Sampling methods and use of data loggers and other sampling equipments are emphasized. Skills developed here will be applied to different field sites in course 101B.

151B. Field Methods in Hydrology (3) III. Grismer
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 151A. Data collection methods in the lab and field associated with water movement in the environment. Using the skills developed in course 151A, students evaluate water resource and contamination issues quantitatively at surface and ground water field sites.

182. Environmental Analysis with Geographical Information Systems (GIS) (5) I. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: Applied Biological Systems Technology 180; Applied Biological Systems Technology 181 recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment. Precision farming. Natural resource management. Spatial database structures. Remote sensing applications. Data quality and error analysis in GIS. (Same course as Applied Biological Systems Technology 182.)

192. Hydrologic Science Internship (1-12) I, II, III, The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: senior standing. (P/NP grading only.)

Immunology (A Graduate Group)

M. Eric Gershwin, M.D., Chairperson of the Group

Group Office, 1202E Meyer Hall (916-752-2512)

Faculty. The faculty includes members from several colleges and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Immunology is a multidisciplinary group offering programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunology. Possible areas of specialization include molecular biology, immunochemistry, immunogenetics, cellular immunology, clinical immunology, and tumor and developmental immunology.

Preparation. Applicants for candidacy to these programs should have completed undergraduate preparation in general biology, zoology or botany, general bacteriology or microbiology, general genetics, mathematics, general physics, chemistry, and biochemistry.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements more specialized preparation in at least one of the following is required: *(a)* microbiological specialties (bacteriology, virology, parasitology, medical microbiology); *(b)* zoological specialties (cell biology, endocrinology, embryology, protozoology, histology, cytology, physiology); *(c)* medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, epidemiology); *(d)* biochemistry/biophysics specialties (biologically active molecules, control mechanisms); *(e)* genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

Graduate Adviser. Contact the Group Office.

Courses in Immunology (IMM)

Additional courses are available and listed under the individual sponsoring departments. Contact the group office for information.

Graduate Courses

292. Immunotoxicology Seminar (2) I. Golub
Seminar—2 hours. Prerequisite: graduate standing in Pharmacology/Toxicology, Immunology, Physiology, or Biochemistry. Seminar presentations dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. Offered in alternate years. (S/U grading only.)

295. Cytokines: An Expanding Class of Cell Regulatory Agents (2) II. Benton, Erickson
Lecture/discussion—2 hours. Prerequisite: undergraduate courses in immunology, cell biology and biochemistry. Lectures, discussion and presentations which examine the role of cytokines in immunity, inflammation tissue injury and disease. Current knowledge of their molecular structures, specific receptors, antagonists and signalling mechanisms will be discussed.

296. Advanced Topics in Immunology (3) II. Cheung
Seminar—3 hours. Prerequisite: graduate standing. Presentation, discussion and analysis of research topics in immunology, with emphasis on investigative bench research. (S/U grading only.)

Independent Study Program

Information:

Chairperson
Committee on Courses of Instruction
c/o Academic Senate Office (916-752-2220)

The Independent Study Program provides an opportunity for upper division students to design and pursue a full quarter (12-15 units) of individual study in an area of special interest.

A program qualifying as Independent Study will consist of one or more courses in the 190–199 series. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is not to be considered a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:

1. develop, in general terms, a plan of study;
2. locate a faculty sponsor or panel of sponsors, and with their help and approval develop a detailed plan;
3. complete a project proposal form (obtained from the Academic Senate Office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the tenth day of instruction of the term before the term in which the project is to be undertaken. (See the Academic Calendar at the front of the catalog for specific dates.)

You must report the completion or termination of the project to the Committee on Courses of Instruction.

Individual Major

(College of Agricultural and Environmental Sciences and College of Letters and Science)

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisers and appropriate college committees. This major enables a student to pursue a specific interest which cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

College of Agricultural and Environmental Sciences

Academic Advising Center, 228 Mrak Hall
(916-752-0610)

Student Proposal. An Individual Major may be organized for a student having a specific academic interest not represented by an established major. Each student wishing an Individual Major should submit a proposal to the Dean at least **four quarters** before graduation, for review by the Individual Major Committee. This proposal must include *(1)* a description of the special educational aims of the student, including a statement indicating why the educational objectives cannot be met by existing majors; and *(2)* a list of planned courses. It is critical that you contact the Academic Advising Center for consultation and development of the proposal.

B.S. Major Requirements:

UNITS

English Composition requirement 0-8
See College requirement

Preparatory Subject Matter .....(variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Breadth/General Education.....6-24
Satisfaction of General Education requirement

Depth Subject Matter 45-54
Upper division course work must include *(a)* interrelated courses of 45 upper division units from two or more areas of study, and *(b)* at least one of the two or more areas of study must be within the College of Agricultural and Environmental Sciences; and (C) at least 30 or the 45 upper division units that are required in the program must be taken from courses provided by the College of Agricultural and Environmental Sciences.

Unrestricted Electives.....(variable)
Total Units for the Degree.....180

Master Adviser. R. Green *(Agricultural and Resource Economics).*

College of Letters and Science

Program Office, 200 Social Sciences and Humanities Building (Dean's Office), (916-752-0392)

Committee in Charge

Richard Cowen, Ph.D., Chairperson *(Geology)*
Michael R. Dietrich, Ph.D. *(History and Philosophy of Science)*
Jack Goldberg, Ph.D. *(Neurobiology, Physiology and Behavior)*
Richard Levin, Ph.D. *(English)*
Pablo Ortiz, Ph.D. *(Music)*

Student Proposal. A student who wishes to propose an individual major should submit the proposal to the Faculty Committee on Individual Majors in the College of Letters and Science **by the end of the fourth full week of the fifth quarter before graduation.** This proposal will consist of *(1)* an essay, identifying the specific educational and professional objectives, including an indication of why the objectives cannot be met within existing majors, *(2)* a list of courses planned to complete the major, and *(3)* faculty adviser recommendations. The proposal will be reviewed and a decision provided the quarter of submittal. It is important for you to make arrangements to speak with a counselor in the college early in the development of your major.

A.B. and B.S. Major Requirements:

UNITS

Preparatory Subject Matter .....(variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter 45-54
Upper division units must include:
(a) interrelated and complementary courses from two or more departments which provide a unified pattern and focus;
(b) at least 30 units from Letters and Science teaching departments or programs;
(c) no more than 10 units in courses numbered 194H, 198 and 199;
(d) for the A.B. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

Total Units for Degree 180

Major Advisers (selected by student). *Principal Adviser:* a faculty member in a teaching department or program in the College of Letters and Science in major field of emphasis. *Secondary Adviser:* a faculty member from secondary area of interest.

Honors Program. By the fourth week of the last quarter of the junior year, students potentially eligible for high or highest honors at graduation (see College section), may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a senior thesis prospectus that has been agreed upon by the student and faculty adviser. The prospectus must be presented to the Committee by the end of the fourth full week of instruction of the first quarter of the senior year. Graduation with high or highest honors will be conditional upon both the maintenance of the required grade point average and the completion of the senior thesis project. Students who anticipate doing a senior honors thesis should allow up to 3 units of independent study in the program during each of the two quarters in the senior year as course options.

Integrated Studies

Nora A. McGuinness, Ph.D., Program Director

Program Office, 162 Kerr Hall (916-752-9797)

Committee in Charge

Richard T. Curley, Ph.D. *(Anthropology)*
Douglas W. McColm, Ph.D. *(Physics)*
Nora A. McGuinness, Ph.D. *(Integrated Studies)*
Jay E. Mechling, Ph.D. *(American Studies)*, Chairperson
Kenneth L. Verosub, Ph.D. *(Geology)*

Faculty

Richard T. Curley, Ph.D., Lecturer *(Anthropology)*
Dennis J. Dingemans, Ph.D., Associate Professor *(Geography)*
Georges Halpern, M.D., Adjunct Professor *(Internal Medicine)*
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing)*
C. Blake Keasey, Ph.D., Clinical Professor *(Psychiatry)*
Jerold A. Last, Ph.D., Professor *(Internal Medicine, Biological Chemistry)*
Douglas W. McColm, Ph.D., Senior Lecturer *(Physics)*
Nora A. McGuinness, Ph.D., Academic Coordinator *(Integrated Studies/Davis Honors Challenge)*
Jay Mechling, Ph.D., Professor *(American Studies)*
Kenneth A. Shackel, Ph.D., Associate Professor *(Pomology)*
Jessica M. Utts, Ph.D., Professor *(Statistics)*

The Program of Study

Integrated Studies is an invitational first-year honors residential program associated with the Davis Honors Challenge. Established in 1969, the program aims to help high-achieving students integrate knowledge gained from humanities, natural sciences, and social sciences study and organize their learning experiences through interdisciplinary or multidisciplinary approaches to a common theme. The theme for 1997-2000 will be "End of the Century—the End of the Millenium." Enrollment is limited to 25 students per class, and program membership is limited to the top 3% of the entering class. (In 1997-98, 68 students will be admitted to the program.)

Students enroll in at least three Integrated Studies courses and two seminars during the year. **Students not admitted to the Program may not register for Integrated Studies courses or seminars.**

For more information about the Davis Honors Challenge, see the section titled "Honors Challenge."

Courses in Integrated Studies (IST)

Lower Division Courses

1A. Science and Engineering: Physics (4) III. McColm
Lecture—2 hours; discussion—2 hours. Introductory course on the history, philosophy and methodology of physics from 600 B.C. to the present day. Changes in ideas about the physical universe explored. Problem solving not emphasized.

***2A. Arts and Humanities: Mathematics and Civilization** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra and geometry. Topics from arithmetic, geometry, algebra and probability presented in historical context which is designed to convey an appreciation of the role that mathematics has played in shaping our world and civilization.

***2C. Arts and Humanities: Origins of Western Civilization** (4) III. Roller
Lecture—3 hours; discussion—1 hour. Civilizations of the ancient Near East and Greece: the problem of divine-human relations, problems of law and justice, and development of science and of logical thought. Readings include selections from Near Eastern texts and from Greek literature.

***2E. Arts and Humanities: Playing Shakespeare** (4) III. The Staff
Lecture—3 hours; laboratory—2 hours. Prerequisite: completion of Subject A requirement. Shakespeare as a theatre professional: producer, actor, director. His use and development of Elizabethan theatre acting space. Objective analysis of how Shakespeare's text actually works on stage. Scene exercises to illustrate effective playing of the text.

***3A. Social Sciences: History in Our Time** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Major political, economic, historical, and ideological changes in the global community since the 1970s.

***3B. Society Through Literature: Modern Europe** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Readings and discussion concerning European experience as related to the Russian revolution, two world wars, the rise of Fascism, Nazi holocaust, and the decline of Europe as the center of world politics.

***3E. Social Sciences: Sociology** (4) III. The Staff
Lecture—2 hours; discussion—2 hours. Introduction to modern sociological research and theory utilizing material drawn from three topical areas: the development of gender identities, the social production of scientific and other forms of knowledge, and the social basis of religious belief.

8. Colloquium (1) I, II. The Staff (N. McGuinness in charge)
Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/NP grading only.)

8A. Special Topics in Natural Science and Mathematics (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. Limited enrollment. May be repeated for credit. GE credit: SciEng, Wrt.

8B. Special Topics in Humanities (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Group study of a special topic in humanities. Course varies with topic offered. Limited enrollment. May be repeated for credit. GE credit: ArtHum, Wrt.

8C. Special Topics in the Social Sciences (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Group study of a special topic in social sciences. Course varies with topic offered. Limited enrollment. May be repeated for credit. GE credit: SocSci, Wrt.

9. Seminar (1) I, II, III. The Staff (N. McGuinness in charge)
Lecture—1 hour. Lectures, films, and readings on the themes for the year. May be repeated for credit. (P/NP grading only.)

Upper Division Course

197T. Tutoring in Integrated Studies (1-4) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of Director of Integrated Studies. Tutoring in lower division Integrated Studies courses, usually in small discussion groups. Weekly discussions with the instructor on the subject matter of the course being tutored and on the art and craft of teaching. (P/NP grading only.)

Interior Design

See Design

Internal Medicine

See Medicine, School of

*Course not offered this academic year.

International Agricultural Development

(College of Agricultural and Environmental Sciences)

International Agricultural Development is an interdisciplinary major in the Human and Community Development department.

Faculty. Includes members from various departments across colleges.

The Major Program

The goal of international agricultural development is to improve food production, nutrition, marketing, and health in less technically advanced countries. Students in this major are trained in technical areas of agriculture that can be applied to the problems of world hunger and health.

The Program. International agricultural development majors may select their areas of technical specialization from any of the agricultural and environmental sciences, for example, agricultural economics, agricultural engineering, animal science, community development, food science, plant science, or resource science. Students interested in international work also need to develop the qualities necessary for effective performance in developing areas of the world. Courses in social sciences, humanities, and economics work toward this end by providing an understanding of the broad cultural, social, and economic environments in which agriculture operates in countries outside of the United States.

Career Alternatives. The study of international agricultural development prepares a student for a variety of careers. Some students choose service through the Peace Corps. Others seek employment in international trade, while others choose to work for a governmental or private agency in a foreign nation. Religious groups and organizations also employ university-trained individuals for agricultural work in conjunction with missions and other types of human service work overseas. The major is also preparation for further graduate work in agricultural development.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 39-43
Choose either Social Sciences or Natural Science core.

Social Sciences core.....39
- Chemistry (Chemistry 10) 4
- Science (Biological Sciences 10, Agricultural Systems and Environment 2, Animal Science 1, Nutrition 10, Soil Science 10) 15
- Social sciences (Community and Regional Development 1, Anthropology 2, Political Science 2, Sociology 1, History 4C) 16
- Statistics (Agricultural Systems and Environment 120 or Statistics 13 or Sociology 46A).....4

Natural Science core.....54
- Biological sciences (Animal Science 2, Biological Sciences 1A, 1B, 1C, 101, Agricultural Systems and Environment 2) 15-27
- Chemistry (Chemistry 2A, 2B, 8A, 8B) 16
- Mathematics (Mathematics 16A or 21A) 3-4
- Physics (Physics 1A).....4
- Statistics (Agricultural Systems and Environment 120 or Engineering: Computer Science 10).....4

Breadth/General Education 6-24
Satisfaction of General Education requirement

Depth Subject Matter 38
- International Agricultural Development 10, 110, 111 8
- International agricultural development (International Agricultural Development 102, 103, 190, 191, 195, 198; Agricultural Systems and Environment 110A, 110B, 110C) 12
- Economics and social sciences: Economics 1A-1B and two upper division courses relevant to development (Agricultural and Resource Economics 100A, 100B, 106, 113 or 136, 140, 145, 147, 150, 176; Economics 100, 110A, 115A, 115B; Anthropology 126, 131, 135; Community and Regional Development 153; Political Science 126, 146, 148A-148B; Sociology 144, 145A, 145B).....18

Primary Field of Specialization 60
Natural Sciences or Social Sciences: Courses chosen by student, with an adviser in that specialization, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.

Natural Sciences: Student should include some course work in social sciences appropriate to the geographic area of personal interest (e.g., anthropology, geography, history, or political science area studies courses).

Unrestricted Electives 1-34
Students not possessing a reading/speaking ability in a foreign language will be encouraged to use these electives for language study or to attend an intensive language school.

Total Units for the Degree.....180

Specialization Advisers
A listing of faculty in the various areas of specialization and with interests in International Agricultural Development is available from the Major Adviser.

Major Adviser. S.B. Brush *(Human and Community Development).*

Minor Program Requirements:

UNITS

International Agricultural Development.....20
- International Agricultural Development 10, 102, 110, 111; Agricultural Systems and Environment 110A, 110B, 110C.....16
- Minimum of four units chosen from Agricultural Systems and Environment 111, International Agricultural Development 103, 141, 190, 195, Economics 115A-115B.....4

Minor Adviser. S.B. Brush (1331 Hart Hall).

Graduate Study. A program of study and research leading to the M.S. degree is available in International Agricultural Development. Detailed information regarding graduate study may be obtained by writing to the Coordinator of Graduate Recruitment (I.A.D.), Graduate Studies, UC Davis.

Graduate Advisers. D.J. Boyd *(Anthropology);* K.G. Cassman *(Agronomy and Range Science);* L.S. Jarvis *(Agricultural and Resource Economics).*

Related Courses. See Agricultural and Resource Economics 148, 215C; Agricultural Systems and Environment 111; Anthropology 221; Economics 115A-115B, 215A-215B-215C; Geography 142; Nutrition 20; Sociology 144.

Courses in International Agricultural Development (IAD)

Questions pertaining to the following courses should be directed to the instructor or to the Department of Human and Community Development Advising Center in 1303 Hart Hall (916-752-2244).

Lower Division Courses

10. Introduction to International Agricultural Development (4) II. Brush
Lecture—3 hours; discussion—1 hour. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. GE credit: SocSci, Div, Wrt.

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

Upper Division Courses

103. Social Change and Agricultural Development (4) III. Brush
Lecture/discussion—4 hours. Prerequisite: introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment. GE credit: SocSci, Div.

104. Gender and Environment in the Developing World (4) III. Momsen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 recommended. Examines how environmental problems in the countries of Africa, Asia and Latin America affect men and women differently and the impact of structural adjustment on the environment in rural and urban areas.

110. Agricultural Production Economics (4) I. The Staff
Lecture—4 hours. Prerequisite: upper division status and an introductory course in microeconomics (Economics 1A). Economic analysis of agricultural production in low income countries, from field-level data collection to national food policy. Emphasis is given to construction and use of farm models in project evaluation.

111. Agricultural Marketing Systems (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status and an introductory course in microeconomics recommended (Economics 1A). Economic analysis of agricultural marketing systems in low income countries, including the functions of transportation, storage, packaging, handling, grading and standardization, processing, and market news. Emphasis is given to evaluation of interventions in marketing systems to speed economic development.

142. Equipment and Technology for Small Farms (2) III. Rumsey, Plant
Lecture—1 hour; laboratory—3 hours. Types and characteristics of agricultural equipment and technologies appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Same course as Applied Biological Systems Technology 142.)

160. Agroforestry: Global and Local Perspectives (2) I. Weinbaum
Lecture/discussion—2 hours. Prerequisite: Agricultural System and Environment 2 or Biological Sciences 1C; Plant Biology 142 or a general ecology course (Environmental Studies 100). Explores traditional and evolving use of trees in agricultural ecosystems, their multiple roles in environmental stabilization and the production of food, fuel and fiber, and socioeconomic barriers to adoption. Offered in alternate years. (Same course as Agricultural Systems and Environment 160.)

190. Proseminar in International Agricultural Development (1) I, II, III. The Staff
Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.)

***191. Topics in International Agricultural Development** (3) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations—variable content. May be repeated for credit.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

195. Field Study in Agricultural Development (3) III. The Staff
Lecture—2 hours total; seminar—8 hours total; field work—overnight trips to sites in California (four two-day visits) or Mexico (one eight-day visit). Students will incur travel expenses. Observation of agricultural development strategies and impact on rural communities. Discussion with farmers, workers and organizational staff members. Study of farm commodities, institutions and experiences in dealing with agricultural development problems. International influence on United States agriculture. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200. Analysis and Determinants of Cropping Systems (4) III. Van Kessler
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101, Agricultural Science and Management 150 (or comparable statistics course). Cropping systems as a function of farmer objectives, resource availability, environment, and yield potential; interactions among management strategies, resource use efficiency, and the agroecosystem; stability, diversity, and substainability of cropping systems.

201. The Economics of Small Farms and Farming Systems (4) II. Jarvis
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100A. Economic perspective on small farm development. Establishes a basis for predicting farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare.

202. Social Systems and Agricultural Development (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division course work in economic development, cultural anthropology, sociology, or political science (especially comparative politics or public administration), or consent of instructor. Social and cultural factors in agricultural and rural development; adaptation of rural people to development process; agrarian movements and revolution; evaluation of theories of rural development; application of social analysis to design and implementation of rural and agricultural policies and programs.

203. Management Systems for Agricultural Development (4) II. Wolf
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or 201 preferably, or 202; or consent of instructor. Contexts of agricultural and rural development; strategies for program implementation; planning, staffing, and financing agricultural development; processes and structures of implementation; delegation, decentralization, devolution, deconcentration, and dispersal.

217. Conservation and Sustainable Development in Third World Nations (4) II. Orlove
Lecture/discussion—3 hours; fieldwork—2 hours. Prerequisite: at least one course from two of these three groups: a) Environmental Studies 160, 161, 168A, 168B; b) Environmental Studies 101, 133, International Agricultural Development 103, Geography 142; c) Anthropology 126, 131, Geography 141, Sociololgy 144, 145A, 145B. Examination of the patterns of resource ownership, control and management in agricultural lands, extractive zones (fisheries, forests) and wildlands, with emphases on conservation and sustainability. Comparison of industrial democracies and poorer nations. (Same course as Ecology 217.)

220. Food and Nutrition Strategies in Developing Countries (4) I. Jarvis
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100A. Identifies important topical problems in food and nutrition policy, develops theoretical frameworks suitable for their analysis, examines the empirical information relevant to the problems and, using theory data, draws appropriate policy implications. Offered in alternate years.

290. Seminar in International Agricultural Development (1-2) I, II, III. The Staff
Seminar—1-2 hours. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. May be repeated for credit. (S/U grading only.)

291. Topics in International Agricultural Development (1-3) I, II, III. The Staff
Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated once for credit.

292. Graduate Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: participation in H. Humphrey Fellow Program or consent of instructor. Individually designed supervised internship, off or on campus, in community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (S/U grading only.)

298. Directed Group Study (1-5) I, II, III. The Staff (Graduate Group Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Graduate Group Chairperson in charge)
(S/U grading only.)

International Agricultural Development (A Graduate Group)

———, Chairperson of the Group

Group Office, 1303 Hart Hall (916-752-1926)

Faculty. The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the School of Veterinary Medicine.

Graduate Study. The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. The group's approximately 85 faculty members possess a wide range of experience in international development.

The philosophy guiding the program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirty different specializations are offered. In addition, to apply their specializations, graduates should be perceptive and understanding of people in developing nations, and have a comprehension of how technological, social, economic, and political variables affect the development process. They should have insight into individual and group motivations and be able to discern ways to initiate changes.

The program provides a multidisciplinary education designed to recognize these needs. It guides students to the knowledge, skills, and abilities needed to stimulate, assist, or manage agricultural development and enhance rural life in developing countries. Students are prepared to accomplish technological and biological improvement in agricultural methods and to encourage social innovations where appropriate. Specialization is available in fields ranging from agricultural economics, agronomy, animal science, and community development to agricultural ecology, international nutrition, and women's issues, all with an emphasis on international development.

Graduate Adviser. Contact the Group Office.

International Nutrition

Kenneth H. Brown, M.D., Program Director (916-752-1992)

Program Office, 3150 Meyer Hall (916-752-1992)
World Wide Web:
http://www-nutrition.ucdavis.edu/pin/index/htm

Faculty

Lindsay H. Allen, Ph.D, Professor *(Nutrition)*
Kenneth H. Brown, Ph.D, Professor *(Nutrition)*
Kathryn G. Dewey, Ph.D, Professor *(Nutrition)*
Louis E. Grivetti, Ph.D, Professor *(Nutrition)*
Charles H. Halstead, M.D., Professor *(Internal Medicine)*
Lovell S. Jarvis, Ph.D, Professor *(Agricultural and Resource Economics)*
Lucia Kaiser, Ph.D *(Cooperative Extension)*
Bo L. Lönnerdal, Ph.D, Professor *(Nutrition)*
Suzanne Murphy, Ph.D, *(EFNEP, Program Director)*
Benjamin Orlove, Ph.D, Professor *(Environmental Studies)*
Ernesto Pollitt, Ph.D, Professor *(Pediatrics)*

Graduate Study. The Program in International Nutrition, an organized research unit located in the Department of Nutrition, coordinates specialized course work and research leading to the **designated emphasis** in International Nutrition for students in various graduate programs. The program focuses on both theoretical and practical issues concerning the indentification, treatment, and prevention of human nutritional problems in low-income countries. Students enrolled in the designated emphasis are expected to *(1)* complete the course requirements already established by their respective graduate programs, *(2)* participate in a weekly advanced seminar in international nutrition, *(3)* complete additional core coures in international nutrition (Nutrition 219A, 219B, 258) and selected courses in the related disciplines of epidemiology, statistics, and social and behavioral sciences, and *(4)* conduct their dissertation research on a relevant topic under the supervision of a major professor who is a member of the Program in International Nutrition.

Students accepted into the following doctoral programs are automatically eligible to participate in the designated emphasis: Nutrition, Agricultural Economics, Epidemiology, Anthropology, and Human Development. Students from other programs may also be accepted by special request to the Program Director. Upon graduation, students receive a Ph.D. in their major field, with specific recognition on their diploma for the designated emphasis in international nutrition.

Graduate Adviser. Contact the Program Office.

*Course not offered this academic year.

International Relations

(College of Letters and Science)

Emily O. Goldman, Ph.D., Program Director

Program Office, Social Sciences and Humanities Building (916-752-3063)

Committee in Charge

David J. Boyd, Ph.D. *(Anthropology)*
Daniel R. Brower, Ph.D. *(History)*
Gregory Clark, Ph.D. *(Economics)*
Dennis J. Dingemans, Ph.D. *(Geography)*
Dennis J. Dutschke, Ph.D. *(Italian)*
Emily O. Goldman, Ph.D. *(Political Science)*
Jack A. Goldstone, Ph.D. *(Sociology)*
Jeannette Money, Ph.D. *(Political Science)*
Miroslav Nincic, Ph.D. *(Political Science)*
Geoffrey Wandesforde-Smith, Ph.D. *(Political Science)*

The Major Program

Problems of security, development, ethnic conflict, human rights, health, and the environment are increasingly confronted at a global rather than a national level. With its theoretical models and real-world application, the study of international relations is an exciting and highly relevant interdisciplinary major.

The Program. Graduation with a major in international relations requires completion of introductory courses in political science, economics, geography, and history. Upper division work is composed of twelve courses chosen from one of four tracks which encompass major topical areas in combination with an area studies emphasis: I. World Trade and Development, II. Peace and Security, III. Global Environment, Health, and Natural Resources, IV. Peoples and Nationalities. The major also requires fluency in English and a working knowledge (approximately 24 to 30 units of course credits or equivalent fluency) of one other modern language.

Programs, Internships, and Career Alternatives. One program of special interest to international relations majors is the Education Abroad Program, which provides insights into the life and culture of other countries. At UC Davis, the Internship and Career Center assists students in obtaining legislative, legal, and business internships. In addition, the UC Davis Washington Center arranges internships and runs a full-credit academic program in Washington, D.C. with a full range of oppotunties for International Relations majors (see also the UC Davis Washington Center listing). International relations graduates are prepared for employment in government agencies (such as the Foreign Service), state agencies, international or nongovernmental organizations (such as the United Nations), foundations, and companies having interests in international business, trade, or finance. The stringent language requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

International Relations Abroad: International Relations strongly encourages students to participate in the UC Education Abroad Program. A maximum of four courses taken abroad may be applied toward the 12 upper division courses in the International Relations major. Courses are selected with the approval of an adviser for the International Relations program.

Preparatory requirements. Before declaring a major in International Relations, students must complete the following courses with a combined GPA of at least 2.50 (all courses must be taken for a letter grade):

Economics 1A, 1B.....10 units
Geography 10 .....3 units
History 4C or 10.....4 units
Political Science 3 .....4 units

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24-27
Economics 1A, 1B.....10
Geography 10 3
History 4C or 10 4
Political Science 3 4
One course selected from Anthropology 2, 10, Environmental and Resource Sciences 3, Environmental Studies 30, Geography 2, History 8, 9A, 9B, 15, 17B, International Agricultural Development 10, Political Science 1, 2, Science and Society 2, Sociology 4 3-4
Recommended: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)
Note: Mathematics 16A is a required prerequisite for some courses.
Foreign language 0-30
One of the following series in a single language:
Chinese 1, 2, 3, 4, 5, and 630
or Chinese 7, 17, 2715
or Chinese 8, 18, 28.....15
French 1, 2, 3, 21, 22 25
German 1, 2, 3, 20, 21 23
Italian 1, 2, 3, 4, 521
or Italian 1, 2, 3, 8A, 8B.....21
Japanese 1, 2, 3, 4, 5, 630
or Japanese 8, 18, 28 15
Russian 1, 2, 3, 4, 5 23
Spanish 1, 2, 3, 21, 2225
or Spanish 31, 32, 33.....15
Note: The language curricula are subject to change; please check with an adviser for the major. A language not listed above may be substituted *only with prior written approval of the International Relations Program Committee.*

Depth Subject Matter 47-50
Twelve upper division courses—choose one track below:

Track I: World Trade and Development
(Emphasizes contemporary economic relations of industrialized and developing countries)

For Advanced Industrialized Focus:
Economics 100 or 104; 101 or 105; 160A-160B, Political Science 123 20-22
Two courses selected from Group A.....8
One course selected from Group B.....4
Four courses to fulfill Area Studies Requirement 16

For Developing Countries Focus:
Economics 115A-115B, 162.....12
Political Science 123, 124 8
One course selected from Group A.....4
Two courses selected from Group B.....8
Four courses to fulfill Area Studies Requirement 16
Group A courses (Advanced Industrialized Countries):
Anthropology 127, Community and Regional Development 141, 156, Economics 110B, 116, Political Science 102, 130, 140, Sociology 139, 141, 143A
Group B courses (Developing Countries):
Anthropology 122, 123C, 126, 127, 135, Community and Regional Development 153, Economics 110B, Geography 156, International Agricultural Development 103, Political Sciences 102, 124, 126, 178, Sociology 141, 145A

Track II: Peace and Security
(Focuses on political and security relationships among states and non-state actors, examining questions of war, peace, alliances, and diplomacy)

Economics 162 4
Political Science 123, 130, 132.....12
Political Science 120 or 121.....4
Three additional courses from at least two departments selected from Rhetoric and Communication 157, Economics 116, Geography 143, History 145, 146A, 146B, Philisophy 118, Physics 137, Political Sciences 112, 126, 128, 131, 140, 177, Sociology 100, 118 12
Four courses to fulfill Area Studies Requirement 16

Track III: Global Environment, Health, and Natural Resources
(Familiarizes students with new sources of global interdependence such as biodiversity, natural resource conflicts, population growth, and world health)

Note: Some courses shown below have additional prerequisities
Economics 115A or 115B
Economics 162.....4
Political Science 122, 123 8
Select one from Agricultural and Resource Economics 175, 176, Economics 115A, or Physics 150.....4
Select one from Agricultural and Resource Economics 147, Anthropology 121N, Environmental Studies 164, Political Science 107 3-4
Select three additional courses from two of the following groups.....9-12
Atmospheric environments:
Atmospheric Science 116, Environmental and Resource Sciences 131
Marine environments:
Environmental and Resource Sciences 121, Geology 116
Land use and food supply:
Agricultural Systems and Environment 101, 150, Community and Regional Development 142, Biological Sciences 151
Energy supplies and technology:
Environmental Studies 167, Geology 130, Political Science 171
Human populations:
Anthropology 101, 133, Geography 156, Political Science 102, Sociology 170
Health: Environmental Studies 126, Environmental Toxicology 101, 112A, Infectious Diseases (Internal Medicine) 141, Medical Microbiology 115, Nutrition 111, 118
Four courses to fulfill Area Studies Requirement 16

Track IV: Peoples and Nationalities
(Examines social and cultural foundations of national development and international relations)

Anthropology 133.....4
Political Science 124 4
Sociology 118.....4
Select one course from Community and Regional Development 176, Political Science 126 4
Select four courses from at least two departments 16
Anthropology 123A, 123B, 123C, 124, 126, 131, 135, Chicano Studies 140, Human Development 103, Philosophy 105, Political Science 127, 128, 178, Rhetoric and Communication 145, Religious Studies 168, 170, Sociology 143A, 145B, 146, 156, 175, 185, Women's Studies 102
Four courses to fulfill Area Studies Requirement 16

Area Studies Requirement
Four courses: three of the four must be selected within one region, and from at least two of three groups (History, Social Analysis, Culture and Literature); the fourth course may be selected from any region.

Western Europe
History: History 140, 141, 142, 144, 145, 146A, 146B, 147A, 147B, 147C, 151D

Social Analysis: Geography 123, Political Science 137, 147

Culture and Literature: French 107N, 108, 120, 121, 133, German 115A, 115B, 118B, 118C, 118E, 120, 126, 141, 142C, 143, 150, 185, English 137, 155C, Italian 120A, 120B, Spanish 137N, 139, 140N, 141, 142, 148, 157, 170

Russian and East/Central Europe

History: History 138B, 138C, 143

Social Analysis: Geography 124, Political Science 136, 141, 143, 144

Culture and Literature: Russian 123, 129, 130, 131, 143, 151

Asia and the Pacific

History: History 191E, 191F, 194C, 194D, 196B

Social Analysis: Anthropology 143A, 143B, 147, 148A, 148B, 149B, Geography 126, Political Sciences 133, 138, 148A, 148B, Sociology 147

Culture and Literature: Art History 163C, Chinese 104, 105, 110, Japanese 103, 104, 106, 107, 131, 132, 133, 135, 136, Dramatic Art 154, East Asian Studies 113

Latin and South America

History: History 161B, 162, 163B, 164, 165, 166B, 168

Social Analysis: Anthropology 144, 145, 146, Chicano Studies 130

Culture and Literature: African American and African Studies 153, Rhetoric and Communication 152, Spanish 149, 155, 172

Africa and the Middle East

History: History 115A, 115B, 115C

Social Analysis: African American and African Studies110, Anthropology 140A, 140B, 142, Political Science 134, 146, 149

Culture and Literature: African American and African Studies 162, Art History 150

Total units for the major 72-105

Major Adviser. E. Goldman *(Political Science).*

Courses in International Relations (IRE)

Lower Division Courses

1. Global Interdependence (4) I, III. Nincic, Goldman
Lecture—3 hours; discussion—1 hour. Development of the concept of global interdependence along its political, economic, demographic, cultural, technological, and environmental dimensions. Focus on the ways societies and states interact. Course provides the foundation for upper division multidisciplinary work in international relations.

98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

190. Topics in International Relations (4) I, II, III.
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Selected topics in international relations. Variable content. May be repeated for credit when topic differs.

192. International Relations Internship (1-12) I, II, III. The Staff (Committee Chairperson in charge)
Internship—3-36 hours (to be arranged). Prerequisite: upper division standing and consent of instructor. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4) II-III. Goldman and staff
Seminar—2 hours; term paper. Prerequisite: open only to majors of senior standing who qualify for honors program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Internship

See Internship Program below; also UC Davis Washington Center

Internship Program

Albert A. Harrison, Ph.D., Director

The Internship and Career Center 2nd Floor, South Hall (916-752-2855)

Program Areas

Agricultural and Environmental Sciences
Joe J. Stasulat, Program Manager

Education and Graduate Placement
Kathi Shull, Coordinator

Engineering and Physical Sciences
Linda R. Hughes, Program Manager

Health and Biological Sciences
Linda R. Hughes, Program Manager

Liberal Arts
Marti Hanna, Coordinator
Marcie Kirk-Holland, Coordinator
Sandra McDonald, Coordinator

Internship Experience

The Internship and Career Center facilitates a campuswide internship program. All internships, both credit and non-credit, can be taken for *Transcript Notation* with completion of required evaluation reports. The notation briefly describes the nature and location of the internship experience. Questions pertaining to academic credit and Transcript Notation may be directed to The Internship and Career Center.

Course Credit. Internship courses (numbered 92 and 192) are available for credit on a variable-unit and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have acquired 84 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by The Internship and Career Center Staff.

Italian

(College of Letters and Science)

Juliana Schiesari, Ph.D., Program Director

Department Office (French and Italian), 522 Sproul Hall (916-752-0830)

Faculty

Antonella Bassi, M.A., Lecturer
JoAnn Cannon, Ph.D., Professor
Dennis J. Dutschke, Ph.D., Professor
Gustavo Foscarini, M.A., Lecturer
Jay Grossi, M.A., Lecturer
Juliana Schiesari, Ph.D., Professor *(Italian, Comparative Literature)*

The Major Program

The major in Italian provides a solid language background which will enable the student to develop an appreciation for Italian language and culture.

The Program. The Italian program is small and geared to the individual needs of the student. The use of Italian is stressed on all levels and a knowledge of the language is required for literature courses which are taught only in Italian. The Italian program actively participates in the Education Abroad Program, the International Internships Program, and the Summer Sessions International (Rome), all of which offer opportunities for travel and study in Italy.

Career Alternatives. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live (for brief or longer periods of time) and work in Italy have a choice of cities: Milan for business, Rome for international concerns in agriculture and nutrition in the F.A.O., and Florence for retail commerce and the arts, just to name a few. In the U.S., foreign-owned companies or American companies with interests in the foreign market need qualified people who are also fluent in a foreign language.

Education Abroad Program. Applicable courses taken on EAP are accepted for credit in the major or the minor programs.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 0-24
Italian 1, 2, 3, 4, 5, and 9 (or the equivalent) 0-24

Depth Subject Matter 36
Italian 101 and 105.....8
Upper division courses in literature, taught in the language 28
Must include at least one course from two of the following literary periods: *(a)* Early Italian, *(b)* Renaissance and Baroque, *(c)* Eighteenth through Twentieth Centuries. Upper division General Education courses in Italian may fulfill this requirement with approval of the major adviser.

A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or by courses in related fields such as history, art history, music, comparative literature, English, critical theory, classics, and linguistics.

Note: All upper division courses are to be chosen in consultation with the major adviser.

Total Units for the Major 36-60

Recommended
One year of study abroad with the Education Abroad Program or college Latin or a Romance Language.

Major Adviser. D. Dutschke.

*Course not offered this academic year.

Minor Program Requirements:

UNITS

Italian.....20

Italian 101 and 105.....8

Three upper division courses in literature chosen in consultation with major adviser..12

One course chosen from two of the following three areas: *(a)* Early Italian Literature, *(b)* Renaissance and Baroque, and *(c)* Eighteenth through Twentieth Centuries. (One of the above courses may be replaced by course 107 or by a course of literature in translation offered by the Italian Program).

Prerequisite Credit. Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the Program Director.

Honors and Honors Program. The honors program comprises two quarters of study under course 194H (3 units) and course 195H (3 units), which will include a research paper and a comprehensive examination. See also the Academic Information chapter of this catalog.

Teaching Credential Subject Representative. See Major Adviser above and also the section on the Teacher Education Program in this catalog.

Courses in Italian (ITA)

Lower Division Courses

Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian (5) I, II, III. Foscarini in charge
Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Italian (5) I, II, III. Foscarini in charge
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

3. Elementary Italian (5) I, II, III. Foscarini in charge
Lecture/discussion—5 hours. Prerequisite: course 2. Continuation of grammar sequence, and practice of all language skills through cultural texts.

4. Intermediate Italian (3) I, II, III. Director in charge
Lecture/discussion—3 hours. Prerequisite: course 3 or the equivalent. Review of grammar and syntax through written exercises, and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first-year language classes.

5. Intermediate Italian (3) I, II, III. Director in charge
Lecture/discussion—3 hours. Prerequisite: course 4 or the equivalent. Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand and discuss modern Italian.

8A. Italian Conversation (3) I, III. The Staff
Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only.)

8B. Italian Conversation (3) II. The Staff
Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. (P/NP grading only.)

9. Reading Italian (3) I, II, III. Director in charge
Lecture/discussion—3 hours. Prerequisite: course 5. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture, as well as a means of strengthening the student's command of the Italian language.

50. Studies in Italian Cinema (4) II. Cannon
Lecture—2 hours; discussion—1 hour; term paper. Introduction to Italian cinema through its genres. Focus is on cinema as a reflection of and a comment on modern Italian history. Film will be studied as an artistic medium and as a form of mass communication. GE credit: ArtHum, Wrt.

***90X. Lower Division Seminar** (1-2) I, II, III. The Staff
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Italian language or culture (such as Italian culture seen through film, Italian feminism, literature, or politics) through shared readings, discussions, written assignments, or special activities such as film screening or laboratory work.

***98. Directed Group Study** (1-5) I, II. The Staff
Primarily intended for lower division students. (P/NP grading only.)

Upper Division Courses

101. Advanced Conversation, Composition, and Grammar (4) I. The Staff
Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

***104. Italian Translation and Style** (4) III. Dutschke
Lecture/discussion—3 hours; two research papers; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material.

105. Introduction to Italian Literature (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 101 or consent of instructor. Introduction to the study of the principal authors, works, and movements of the Medieval, Renaissance, and Early Modern periods in Italy. GE credit: ArtHum.

107. Survey of Italian Culture and Institutions (4) III. Foscarini
Lecture—3 hours; term paper. Assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. GE credit: ArtHum.

112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4) I. Dutschke
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the origins of Italian religious and secular poetry of the 13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors. Offered in alternate years. GE credit: ArtHum.

113. Dante Alighieri, *Divina Commedia* *(Inferno, Purgatorio, Paradiso)* (4) III. Dutschke
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of Dante Alighieri's *Divina Commedia*, and its role in the development of Italian language and literature. Emphasis will be placed on reading the whole poem within the historical context of the Middle Ages. GE credit: ArtHum.

114. Boccaccio, *Decameron,* and the Renaissance *Novella (4) II. Dutschke
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the development of the short story in Italy, as exemplified in Giovanni Boccaccio's *Decameron,* in his predecessors and Renaissance followers. Offered in alternate years. GE credit: ArtHum.

115A. Studies in the Cinquecento (4) III. Schiesari
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Analysis of key texts from the high moment of the Italian Renaissance. The political and aesthetic legacy of humanism will be foregrounded in relation to authors such as Ficino, Ariosto, Machiavelli, Aretino, Castiglione, and Tasso. Offered in alternate years. GE credit: ArtHum.

***115B. Italian Literature of the Renaissance and the Baroque: From Cellini to Marino** (4) III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 115A. Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus on Galileo's role in the formation of a modern literary standard. GE credit: ArtHum.

***115C. Italian Drama from Machiavelli to the Enlightenment** (4) I. Schiesari
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of comic and tragic forms as critical representations of their societal and historical contexts, i.e. Machiavelli and the logic of power, Baroque dramatists in the service of counter-reformation Italy, Goldoni's comedies and bourgeois social consciousness. Offered in alternate years. GE credit: ArtHum.

***115D. Early Modern Italian Lyric** (4) I. Schiesari
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Examination of the poetic tradition influenced by Petrarch. Consideration of the relation between gender and genre in such poets as Petrarch, Bembo, della Casa, Tasso, Marino, Gaspara Stampa, Veronica Franco, Isabella di Morra. Offered in alternate years. GE credit: ArtHum.

***118. Italian Literature of the Eighteenth Century** (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico. GE credit: ArtHum.

***119. Italian Literature of the Nineteenth Century** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Romanticism in Italy, including Manzoni, Verga, and *Verismo*. GE credit: ArtHum.

120A. Italian Literature of the Twentieth Century: The Novel (4) III. Cannon
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese, and Vittorini. GE credit: ArtHum.

***120B. Italian Literature of the Twentieth Century: Poetry and Drama** (4) I. Cannon
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Italian poetry with emphasis on Hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama. GE credit: ArtHum.

***131. Autobiography in Italy** (4) III. Schiesari
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. The development of representations of selfhood with particular attention to generic conditions, the confessional tradition and the problem of women's self-representation. Authors studied may included Petrarch, Tasso, Casanova, Alfieri, Zvevok, Sibilla Aleramo and Primo Levi. Offered in alternate years. GE credit: ArtHum.

***139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance** (4) II. Dutschke
Lecture/discussion—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance; the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso. GE credit: ArtHum.

140. Italian Literature in English Translation: Dante, *Divine Comedy (4) I. Dutschke
Lecture/discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Reading of Dante Alighieri's *Divine Comedy*, through the otherworld realms of Inferno, Purgatory, and Paradise. GE credit: ArtHum, Wrt.

***141. Culture, Gender and the Italian Renaissance** (4) II. Schiesari
Lecture/discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Critical analysis of texts from the Italian Renaissance. Primary concern focuses on issues such as "the dignity of Man;" education and gender politics; "high" and "low" culture and its relation to literary practices. GE credit: ArtHum, Div, Wrt.

***142. Masterpieces of Modern Italian Narrative** (4) III. Cannon
Lecture—1.5 hours; discussion—1.5 hours; term paper. Prerequisite: either English 3, Comparative Literature 2, or History 4C. Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representative methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. Offered in alternate years. GE credit: ArtHum, Wrt.

145. Special Topics in Italian Literature (4) I, II, III. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: course 9 or consent of instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth century theater, fascism, futurism, women and literature, and the image of America, etc. May be repeated for credit when topic differs. GE credit: Wrt.

150. Studies in Italian Cinema (4) II. Cannon
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: Humanities 10 or consent of instructor. Introduction to Italian cinema through its genres. Focus on cinema as a reflection or a comment on modern Italian history. Film as an artistic medium and as a form of mass communication. GE credit: ArtHum, Div, Wrt.

***190X. Upper Division Seminar** (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. Examination of a special topic in Italian language or culture through shared readings, discussions, written assignments or special activities such as film screening or laboratory work. Limited enrollment. May *not* be repeated for credit.

192. Italian Internship (1-12) I, II, III, IV. The Staff (Director in charge)
Internship—3-36 hours. Prerequisite: upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only.)

194H. Special Study for Honors Students (3) I, II, III. The Staff
Independent study—3 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Italian literature, civilization, or language studies. (P/NP grading only.)

195H. Honors Thesis (3) I, II, III. Staff (Director in charge)
Independent study—3 hours. Prerequisite: course 194H. Writing of an honors thesis on a topic in Italian literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.)

197T. Tutoring in Italian (1-4) I, II, III. The Staff
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of instructor. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Community Tutoring in Italian (1-5) I, II, III. Foscarini
Discussion—1-2 hours; laboratory—2-4 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for credit for a total of 10 units. (P/NP grading only.)

198. Directed Group Study (1-4) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

297. Individual Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: graduate standing or consent of instructor.

298. Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: graduate standing or consent of instructor.

299. Research (1-12) I, II, III. The Staff (Director in charge)
Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Director in charge)
Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

Japanese

See Chinese and Japanese

Jewish Studies

(College of Letters and Science)

The interdisciplinary minor in Jewish Studies provides an introduction to the study of Jewish culture, thought, history and literature, primarily in the modern period. Students are introduced to a broad range of methodologies and critical concepts in these areas. The minor provides insight into the relation between Jewish identities, histories, and representations and those of the cultures in which Jews throughout the world find themselves. The minor is sponsored by the Humanities Program.

Minor Program Requirements

	UNITS
Jewish Studies	**20**
Religious Studies 23	4
Upper division courses selected from the following list, with at least one in each category	16
(a) Religion: Religious Studies 122, 124	
(b) Representations, Language, and Identity: Comparative LIterature 147, Englsh 179, German 141, Hebrew 100, 101, 102, Sociology 130, 195	
(c) Histories: History 142, 143, 144A, 144B, 173	

Note: Students are encouraged to participate in the Education Abroad Program in Israel. Courses taken in EAP may, with an adviser's concurrence, be approved for credit in the minor.

Advising. Humanities Program (916-752-9934).

Land, Air, and Water Resources

(College of Agricultural and Environmental Sciences)

Dennis E. Rolston, Ph.D., Chairperson of the Department

Miguel A. Marino, Vice Chairperson, Hydrology

———, Ph.D., Vice Chairperson, Soils and Biogeochemistry

John J. Carroll, III, Ph.D., Vice Chairperson, Atmospheric Science

Department Office, 151 Hoagland Hall (916-752-1406)

Faculty—Soils and Biogeochemistry

Office: 151 Hoagland Hall (916-752-1406)

Conrad J. Bahre, Ph.D., Professor *(Environmental and Resource Sciences)*
Caroline S. Bledsoe, Ph.D., Associate Professor *(Soil Science)*
William H. Casey, Ph.D., Professor *(Aqueous Geochemistry)*
Randy A. Dahlgren, Ph.D., Associate Professor *(Soil Mineralogy)*
William R. Horwath, Ph.D. Assistant Professor *(Soil Biogeochemistry)*
André E. Läuchli, Ph.D., Professor *(Plant Nutrition)*
James H. Richards, Ph.D., Professor *(Plant Nutrition)*
Dennis E. Rolston, Ph.D., Professor *(Soil Science)*
Kate M. Scow, Ph.D., Associate Professor *(Soil Science)*
Wendy Kuhn Silk, Ph.D., Professor *(Hydrologic Science)*
Michael J. Singer, Ph.D., Professor *(Soil Science)*
Randal J. Southard, Ph.D., Professor *(Soil Genesis/Morphology)*
Joe J. Stasulat, Ph.D., *(Environmental and Resource Sciences)*
Robert J. Zasoski, Ph.D., Professor *(Soil Science)*

Emeriti Faculty

Francis E. Broadbent, Ph.D., Professor Emeritus
Richard G. Burau, Ph.D., Professor Emeritus
C.C. Delwiche, Ph.D., Professor Emeritus
Emanuel Epstein, Ph.D., Professor Emeritus
Gordon L. Huntington, Ph.D., Lecturer Emeritus
Donald N. Munns, Ph.D., Professor Emeritus
H. Michael Reisenauer, Ph.D., Professor Emeritus
Victor V. Rendig, Ph.D., Professor Emeritus
Harry O. Walker, Ed.D., Senior Lecturer Emeritus

Affiliated Faculty

Roland D. Meyer, Ph.D., Cooperative Extension Specialist
G. Stuart Pettygrove, Ph.D., Cooperative Extension Specialist

Faculty—Atmospheric Science

Office: 151 Hoagland Hall (916-752-1406)

Cort Anastasio, Ph.D., Assistant Professor *(Tropospheric Chemistry)*
John J. Carroll, III, Ph.D., Professor *(Meteorology)*
Robert G. Flocchini, Ph.D., Professor *(Environmental and Resource Sciences)*
Richard D. Grotjahn, Ph.D., Professor *(Atmospheric Science)*
Terrence R. Nathan, Ph.D., Associate Professor *(Atmospheric Science)*
Kyaw Tha Paw U, Ph.D., Professor *(Atmospheric Science)*
Roger H. Shaw, Ph.D., Professor *(Meteorology)*
Marlyn L. Shelton, Ph.D., Professor *(Atmospheric Science)*
Su-Tzai Soong, Ph.D., Associate Professor *(Atmospheric Science)*
Bryan C. Weare, Ph.D., Professor *(Meteorology)*

Emeriti Faculty

Thomas A. Cahill, Ph.D., Professor Emeritus
Kinsell L. Coulson, Ph.D., Professor Emeritus

Affiliated Faculty

Richard L. Snyder, Ph.D., Lecturer *(Atmospheric Science)* and Cooperative Extension Specialist

Faculty—Hydrology

Office: 113 Veihmeyer Hall (916-752-0453)

Graham E. Fogg, Ph.D., Professor *(Hydrogeology)*
Mark E. Grismer, Ph.D., Professor *(Hydrologic Science, Biological and Agricultural Engineering)*
Jan W. Hopmans, Ph.D., Associate Professor *(Water Management)*
Theodore C. Hsiao, Ph.D., Professor *(Hydrologic Science)*
Miguel A. Mariño, Ph.D., Professor *(Hydrologic Science, Civil and Environmental Engineering)*
Marc B. Parlange, Ph.D., Professor *(Hydrologic Science, Biological and Agricultural Engineering)*
Carlos E. Puente, Ph.D., Professor *(Hydrology)*
Kenneth K. Tanji, Sc.D., Professor *(Hydrologic Science)*
Susan Ustin, Ph.D., Assistant Professor *(Environmental and Resource Sciences)*
Wesley W. Wallender, Ph.D., Professor *(Hydrologic Science, Biological and Agricultural Engineering)*

Emeriti Faculty

James W. Biggar, Ph.D., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
Donald W. Grimes, Ph.D., Lecturer Emeritus
Robert M. Hagan, Ph.D., Professor Emeritus
Delbert W. Henderson, Ph.D., Professor Emeritus
Allen W. Knight, Ph.D.,Professor Emeritus
Donald R. Nielsen, Ph.D., Professor Emeritus
William O. Pruitt, Jr., Ph.D., Lecturer Emeritus
Frank E. Robinson, Ph.D., Lecturer Emeritus
Verne H. Scott, Ph.D., Professor Emeritus

Affiliated Faculty

David, A. Goldhamer, Ph.D., Lecturer *(Hydrologic Science)* and Cooperative Extension Specialist
Stephen Grattan, Ph.D., Lecturer *(Hydrologic Science)* and Cooperative Extension Specialist
Blaine R. Hanson, Ph.D., Lecturer *(Hydrologic Science)* and Cooperative Extension Specialist
Thomas Harter, Ph.D., Cooperative Extension Specialist
Terry L. Prichard, M.S., Lecturer *(Hydrologic Science)* and Cooperative Extension Specialist
Lawrence J. Schwankl, Ph.D., Lecturer *(Hydrologic Science)* and Cooperative Extension Specialist

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, resource, soil and water science, hydrology, and water engineering. Teaching and research focus on both agricultural and environmental science. The faculty contribute to numerous other undergraduate and graduate programs in the Colleges of Letters and Science, Engineering, and Agricultural and Environmental Sciences.

Major Programs. Undergraduates in the department major in Atmospheric Science, Environmental and Resource Sciences, Hydrology, and Soil and Water Science.

Advising Center is located in 111A Veihmeyer Hall and 148 Hoagland Hall (916-752-1669).

Graduate Study. Graduate work offered in the area of resource sciences is Atmospheric Science, Hydrologic Sciences, and Soil Science. Detailed information can be obtained from graduate advisers for these areas and the *Graduate Announcement*.

Courses. See courses listed under Atmospheric Science, Hydrologic Sciences, Hydrology, Environmental and Resource Sciences, and Soil Science.

Landscape Architecture

(College of Agricultural and Environmental Sciences)

Mark Francis, M.L.A., Chairperson

Department Office, 142 Walker Hall (916-752-3907)

Faculty

Nigel J. R. Allan, Ph.D., Professor
Sharon Collinge, Ph.D., Assistant Professor
Mark Francis, M.L.A., Professor
Dean MacCannell, Ph.D., Professor
E. Byron McCulley, B.S.L.A., Lecturer
Edward S. McNiel, M.L.A., Lecturer
Patsy E. Owens, M.L.A., Assistant Professor
Heath Schenker, M.A., Assistant Professor
Robert L. Thayer, Jr., M.A., Professor

The Major Program

Landscape architecture is the planning and design of land areas where human use requires adaptation or conservation of the environment. Students who study landscape architecture are concerned about the welfare of the environment and the people who use it. They are capable of solving physical problems and are able to visualize and "think" in terms of spaces and three-dimensional concepts. The program is fully accredited by the American Society of Landscape Architects, which is the only organization professionally sanctioned to grant landscape architectureal accreditations in the United States, and was last reviewed in 1996.

The Program. The curriculum balances creativity and visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem solving relating to design of parks, urban open spaces, energy-efficient neighborhoods, land reclamation projects, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. A process-oriented approach to design is stressed and environmental and community values are emphasized.

Preparatory Requirements. Students are admitted to the landscape architecture major only after submitting a portfolio for review and selection by the faculty. Contact the Environmental Design Advising Center or the Landscape Architecture major adviser for further information, 152 Walker Hall (916-752-1165).

Career Alternatives. Graduates may find jobs in private landscape architectural firms or public agencies and corporations employing landscape architects. The landscape architecture major provides the student with excellent preparation for graduate school or career development in a wide range of environmental and design-related fields.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

English Composition Requirement 8
English 1, 3, 20, 101, 104A, 104B, 104C, 104D, or 104E 4
Rhetoric and Communication 1.....4

Preparatory Subject Matter 61-69
Biological sciences (Biological Sciences 1A, 10).....4-5
Two courses from Biological Sciences 1C, Chemistry 2A or 10, Computer Science Engineering 10, 15, 30, Geology 1, Geography 1, Mathematics 16A, Physics 1A, 5A, 7A, 10, Soil Science 10, Statistics 13 7-10
Environmental Horticulture 6 3
Two courses from Art Studio 2, 5, 16, 142, Design 125, any course from History, Music, Dramatic Art, Philosophy, Art History, language or literature 8-10
One course from Landscape Architecture 2, Geography 2 or 10.....3-4
Two courses from Anthropology 2, 3, 20, 21, Economics 1A, 1B, Psychology 1, Political Science 1, 2, 3, 4, 5, 7, Sociology 1, 2, 3, 4, 5, or 25 8-10
Introductory landscape architecture, Landscape Architecture 21, 23, 30, 40, 50, 60, 70 27

Breadth/General Education.....0-24
See General Education requirement

Depth Subject Matter 48-49
Design field studio, Landscape Architecture 170 12
Select at least three studios from Landscape Architecture 180/181 or 191 14-15
Senior project, Landscape Architecture 193A, 193B.....7
Graphics/communications, Landscape Architecture 120 or 122 4
Technology/professional practice, Landscape Architecture 160, 161 8
Proseminar in landscape architecture, Landscape Architecture 190 (three quarters) 3
Internship (Landscape Architecture 192) recommended.

Restricted Electives 32
Natural sciences, one of Environmental Horticulture 105, 133, Evolution and Ecology 121, 138 4
Select 24 units of upper division courses in consultation with adviser.....24
Environmental awareness (Psychology 144) 4

Unrestricted Electives 0-31

Total Units for the Major 180

Major Adviser. H. Schenker.

Advising Center is located in 152 Walker Hall (916-752-1165).

Graduate Study. Refer to the Graduate Studies chapter of this catalog.

Courses in Landscape Architecture (LDA)

Lower Division Courses

2. Place, Culture and Community (4) III. MacCannell
Lecture—4 hours. Introduction to the relationship of social and spatial arrangements. Basic social-science concepts such as class, status, role, kinship, ritual, myth, alienation, etc., introduced through site-specific case studies of both historical and contemporary communities. GE credit: SocSci, Wrt.

21. Landscape Drafting and Visualization (4) I. The Staff
Studio—8 hours; two all-day field trips. Prerequisite: course in free-hand drawing recommended. Development of idea expression through graphic media and the use of drawing techniques for visual representation, including plan, section, and axonometric drawing. Includes an introduction to computerized drafting and drawing.

23. Computer Graphics for Landscape Architecture (4) II, III. The Staff
Studio—8 hours; two all-day field trips. Prerequisite: course 21. Landscape architectural communications explored through the computer. Includes computerized drafting, drawing, rendering, desktop publishing, and photorealistic simulation.

30. History of Landscape Architecture (4) II. Schenker
Lecture—3 hours; discussion—1 hour. Introduction to the history of landscape architecture, emphasizing landscape design as a product of cultural, political, social, and environmental factors. Topics include the history of gardens, parks, community design and

environmental planning. Not open for credit to students who have taken course 140. GE credit: ArtHum, Wrt.

40. Introduction to Landscape Architecture (3) I. The Staff
Lecture—3 hours. History, theory, philosophy, techniques and applications of landscape architecture and the analysis, planning, design, and management of outdoor spaces. GE credit: ArtHum or SocSci, Wrt.

50. Site Ecology (4) III. Collinge
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A or 10 or an introductory course in biology, botany, or plant science. Priority given to Landscape Architecture majors. Introduction to ecological concepts, including nutrient dynamics, population regulation, community structure, ecosystem function. Principles will be applied to human activities such as biological conservation, ecological restoration, landscape planning, and management. Weekly laboratory devoted to field exercises in local ecosystems. Not open for credit to students who have taken course 153. GE credit: SciEng.

60. Technology I: Grading and Drainage (4) III. McCulley
Studio—8 hours. Prerequisite: courses 21 and 23 or consent of instructor. Priority given to Landscape Architecture majors. Topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, sections and profiles and cut and fill calculations. Not open for credit to students who have taken course 132.

70. Basic Landscape Design Studio (4) II. McNiel and staff
Studio—8 hours; field trips. Prerequisite: courses 1, 21, 30 or consent of instructor. Priority given to Landscape Architecture majors. Introduction to basic aesthetic, functional, social, and environmental considerations in landscape design. Provides a broad foundation in landscape design methodologies and skills necessary to create environmentally and socially responsible landscape designs. Not open for credit to students who have taken course 11.

Upper Division Courses

120. Advanced Computer Applications (4) III. McNiel
Studio—8 hours; two all-day field trips. Prerequisite: course 23; open to majors in Landscape Architecture only. Studio work using computer-aided design, geographic information systems, and other advanced computer programs.

122. Advanced Communication in Landscape Architecture (4) III. The Staff
Studio—8 hours; field trips. Prerequisite: course 1, 30, 170 and junior standing in the Landscape Architecture major. Advanced concepts and methods of personal and group communication including group process, participatory methods, written and verbal presentation in landscape architecture.

***155. Plants in the Cultural Environment** (3) II. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 10. Cultural parameters of selecting plants for use in environmental design and planning. Contemporary themes in climate, energy and resource conservation, low maintenance, aesthetics, edible landscapes, historic preservation, native plants, specialized gardens, and computerized plant selection.

160. Technology II: Construction Materials and Detailing (4) II. McCulley
Studio—8 hours. Prerequisite: courses 21, 23, and 60. Priority given to Landscape Architecture majors. Introduction to materials and methods in landscape construction, including properties of common construction materials (stone, concrete and wood), detailing, preparation of cost estimates and specifications, design of drainage systems, fountains and roof decks. Not open for credit to students who have taken course 133.

161. Technology III: Professional Practice and Construction Documents (4) I. McCulley
Studio—8 hours. Prerequisite: course 160. Priority given to Landscape Architecture majors. Legal and professional aspects of landscape architecture, including the development of construction documents (drawings and specifications), proposal writing, fee calculations, project management, cost estimation and insurance. Not open for credit to students who have taken course 134.

168. Mountain Landscapes and Life (3) I. Allan
Lecture—3 hours. Prerequisite: an introductory course in cultural geography, cultural anthropology or landscape theory. Course provides knowledge of mountain landscapes, explains why different mountain societies exploit and reject resources available, examines myths about mountain landscapes that influence individual and collective behavior of residents and visitors. Examples from Himalayas, Andes, Alps, and Rockies. GE credit: ArtHum or SocSci, Div, Wrt.

170. Field Studio in Landscape Architecture (12) I. The Staff (Chairperson in charge)
Lecture—6 hours; studio—12 hours. Prerequisite: course 1, 30, 70 and junior standing in the Landscape Architecture major. Intensive study of current topics in landscape architecture, focusing on relationships between environmental, social, and cultural systems on the land. Comprehensive field study and problem solving experience. Topics and sites will vary. Extended field trips will be arranged, ranging from 1 to 10 days.

180A. Special Topics in Landscape Architecture: Postmodern Landscapes (2) II. MacCannell
Lecture—2 hours. Prerequisite: upper division standing. Basic principles of critical theory and postmodern modes of analysis. Application to interpretation and change of designed environment. Offered in alternate years. Not open for credit to students who have taken course 185.

***180B. Special Topics in Landscape Architecture: Poetics and Problems of Landscape Architecture History** (2) II. Schenker
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture and Design majors. Historic examples of landscape design and encouragement of critical thinking about the "uses" of these precedents in contemporary landscape architecture. Offered in alternate years.

180C. Special Topics in Landscape Architecture: Art of the Environment (2) III. Schenker
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture and Design majors. Introduction to environmental art. Encouragement of critical thinking about the intersection of art, landscape and environmental issues. Offered in alternate years.

***180D. Special Topics in Landscape Architecture: Advanced Technology** (2) I. McCulley
Lecture—2 hours. Prerequisite: courses 60 and 160 or consent of instructor. Specialized areas of advanced technology related to site design and construction. Understanding of the concepts, resources and skills necessary to develop these areas in professional practice. Offered in alternate years.

***180E. Special Topics in Landscape Architecture: Transit Facility Design** (2) II. McCulley
Lecture—2 hours. Prerequisite: courses 1, 23 and 60 or consent of instructor. Specialized area of transit facility design. Concepts, skills and resources necessary to incorporate into professional practice. Offered in alternate years.

180F. Special Topics in Landscape Architecture: Landscape Ecology (2) II. Collinge
Lecture—2 hours. Prerequisite: course 50 or introductory course in ecology. Theories, major concepts and research methods of landscape ecology. Spatial structure, function and dynamics of various landscape types. Biological conservation, ecological restoration, and landscape planning, design, and management. Offered in alternate years. Not open for credit to students who have taken course 183.

180G. Special Topics in Landscape Architecture: Regional Land Planning (2) II. McNiel
Lecture—2 hours. Prerequisite: upper division standing. Theories, methods and resources used in large scaled landscape analyses for orderly settlement, preservation or management of the land. Integration of natural, cultural and experiential data into decision making. Offered in alternate years.

***180H. Special Topics in Landscape Architecture: The Bioregional Landscape** (2) I. Thayer
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture majors. Emerging concepts of bioregionalism and community-based ecological regional landscape planning. Extensive examples from within the Sacramento Valley Bioregion. Offered in alternate years.

180I. Special Topics in Landscape Architecture: Regenerative Landscape Systems (2) II. Thayer
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture majors. Theories, basic techniques and applications for various systems by which landscapes regenerate and sustain life (both human and non-human) and culture over time. Offered in alternate years.

***180J. Special Topics in Landscape Architecture: Community Participation in Design** (2) III. Owens
Lecture—2 hours. Prerequisite: upper division standing. History and role of community participation in landscape design; methods of community involvement, including workshop techniques. Introduction to design processes, including public participation. Offered in alternate years.

180K. Special Topics in Landscape Architecture: Social Factors in Landscape Architecture (2) III. Owens
Lecture—2 hours. Prerequisite: Psychology 144 and upper division standing. Concepts in environmental psychology as they relate to landscape architecture. Discussion of needs of various user groups of a land area. Introduction to post occupancy evaluations. Offered in alternate years.

***180L. Special Topics in Landscape Architecture: Public Open Space** (2) II. Francis
Lecture—2 hours. Prerequisite: upper division standing. Intensive study of public open spaces, including parks, plazas, playgrounds, greenways and community gardens. Current issues associated with design and management of the public environment of cities. Offered in alternate years.

***180M. Special Topics in Landscape Architecture: Urban and Community Design** (2) III. Francis
Lecture—2 hours. Prerequisite: upper division standing. Theories and methods of community and neighborhood design. Past and contemporary approaches including new urbanism, planned unit development, mixed use, pedestrian and transit-oriented development. Issues of open space and community form. Offered in alternate years.

180N. Special Topics in Landscape Architecture: Planting Design (2) I. The Staff
Lecture—2 hours. Prerequisite: upper division standing and Environmental Horticulture 6. Develop an understanding of the sensory, visual and functional importance of plants in the landscape. Visualization and design of planted landscapes. Development of planting plans. Offered in alternate years. Not open for credit to students who have taken course 156.

***180O. Special Topics in Landscape Architecture: Current Issues in Landscape Architecture** (2) I, II, III. The Staff
Lecture—2 hours. Prerequisite: course 1 and 30. Priority will be given to Landscape Architecture and design majors. Study of current issues in landscape architecture with emphasis on design and/or design history. Offered in alternate years.

181A. Postmodern Landscapes Design and Planning Studio (3) II. MacCannell
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180A concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180A. Offered in alternate years.

***181B. Poetics and Problems of Landscape Architecture History and Design and Planning Studio** (3) II. Schenker
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180B concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180B. Offered in alternate years.

181C. Art of the Environment Design and Planning Studio (3) III. Schenker
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180C concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180C. Offered in alternate years.

***181D. Advanced Technology Design and Planning Studio** (3) I. McCulley
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180D concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180D. Offered in alternate years.

***181E. Transit Facility Design and Planning Studio** (3) II. McCulley
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180E concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180E. Offered in alternate years.

181F. Landscape Ecology Design and Planning Studio (3) II. Collinge
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180F concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180F. Offered in alternate years. Not open for credit to students who have taken course 183.

181G. Regional Land Planning Design and Planning Studio (3) II. McNiel
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180G concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with 180G. Offered in alternate years.

***181H. The Bioregional Landscape Design and Planning Studio** (3) I. Thayer
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180H concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180H. Offered in alternate years.

181I. Regenerative Landscape Systems Design and Planning Studio (3) II. Thayer
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180I concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180I. Offered in alternate years.

***181J. Community Participation in Design: Design and Planning Studio** (3) III. Owens
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180J concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180J. Offered in alternate years.

181K. Social Factors in Landscape Architecture Design and Planning Studio (3) III. Owens
Studio—6 hours; one field trip required. Prerequisite: course 170 and Psychology 144; course 180K concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180K. Offered in alternate years.

***181L. Public Open Space Design and Planning Studio** (3) II. Francis
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180L concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180L. Offered in alternate years.

***181M. Urban and Community Design: Design and Planning Studio** (3) III. Francis
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180M concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180M. Offered in alternate years.

181N. Planting Design and Planning Studio (3) I. The Staff (Chair in charge)
Studio—6 hours; one field trip required. Prerequisite: course 170 and Environmental Horticulture 6; course 180N concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180N. Offered in alternate years.

***181O. Current Issues Design and Planning Studio** (3) I, II, III. The Staff (Chair in charge)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180O concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180O. Offered in alternate years.

190. Proseminar in Landscape Architecture (1) I, II, III. Schenker, Thayer, MacCannell
Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only.)

191. Workshop in Landscape Architecture (2-12) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour workshop—3 hours. Prerequisite: courses 11 and 40, upper division standing and consent of instructor. Faculty-initiated workshops featuring advanced studies and applications of original work in landscape architecture. May be repeated for credit for a total of 12 units.

192. Internship in Landscape Architecture (1-12) I, II, III. The Staff
Internship. Prerequisite: senior standing in Landscape Architecture. Professional field experience in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)

193A. Senior Project in Landscape Architecture (3) II. Owens
Studio—6 hours. Prerequisite: senior standing in Landscape Architecture. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.)

193B. Senior Project in Landscape Architecture (4) III. Owens
Studio—8 hours. Prerequisite: course 193A and senior standing in Landscape Architecture. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.)

197T. Tutoring in Landscape Architecture (1-5) I, II, III. The Staff
Tutoring—3-15 hours. Prerequisite: consent of instructor. Tutoring in Landscape Architecture courses. (P/NP grading only.)

198. Directed Group Study in Landscape Architecture (1-5) I, II, III. The Staff (Master Adviser in charge)
Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

199. Special Study for Advanced Undergraduates in Landscape Architecture (1-5) I, II, III. The Staff (Master Adviser in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

***201. Theory and Philosophy of the Designed Environment** (4) III. Francis
Seminar—4 hours. Prerequisite: course 140 or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning. Normative theories of design are reviewed along with the social and environmental sciences. Offered in alternate years.

***202. Methods in Design and Landscape Research** (4) II. Owens
Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor. Explores many of the research and advanced design and planning methods employed in landscape architecture. Exercises provide the student with a vehicle for designing independent landscape research and creative activities. Lectures provide an historical overview of research methodology. Offered in alternate years.

203. Perceptions of Environmental Quality (4) III. Thayer
Seminar—4 hours. Prerequisite: Psychology 144 or consent of instructor. Examines human perceptual responses to the physical environment beginning with aesthetics and leading to more complex cognitive evaluations and personal and social interpretations of environmental quality. Discusses means by which intervention by design can affect human/environmental perception, cognition, and behavior. Offered in alternate years.

204. Case Studies in Landscape Design and Research (4) I. Schenker
Laboratory—8 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Case studies in landscape design and research have as their primary goal the exposure of the student to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Offered in alternate years.

***210. Advanced Landscape Architecture Studio** (4) The Staff
Laboratory—8 hours. Prerequisite: course 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Advanced landscape problems will be utilized at the site, urban or rural scale. Offered in alternate years.

220. Public Space and Culture (3) III. MacCannell
Seminar—3 hours. Prerequisite: course 182 or the equivalent; graduate standing or consent of instructor. Explores the public environment of cities including their streets, parks, and squares. Public life and culture of American cities is examined and design responses to this culture evaluated. Typology is used to identify spaces. Offered in alternate years.

***240. Rural Landscape Planning and Design** (3) The Staff
Seminar—3 hours. Prerequisite: course 181 or the equivalent; graduate standing or consent of instructor. Addresses physical planning issues facing rural farmsteads, subdivisions, commercial zones, and small communities in their challenge of economic and social change. Concern is with runaway growth, shrinking populations, shifting economies, and lack of public funds or consensus. Offered in alternate years.

***250. Technology and Sustainable Landscape** (3)
Seminar—3 hours. Prerequisite: course 184 or the equivalent; graduate standing or consent of instructor. Explores the relationship between technology and landscape quality. Typology of technological landscape adaptations is presented and impacts of these

technologies are discussed. Emphasizes a theoretical understanding of technological change and a practical approach to sustainable technologies. Offered in alternate years.

***280. Landscape Conservation** (3) II. Collinge
Seminar—3 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Focus is on land planning, design, and management techniques to further the goal of resource preservation. Examines current critical theory in the establishment and management of conservation areas. Offered in alternate years.

***290. Graduate Seminar in Landscape Architecture** (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: graduate standing and consent of instructor. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. (S/U grading only.)

297. Practicum in Landscape Architecture (1-10) I, II, III. The Staff
Independent study—1-10 hours. Prerequisite: graduate standing and consent of instructor. Opportunity for students to work directly in the field with academics at other institutions or with professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Directed Individual Research for Graduate Students (1-5) I, II, III. The Staff
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Latin

See Classics

Law, School of

Bruce A. Wolk, J.D., Dean

Rex R. Perschbacher, J.D., Associate Dean (Academic Affairs and Research)

Antonia E. Bernhard, J.D., Assistant Dean (Student Affairs)

Mary A. Grivna, B.A., Assistant Dean (Administration)

George S. Grossman, LLB., M.S.L.S., Director (Law Library)

Dean's Office, 1011 Martin Luther King, Jr. Hall (916-752-0243)

Faculty

Diane M. Amann, J.D., Acting Professor
Vikram Amar, J.D., Acting Professor
John D. Ayer, J.D., LL.M., Professor
Antonia E. Bernhard, J.D., Lecturer
Alan E. Brownstein, J.D., Professor
Carol S. Bruch, J.D., Professor
Susan D. Christian, J.D., Lecturer
Joel C. Dobris, LL.B., Professor
Holly G. Doremus, J.D., Acting Professor
Harrison C. Dunning, LL.B., Professor
Floyd F. Feeney, LL.B., Professor
Arturo Gándara, J.D., Professor
Michael J. Glennon, J.D., Professor
Gary S. Goodpaster, J.D., Professor
George S. Grossman, LL.B., M.S.L.S., Professor
Sarah D. Gray, Ph.D., Professor *(Human Physiology)*
Robert W. Hillman, J.D., Professor
Edward J. Imwinkelried, J.D., Professor
Margaret Z. Johns, J.D., Senior Lecturer and Director of Legal Writing
Kevin R. Johnson, J.D., Professor
Thomas W. Joo, J.D., Acting Professor
Ellen R. Jordan J.D., Professor
Friedrich K. Juenger, J.D., Professor
Leslie A. Kurtz, J.D., Professor
Evelyn A. Lewis, J.D., Professor
Millard Murphy, J.D., Lecturer
John B. Oakley, J.D., Professor
Amagda Perez, J.D., Lecturer
Rex R. Perschbacher, J.D., Professor
Jill Peterson, J.D., Lecturer
John W. Poulos, J.D., Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Senior Lecturer
Martha S. West, J.D. Professor
Bruce A. Wolk, J.D., Professor
Richard C. Wydick, LL.B., Professor

Emeriti Faculty

Homer G. Angelo, J.D., LL.M., Professor Emeritus
Edward L. Barrett, Jr., J.D., Professor Emeritus
Florian Bartosic, B.C.L., LL.M., Professor Emeritus
Daniel J. Dykstra, LL.B., S.J.D., Professor Emeritus
Daniel Wm. Fessler, J.D., S.J.D., Professor Emeritus
James E. Hogan, LL.B., Professor Emeritus
Pierre R. Loiseaux, LL.B., LL.M., Professor Emeritus
Raymond I. Parnas, J.D., LL.M., S.J.D., Professor Emeritus
Edward H. Rabin, LL.B., Professor Emeritus
Mortimer D. Schwartz, J.D., LL.M., Professor Emeritus

Courses of Instruction. The following courses for students enrolled in the School of Law are set up for the semester-system basis only. Instruction dates can be found at the end of the School of Law section at the front of the catalog. For currrent schedule of classes, contact the School of Law.

Courses in Law (LAW)

Professional Curriculum

First Year Courses

200. Introduction to Law (1)
Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, the precedent system in its practical operation, the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (S/U grading only.)

201A-201B. Property (2-3)
Discussion—2-3 hours. Study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes the estates in land system, the landlord-tenant relationship, conveyancing, and private and public land use control. (Deferred grading only, pending completion of sequence.)

202A-202B. Contracts (3-2)
Discussion—3-2 hours. Course examines the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts—or fails to adjust—to changing social demands. (Deferred grading only, pending completion of sequence.)

203A-203B. Civil Procedure (3-2)
Discussion—3-2 hours. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Among the topics covered are the relation between federal and state courts; the power of courts over persons, property, and subject matter (jurisdiction); the scope of litigation (joinder of claims and parties); preparation for trial through pleadings, discovery, and pretrial; devices for resolving actions and issues before and during trial; functions of judge and jury; and the finality of the trial court's disposition. (Deferred grading only, pending completion of sequence.)

204A-204B. Torts (3-2)
Discussion—3-2 hours. Legal concepts which apply to actions brought by litigants who seek relief for injury. Intentional and unintentional invasions of personality and property. Analysis of civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. (Deferred grading only, pending completion of sequence.)

205. Constitutional Law I (4)
Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, course treats judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in course 218, of procedural and substantive constitutional rights and the limits they place on governmental action. Economic substantive due process, procedural due process, and rights of privacy and personal autonomy will also be addressed.

206. Criminal Law (3)
Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and provide defenses to individual liability for the major criminal offenses.

207. Legal Research (1)
Discussion—0.5 hours; laboratory—0.5 hours. Description of the evolution and use of sources of law and secondary authority. Class discussion followed by research exercises.

208. Legal Writing (2)
Lecture—2 hours. Instruction in the form and substance of writing. A variety of law-related documents will be discussed and drafted. An experience in oral advocacy will be included. Graded on the basis of the writing and advocacy assignments. No final examination.

Second and Third Year Courses

The second- and third-year courses fall into subject areas as shown here

(a) General courses: 209, 217, 222, 226, 231, 234, 237, 240, 241, 244, 250, 254, 258, 259, 266, 267, 268, 277, 280, 286, 292, 296, 408
(b) Business Law: 212, 215, 216, 228, 232, 236, 238, 243, 253, 262, 269, 270, 271, 274, 295
(c) Constitutional Law: 218, 257, 288
(d) Criminal Law: 210, 213, 227, 245, 276, 284
(e) Estate Planning: 214, 221, 223
(f) Family Law: 225, 272, 273
(g) International Comparative and Foreign Law: 213, 224, 230, 233, 248, 249, 252, 257, 270, 279, 290, 291
(h) Labor and Employment Relations Law: 251, 255, 260
(i) Procedure and Jurisdiction: 242, 246, 275, 283
(j) Property and Environmental Law: 230, 232, 256, 264, 265, 282, 285, 287, 289, 409
(k) Public Law: 235, 271, 281, 282, 293
(l) Skills and Litigation: 211, 219, 229, 239, 252, 261, 263, 278, 297, 409, 410A, 410B, 412, 413, 414, 415
(m) Taxation: 214, 220, 228, 238, 247, 294
(n) Individual and Group Study: 298, 299, 411, 416, 417, 418, 419, 495
(o) Clinical Programs: 420, 425, 430, 440, 450, 455, 460, 470, 480

209. Computers and the Law (2)
Discussion—2 hours. Examination of the cutting edge legal issues and problems affecting computer technology. Copyright and patent protections for computer software and the competing policies served by these two forms of intellectual property protection; the challenges of applying privacy and libel law in the context of computers; and the exploitation and licensing of computer technology. Discussion of emerging technologies such as multimedia interactive software and the Internet.

210. Criminal Justice Administration Seminar (2)
Seminar—2 hours. Comparison of American and European criminal procedure, particularly the differing roles of the prosecutor, defense counsel, and the judge. Class paper may satisfy the advanced legal writing requirement. Limited enrollment.

211. Negotiations and Dispute Resolution (2)
Discussion—2 hours. Course teaches negotiation and mediation skills and theories. Students will do five or more practice negotiations or mediations to develop skills, perceptions, and personal style. Class discussion and theory development are based on these exercises. Limited enrollment.

212. Financial Information and the Law (3)
Discussion—3 hours. Prerequisite: students with more than two semesters of accounting will not be admitted, except with consent of instructor. Reading and evaluating financial documents—balance sheets, income statements, etc., with the purpose of learning what they tell, and fail to tell, about the value of an enterprise. A few weeks of study on the mechanics of accounting, but focus primarily will be on the job of the lawyer in helping clients to prepare and use material of this sort. Consideration of what investors and creditors expect out of financial documents. Responsibilities of the client and the lawyer in furnishing documents to regulators. The liability of preparers (including lawyers) for real or supposed deficiencies in disclosure documents.

213. International Criminal Law Seminar (2)
Seminar—2 hours. Prerequisite: courses 205 and 206. Explores issues that arise when crime acquires an international character; for example, when an offense occurs in or harms more than one nation or when a person accused in one nation is a citizen of another. Topics may include the United States' role in investigating and prosecuting international offenses, and what law, domestic or international, U.S. courts should apply in such cases; the duty of a nation to extradite or prosecute persons accused of breaking the law of another nation; the prosecution of international war criminals in the post-World War II tribunals in Nuremberg and Tokyo and in the current Bosnia and Rwanda tribunals in the Hague; and proposals for a permanent International Criminal Court with jurisdiction over international offenses such as kidnapping, money-laundering, and drug trafficking. In addition to class participation, students are required to write a research paper which will satisfy the advanced legal writing requirement. Limited enrollment.

214. Estate and Gift Taxation (3)
Discussion—3 hours. Prerequisite: course 220; course 221 recommended. Fundamentals of federal transfer taxation, including the estate tax, the gift tax, the generation-skipping tax, and the valuation rules under Chapter 14. May include income taxation of trusts and estates.

215. Business Associations (4)
Discussion—4 hours. Course provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely held. Principal attention is given the corporate form of organization, although partnerships are also treated briefly. Topics surveyed include the planning of business transactions, the process of incorporation, the financing of corporations, the role of managements and shareholders, the federal securities laws, and social responsibility.

216. Commercial Law: Article 9 (3)
Discussion—3 hours. The creation and enforcement of security interests in personal property. Focus on Article 9 of the Uniform Commercial Code. Article 9 security interests include liens given to banks by consumers to purchase cars and liens given by businesses in all of their assets. Billions of dollars each day are invented or lent on the strength of Article 9. We will also look at other state and federal laws which affect the Article 9 security interest, and current efforts to reform it.

217. Telecommunications Law (3)
Discussion—3 hours. The economic and administrative regulation of telephony, radio and television broadcasting, and new video technologies such as cable and direct broadcast satellites. Emphasis on the recently enacted Telecommunications Reform Act and the role of the Federal Communications Commission, but other sources of regulation will be treated as well, such as related antitrust law and state public utility regulation.

218. Constitutional Law II (3)
Discussion—3 hours. Course principally covers the First Amendment and the Equal Protection Clause. The First Amendment study involves an examination of freedom of speech and assembly, focusing on the various kinds of speech the courts have identified and their constitutional significance: political speech, commercial speech, offensive speech, obscenity, fighting words, and speech constituting a clear and present danger. Attention will also be directed to issues involving the forum in which speech occurs: prior restraint, overbreadth, vagueness doctrine, and the protection provided symbolic expression. The equal protection study will examine suspect class doctrine involving discrimination on the basis of race, gender, alienage, and other characteristics, affirmative action, the problem of "invidious motive," state action, and the extent to which the equal protection clause prevents government from burdening the exercises of fundamental rights. If time permits, the Establishment Clause and the Free Exercise Clause will also be considered.

219. Evidence (4)
Discussion—4 hours. The rules regarding the admissability of testimonial and documentary proof during the trial of civil and criminal cases, including the concept of relevancy, the hearsay rule, the examination and impeachment of witnesses, the opinion rule, constitutional and statutory privileges.

220. Federal Income Taxation (4)
Discussion—4 hours. Introduction to basic principles of federal income taxation. Topics include identification of income subject to tax, gains and losses from property transactions, deductions from income, the timing of income and deductions (tax accounting), and the identity of persons subject to tax on particular items of income.

221. Trusts, Wills and Decedents' Estates (3)
Discussion—3 hours. Study of the law of wills and trusts. Course coverage includes intestate succession; family protection and limits on the power of testation; execution, revocation and revival of wills; will substitutes; intervivos and testamentary private trusts. Depending on the instructor the course may also cover one or more of the following topics: contracts to make wills; class gifts; powers of appointment; the Rule Against Perpetuities; and introduction to the administration of estates and trusts, including powers, duties, rights and liabilities of fiduciaries and the management of assets.

222. Law of Race Relations Seminar (2)
Explores the treatment of racial issues throughout American legal history as well as current debates over such issues. Examines various, often conflicting, theroetical approaches to the often oversimplified issue of race. Places current legal issues into a historical context, to evaluate the strength of conflicting legal approaches and to apply legal reasoning to issues that are commonly addressed in political or emotional terms. Grading based on class participation and an original research paper to be presented in class. The advanced legal writing requirement may be satisfied at the discretion of instructor. Limited enrollment.

223. Estate Planning Seminar (2)
Seminar—2 hours. Prerequisite: course 221. Selected topics in the estates and trusts area. Content varies with instructor. Satisfies the advanced legal writing requirement. Limited enrollment.

224. Law and Institutions of European Union (2)
Discussion—2 hours. Study of legal problems of European integration, including the transfer of powers to supranational institutions, their decision making, the role of the Courts of the Communities and discussion of selected areas of European Law.

225. Marital Property (3)
Discussion—3 hours. The California community property system including rights of spouses and treatment of property during marriage; characterization, valuation, and division of property upon termination of marriage by dissolution, nullity, or death; and premarital contractual agreements. Also covered are nonmarital cohabitation, creditor's rights, and spousal support.

226. Mass Media Law (2)
Discussion—2 hours. Course will survey legal issues associated with the mass media. Topics covered will include legal problems of news gathering, the regulation of broadcasting, free press/fair trial, and cable television, and the effect of the new technologies.

227. Criminal Procedure (3)
Discussion—3 hours. Examines U.S. Constitutional constraints on the police function; in particular, on arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineups, and the exclusionary rule.

228. Business Planning (3)
Discussion—3 hours. Prerequisite: courses 215 and 220, or consent of instructor. Acquaints students with a range of transactions frequently encountered by lawyers representing business clients, emphasizing the tax aspects of such transactions. Topics may include formation of corporations, executive compensation, retirement of stock interests, financially troubled businesses, and acquisitions, dispositions, divisions, and liquidations of businesses. Class will be taught using the problem method and may include some drafting assignments, and or class presentations.

229. Family Law Mediation (2)
Discussion—2 hours. Prerequisite: course 225. Mediation has emerged as an indispensable dispute resolution alternative in family law. Course reviews the history and evolution of mediation in the family law context. Introduction to several different mediation models and practice of mediation techniques with the assistance of the instructor, who is a family law practitioner and mediator. Limited enrollment.

230. International Environmental Law Seminar (2)
Seminar—2 hours. Prerequisite: prior or concurrent enrollment in course 248 or consent of instructor. Examination of international law norms applicable to the protection of the global environment, including air and water resources, flora and fauna, and historical and cultural treasures of international interest. Study of institutions that make and enforce the norms. Special emphasis on implementation and compliance by the United States. Required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

231. Sex-Based Discrimination (3)
Discussion—3 hours. Focuses on legal issues raised by legal and social discrimination between men and women and explores potential remedies drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in family law, reproductive rights, educational opportunity, criminal law and employment.

232. Real Estate Finance (3)
Discussion—3 hours. Examination of the problems involved in the acquisition, financing, and development of real estate, and of lender remedies and debtor protections in the event of debtor default. Stresses the practical application of California legal doctrines.

233. Refugee Law Seminar (2)
Seminar—2 hours. Prerequisite: course 292 recommended. Focus on the law concerning the admission of refugees into the United States. Detailed study of the Refugee Act of 1980, which is the major piece of legislation dealing with refugee admission, the international law that fueled the passage of the Act, and the various regulations promulgated by the Attorney General implementing the law. Analysis of the implementation of the Refugee Act and examination of some criticisms of the immigration bureaucracy's implementation of the law. Study of some topical issues of refugee law, such as gender-based persecution, persecution based on the exercise of reproductive rights, and the persecution of lesbians and gay men. The advanced legal writing requirement may be satisfied at the discretion of the instructor. Limited enrollment.

234. Law and Sexuality (2)
Discussion—2 hours. Focus on legal and social regulation of human sexuality, principally, sexual orientation.

235. Administrative Law (3)
Discussion—3 hours. Administrative due process, agency adjudication, rulemaking, delegation of legislative and judicial review. Emphasis on the federal Administrative Procedure Act, but some comparative aspects of state administrative procedure will be presented.

236. Securities Regulation I (2)
Discussion—2 hours. Prerequisite: course 215 or consent of instructor. Focuses on the Securities Act of 1933 and the Securities Exchange Act of 1934. Topics covered include domestic and international public offerings, registration statements, exemptions from registration, secondary offerings, market regulation, liability provisions, the definition of a security, enforcement of the securities act, responsibilities of securities lawyers, and transnational securities fraud. Particular attention is devoted to problems of small issuers of securities.

237. Contemporary Legal Theory Seminar (2)
Seminar—2 hours. Contemporary legal theorists have written about privilege, power, and exclusion including issue relating to racism, sexism, sexual orientation, poverty, disability, identity, and legal education. Provides a forum for reading, discussing, and writing about this scholarship. Students are responsible for presenting assigned reading at weekly seminar meetings. Regular writing is required in the form of short essays reflecting on the reading as well as a research paper. Limited enrollment.

238. Corporate Tax (4)
Discussion—4 hours. Prerequisite: course 220. Focus on all aspects of corporate and shareholder taxation, including choice of entity and entity classification; organizational and other transfers from shareholders to corporations; dividends and other corporate distributions to shareholders; distinction between debt and equity; operation and liquidation of corporations; mergers, divisions, acquisitions and other forms of corporate reorganization; subchapter S corporations. Considers historical development of the corporate tax and proposals to integrate the corporate and individual income taxes. It is anticipated that many students will also enroll in course 247.

239. Mediation: Theory and Practice (3)
Discussion—3 hours. This practice-oriented course teaches the basic, practical knowledge necessary to begin a mediation practice. All students will gain a detailed understanding of the mediation process that will enable them to counsel clients knowledgeably about the mediation option and represent clients ably in mediation. All will gain communication skills that will be valuable in working with clients and other attorneys, develop the ability to analyze disputes and understand why negotiations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes. Stages of mediation: contracting (establishing contact with the parties and explaining the process), developing the issues, working the conflict, resolving the conflict, and close. Limited enrollment.

240. Elections and Political Campaigns (2)
Discussion—2 hours. Course covers constitutional, statutory, administrative and case law aspects of federal and state elections, including laws relating to primaries, general elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest. Satisfies advanced legal writing requirement. Limited enrollment.

241. Law and Psychiatry (2)
Discussion—2 hours. Prerequisite: consent of instructor. Open to medical students participating in the UCDMC Forensic Center of Excellence program, and to law students (third-year students have priority). Advanced seminar on forensic psychiatry for medical and legal professionals. Psychiatric trainees and forensic fellows will be paired with law students to work in tandem as a forensic team. Each team will be assigned to actual cases that have been adjudicated, although the teams will approach each client as if adjudication has not yet taken place. Cases will be evaluated both psychiatrically and legally, so that both team members will confront the legal and psychiatric issues presented, and a detailed written psychiatric and legal assessment will be prepared. Cases selected to provide a broad array of legal/psychiatric problems and to raise specific critical issues around which psychiatrists and lawyers interact and at times collide. Limited enrollment.

242. Conflict of Laws (3)
Discussion—3 hours. Study of multistate and international transactions. Topics include jurisdiction, recognition of foreign judgments, and choice of applicable law. Problems practitioners encounter in a wide variety of fields, such as commercial law, family law and personal injury law.

243. Bankruptcy (3)
Discussion—3 hours. Survey of the rights and obligations of debtors in trouble, and of their creditors. Most of it concerns proceedings under the Bankruptcy Code. In the first part of the course, an examination of how and why debtors are permitted to get a "fresh start," wiping out their obligations. Later, consideration of how the bankruptcy trustee collects and distributes money to pay creditors' claims. Study of the bankruptcy system as it applies to both individuals and corporations.

244. Basic Human Physiology (2)
Discussion—2 hours. Several medical basic science faculty give lectures on the basic anatomy and physiological functioning of the organ systems; basic word roots which underlie medical/scientific terminology are emphasized. Several clinical faculty give lectures on new technologies in medicine and some of the associated legal problems which have arisen. Exams are in the format of simple, simulated medical-legal problems in which students are expected to evaluate medical/scientific data, as well as to determine the kinds of expert witnesses that might be valuable in particular cases. Limited enrollment. (S/U grading only.)

245. Advanced Criminal Law (3)
Seminar—3 hours. Prerequisite: course 227; membership in a "death penalty defense team" (because of the constraints imposed by professional ethics, the seminar must be limited to work on one side of the death penalty cases. This year students may work only on the defense side); attendance at a meeting during the fall semester to finalize enrollment; and consent of instructor. In-depth study of selected death penalty issues focusing on federal constitutional and California law. Students will work on death penalty cases under the supervision of the lawyers handling the cases and instructor. There will be a formal classroom component to the course and a paper is required. The student's work on the case (such as a portion of the brief) will satisfy the advanced legal writing requirement.

246. Federal Jurisdiction (3)
Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Constitutional and statutory authority of federal courts to adjudicate civil actions arising under federal law or between parties of diverse citizenship will be examined in contemporary detail, and from the perspective of history and the Constitution. Federal appellate jurisdiction, federal writs in the nature of habeas corpus, abstention, justiciability, and miscellaneous matters affecting attorneys' decisions to seek a federal forum will also be discussed. In addition to careful study of the relevant legislation in light of its history, the course will examine the constitutional themes of separation of powers and federalism as guides to understanding the Supreme Court's leading opinions on the scope of federal jurisdiction.

247. Taxation of Partnerships and LLC's (2)
Discussion—2 hours. Most business that is not publicly traded is organized (or should be) under the partnership tax regime. Course examines the federal income taxation of business entities whose owners are taxed on the income, deductions and losses of the entity on a pass-through basis. This includes partnerships, limited liability companies and S corporations. Explores choice of entity issues, identification of entities eligible for pass-through tax treatment and the income tax impact of formation, operation and dissolution of pass-through business entities.

248. International Law (3)
Discussion—3 hours. Prerequisite: course 217 recommended. Basic international law concepts such as statehood and recognition; treaty law and customary international law; use of force; human rights and war crimes; expropriation; the relationships between international law and national law; and the jurisprudence of international law.

249. Comparative Law (3)
Discussion—3 hours. Comparative perspective for students of American law. After an initial look at the uses of the comparative method, discussions will center around the main differences between common law and civil law and the different styles of legal thinking. Topics include evolution of the civil law and the idea of codification, the structure of European civil codes and the interpretation of their provisions, the personnel of the law and procedure in civil law countries and the analysis of selected problems of substantive law. Knowledge of a foreign language not required.

250. Jurisprudence (2)
Seminar—2 hours. Course deals with the philosophy of adjudication. Considers the nature of legal interpretation and the relationship between justice and law, with special attention to the problem of how judges should decide hard cases where the content of the law is in doubt. To what extent should a judge's personal convictions about justice affect decisions about the legal rights of the parties to a law suit? Does it matter if the judge is interpreting precedent rather than legislation? Introductory readings of a general and synthetic nature will be followed by a detailed study of particular problems and theories of adjudication. Grading will be based on active class participation and on an original paper. Limited enrollment.

251. Labor and Employment Law (4)
Seminar—4 hours. Survey of law of the work place. Focus on both the law of substantive work place rights, including statutory and common law rights to job safety, job mobility, and job and income security; and the law of collective organization, bargaining, and action. Course concentrates on the private sector. Students participate in simulated bargaining sessions and arbitration proceedings.

252. International Litigation and Arbitration (3)
Discussion—3 hours. Current developments in international law, conflict of laws, civil procedure, arbitration and comparative law in the context of transactions and disputes that cut across national boundaries. Topics include jurisdiction, the enforcement of judgments, the relative merits of arbitration and adjudication, international discovery and international choice-of-law problems. Exercises in international arbitration and mediation.

253. Products Liability (3)
Discussion—3 hours. Civil action for harm to the consumer resulting from defective products. Includes manufacturing defects, warning defects and design defects.

254. American Legal History (2)
Seminar—2 hours. Historical study of the relationship between legal change and social and political movements. Between 1953 and 1969, the Warren Court made enormous changes involving civil rights, civil liberties, criminal procedure, federal-state relations, and legislative apportionment. These legal developments occurred in the midst of the McCarthy period and the Cold War, the civil rights struggle, the anti-war movement, the popularity of folk music and rock and roll, the beginning of the space age, the Great Society legislative program and economic prosperity. What is the relationship between legal change and social and political change? Broadly, perspectives from politics and culture help to understand the interplay between constitutional adjudication and social and political change. Focus on the modern Civil Rights Movement and assessment of the influence of law, lawyers, lower courts, and the Movement itself on the Court and the elected branches of government. Emphasis on the

need to understand law in its social and historical context. Limited enrollment.

255. Pension and Employee Benefit Law (3)
Discussion—3 hours. Federal regulation and taxation of private pensions and employee benefits. Focuses on the Employee Retirement Income Security Act of 1974 (ERISA) and deals with such topics as coverage, vesting, funding, spousal interests (both during marriage and after divorce), retiree health and welfare plans, preemption of state law, and a variety of ERISA litigation and fiduciary duty issues. Internal Revenue Code issues such as discrimination in favor of the highly compensated limitations on contributions and benefits, rollovers, early distribution penalties, and minimum distribution rules are also highlighted. Problems surrounding plan terminations are also considered, including bankruptcy issues, Pension Benefit Guarantee Corporation Insurance, and the issue of asset reversions to employers.

256. Land Use Planning and the California Environmental Quality Act (2)
Discussion—2 hours. An assessment of the administrative and judicial applications of land planning and development. Topics include zoning, general plans, and related environmental and local government regulation. In addition, course will analyze the role of the California Environmental Quality Act and its application to California land use law.

257. Foreign Relations Law (3)
Discussion—3 hours. Prerequisite: course 217 or consent of instructor. Seminar covers subjects such as the war power, the treaty power and executive agreements, arms sales and military assistance, the recognition power, the negotiation power, the scope of the appropriations power as a check on executive activities, and other separation-of-powers issues generated by the intersection of international law and constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

258A. Professional Responsibility (1)
Discussion—1 hour. Study of ethical duties and responsibilities under the American Bar Association Code of Professional Responsibility, the Model Rules of Professional Conduct, and the Code of Judicial Conduct and the law of California. Required of all students for graduation. (S/U grading only.)

258B. Professional Responsibility (2)
Discussion—2 hours. Study of lawyers' ethical duties and responsibilities to clients, the courts, third parties, and the legal system. Application of the American Bar Association's Model Code of Professional Responsibility and Model Rules of Professional Conduct and Code of Judicial Conduct. California law studied in more detail than in course 258A and current issues affecting the profession also discussed. Required of all students for graduation.

259. Feminist Legal Theory Seminar (2)
Seminar—2 hours. Readings selected from the field of feminist legal theory and examination of the relationship between theory and legal practice in support of women's rights. Students required to help lead class discussions and write a research paper, which will satisfy the advanced legal writing requirement. Limited enrollment.

260. Employment Discrimination (3)
Discussion—3 hours. Examination of federal law prohibiting employment discrimination based upon race, color, religion, sex, national origin, age, and sexual orientation. Course will focus on Title VII of the Civil Rights Act of 1964, and include coverage of Art. 1981, Art. 1983, the Equal Pay and Age Discrimination Acts. California fair employment laws will also be discussed.

261. Judicial Process Seminar (2)
Seminar—2 hours. Prepares student to participate in the judicial process as an extern. Examines the judge's role in the legal process, and explores problems in the administration of justice and considers judges' differing styles and philosophies. Focus primarily on the judge's role in law creation, dispute resolution, case management and overall administration of justice.

262. Antitrust (3)
Discussion—3 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

263. Trial Practice (3)
Discussion—2 hours; laboratory—2 hours. Prerequisite: course 219 (may be taken concurrently). Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory will be held on Tuesday, Wednesday, or Thursday evening. Limited enrollment. (S/U grading only.)

264. Water Law (3)
Discussion—3 hours. Property rights in surface waters, including riparianism, prior appropriation and federal reserved rights; water administration institutions, including the federal reclamation program; the law of interstate waters and property rights in ground water. Emphasis on California water law and policy.

265. Natural Resources Law Seminar (2)
Discussion—2 hours. Prerequisite: courses 264, 287 recommended (may be taken concurrently). History, policy and law regarding the Colorado Plateau and the Colorado River, "lifeline of the Southwest" and a major source of water for Southern California. Limited enrollment.

266. Legal Realism and Critical Legal Studies Seminar (2)
Seminar—2 hours. Between the two World Wars, American scholars and judges developed and implemented a new approach to law, adjudication, and legal education, known as Legal Realism. Focuses on the antecedents of Legal Realism, the struggle over its meaning, its attack on "classical legal thought," its insights, its impact on American judges' understanding of their responsibilities and power, and its influence on modern American legal scholarship by setting the agenda of questions to be answered and by powerfully affecting the Law and Society, the Law and Economics, and especially the Critical Legal Studies (CLS) movement. Limited enrollment.

267. Civil Rights Law (2)
Discussion—2 hours. Survey of federal civil rights litigation. Includes civil remedies for racial discrimination and civil rights violations, specifically actions under: 42 U.S.C.A.s 1981, et. seq.; Title VIII of the Civil Rights Act of 1968; and Title II of the Civil Rights Act of 1964.

268. Jewish Law Seminar (2)
Seminar—2 hours. The term "Jewish Law" refers to those subjects that would normally be taught in an American law school as they have been approached by the Jewish legal system. This system is based primarily on the Talmud and on the commentaries and decisions that are derived from it. Jewish law is of interest to American law students not for its immediate practical value, but because it is a foreign legal system that is one of the oldest in the world, and one that has faced many of the problems now facing American law. Specifically, although Jewish law is purportedly based on immutable religious law, changing conditions over the centuries have encouraged methods of adaptation that are reminiscent of American constitutional law. Each student will be required to prepare and present a paper that would fulfill the advanced legal writing requirement. Neither a knowledge of foreign languages nor a previous exposure to Jewish law is necessary. Limited enrollment.

269. Basic Finance (3)
Discussion—3 hours. Prerequisite: law basic finance course required; or consent of instructor. Gives students exposure to basic techniques of valuation that are part of the standard inventory in good business school. Gives a student helpful background for a range of business-related courses.

270. International Business Transactions (2)
Discussion—2 hours. A consideration of select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, foreign exchange problems, and national efforts to control imports.

271. Nonprofit Organizations (3)
Discussion—3 hours. Prerequisite: course 215 (may be taken concurrently) or consent of instructor. Focuses on the legal rules and concepts applicable to nonprofit organizations, such as public interest, cultural, religious, educational and other tax-exempt organizations. Considers nonprofits from the state law perspective, covering organization and dissolution, operation and governance, fiduciary obligations of officers and directors, rights of members of social clubs, trade associations and labor unions, enforcement of obligations and rights by the attorney general and others, and regulation of charitable solicitation. Basic information on the taxation of nonprofits, including qualification for exempt status, the inurement and private benefit concepts, limitations on political activities, the unrelated business income, and charitable contributions.

272. Family Law (3)
Discussion—3 hours. For students with substantial interest in family law, especially the legal and psychosocial aspects of parent-child relationships. Who is a "parent"? How does the law create, dismantle, and reconstruct parent-child relationships? Should the law respond differently to biological or genetic as opposed to social (adoptive, foster, de facto) parenting? When should the law attend more to a "child's best interests" than to the autonomy and privacy of the child's parents? These issues are explored in the context of decisions about medical care, child abuse and neglect, foster care and adoption, abortion and birth control, alternative reproductive techniques, same sex parenting, child support and custody. The relevance of social science and mental health expertise to these issues is considered.

273. Current Issues in Family and Marital Property Law Seminar (2)
Seminar—2 hours. Prerequisite: course 225 or 272. Examination in depth of important current issues in the fields of family and marital property law. Heavy emphasis on law reform, including study and direct observation of the legislative process. Each student will select one issue for development and presentation in the seminar. A research paper or draft bill and supporting analysis is required. A more lengthy paper with additional unit credit may be arranged with consent of instructor to satisfy the advanced legal writing requirement.

274. Intellectual Property (3)
Discussion—3 hours. Broad survey of the field of intellectual property, including trademarks, patents, trade secrets, idea protection, unfair competition, and copyright.

275. Complex Litigation (3)
Discussion—3 hours. A study of the issues that frequently arise in large complex litigation involving multiple parties and multiple claims. In-depth treatment of topics introduced in the first-year civil procedure course, with emphasis on cutting-edge issues currently the topic of litigation. Topics include complex party joinder, multidistrict federal court litigation, motion practice and sanctions, class action litigation, discovery and "discovery abuse," including privilege and work product claims, judicial management and settlement of litigation, and preclusion (collateral estoppel and res judicata). Not all topics will necessarily be covered in any one semester.

276. Juvenile Justice (3) II.
Discussion—3 hours. Legal and philosophical bases of separate juvenile justice process for crimes committed by minors; police investigation, apprehension, and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile corrections. The role of counsel at each phase of the process. Guest speakers and field trip possible.

277. Native American Law Seminar (2)
Seminar—2 hours. Focus on legal relations between Native Americans and the federal and state governments. Topics will include rights of indigenous peoples, tribal autonomy, assertion of federal and state authority, economic and technological development of Native American communities, and special protections and rights of terminated tribes, non-recognized tribes and Alaska and Hawaiian natives.

278. Pretrial Skills (3)
Discussion—3 hours. Not open to students who have completed course 297. Course uses a series of role-playing exercises, class discussions and written assignments to introduce students to a set of non-trial skills basic to the practice of law. Course covers client interviewing and counseling, witness interviewing, discovery practice, pleadings, pretrial motions, negotiations, and alternative dispute resolution. Expanded version of the client counseling course. No final examination. Limited enrollment.

279. International Human Rights Seminar (2)
Seminar—2 hours. Prerequisite: prior or concurrent enrollment in course 248 or consent of instructor. Selected topics pertaining to the protection of individuals under treaties and norms of customary international law. Specifically, problems such as the extent to which national courts are required to uphold such rights; how the U.N. can create human rights law; remedies and international enforcement mechanisms; the use of force for human rights purposes, and the substantive requirements of specific human rights norms such as those concerning war crimes, genocide, apartheid, terrorism and torture. Required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

280. Advanced Legal Writing Seminar (2)
Seminar—2 hours. How to write a variety of legal documents in plain English. Writing exercises and outside readings will be assigned weekly. Each student will complete an individual writing project in lieu of final examination. The writing project will satisfy the law school's advanced legal writing requirements. Limited enrollment. (S/U grading only.)

281. Local Government Law (2)
Discussion—2 hours. Comprehensive course with some emphasis on California municipalities. Topics include organization, reorganization, and operation (including open meetings); intergovernment relationships (federal, state, and local, with emphasis on state and local); legislation (authority—including police power and citizen-initiated laws—and enforcement); finance; land use and environmental quality; redevelopment; eminent domain; and regional issues.

282. Energy Law Seminar (2)
Seminar—2 hours. Focus on the regulation of energy distributing industries, such as electricity and natural gas. Topics will include energy economics, cost/benefit analysis, rate-making methodologies, alternative energy technologies, conservation, and administrative regulation of the energy sector.

283. Remedies (3)
Discussion—3 hours. Survey of modern American civil remedies law, in both private and public law contexts. Topics include money damages, injunctive relief, restitution, contempt power, attorneys fees; and equitable defenses such as estoppel and laches. Additional attention to special obstacles to remedies against governmental officials and institutions, such as sovereign immunity, official immunity, and abstention.

284. Advanced Criminal Procedure (3)
Discussion—3 hours. Essential to those who wish to handle criminal cases. In particular, it treats bail, prosecutorial discretion, plea bargaining, trial by jury, and sentencing.

285. Environmental Law (3)
Discussion—3 hours. Introduction to the law of environmental decision making and environmental protection. Substantial attention paid to both substantive and procedural limits on public and private decisions that affect the environment. The allocation of environmental decision making power between state and federal governments, the general public, and the market considered. Includes the National Environmental Policy Act, state and federal law protecting endangered species, and the law governing development of wetlands and other environmentally sensitive areas.

286. Health Law (3)
Discussion—3 hours. Course will identify and analyze the myriad legal issues which arise in the dynamic health care industry of the 1990s. Specific focus on the legal implications posed by various business arrangements between providers and payors, from social issues such as AIDS, human reproduction, and the right to die, to external forces, such as government regulation, and the competitive market place. Course explores many substantive issues, and addresses legal issues posed by the various options presented under the label of "health care reform" and the emerging "integrated delivery systems" of the health care industry.

287. Public Land Law (3)
Discussion—3 hours. Legal aspects of federal land management, including the history of public land law, authority over federal lands and specialized law dealing with particular natural resources and uses found on federal lands (minerals, timber, range, wildlife, recreation and preservation).

288. Advanced Constitutional Law Seminar (2)
Seminar—2 hours; paper. Explores in-depth selected topics or problems in constitutional law and theory. Initial topics may include the regulation of hate speech, the interpretation of the Establishment Clause, or the development of the Takings Clause doctrine. Other topics selected by the seminar group. Students will write papers and present them to the seminar. Satisfies advanced legal writing requirement. Limited enrollment.

289. Pollution Control and Remediation (3)
Discussion—3 hours. Introduction to the law regulating use and disposal of toxic substances, air and water pollution, and remediation of environmental releases of hazardous materials. Topics include the choice of regulatory policy, the role of risk assessment, and the role of cost-benefit analysis. Emphasis on federal statutes, including the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, and Comprehensive Environmental Response Compensation and Liability Act, but common law tort remedies are also considered.

290. International Trade Dispute Seminar (2)
Seminar—2 hours. One of the great debates raging in international trade circles is between pragmatists and legalists. Pragmatists argue that informal, negotiation-based dispute resolution processes are the best, and perhaps the only workable, means of effectively settling trade controversies between disputing countries. Legalists believe that formal, litigation-style dispute resolution processes are superior and that "soft" pragmatic approaches to settling trade disputes inherently are doomed to failure. This seminar introduces students to the economic, political, and legal theories underlying the debate and, using actual disputes from NAFTA, MERCOSUR, and the WTO, attempts to determine which camp has the better argument. Grade based on paper and class presentation. Satisfies the advanced legal writing requirement. Limited enrollment.

291. International Trade Law and Latin America (3)
Discussion—3 hours. Covers the role of the executive, legislative and judicial branches of the United States with respect to international trade policy. International topics include the World Trade Organization (WTO) and the General Agreement on Tariffs and Trade Agreements (GATT, 1947), the GATT, 1994, North American Free Trade Agreement (NAFTA) and economic integration in this Western Hemisphere. Students are encouraged to do supervised research on selected topics of trade law and Latin America. Satisfies the advanced legal writing requirement.

292. Immigration Law and Procedure (3)
Discussion—3 hours. Course will survey a brief history of U.S. immigration and policy; federal agency interrelationship (Justice and State Department); entry of nonimmigrant (temporary) visitors and immigrants into the United States; the worldwide quota and preference systems; family and employment relationship critical to securing favored immigrant status; deportation procedures; discretionary relief available to persons otherwise subject to deportation; available defenses to deportation and exclusion proceedings; immigration consequences of criminal conviction; refugee and asylum law; administrative appeals; federal and state judicial relief; citizenship and naturalization.

293. Public Interest Law (2)
Seminar—2 hours. Examines the problems associated with providing legal services to those people and interests in American society traditionally unable to afford those services. The class will discuss selected readings that review various theoretical issues and specific problems facing public interest lawyers. May satisfy advanced legal writing requirement. Limited enrollment.

294. Tax Policy Seminar (2)
Seminar—2 hours. Prerequisite: course 200. Important tax policy issues through the bifocal lens of the current income tax and radical reform proposals to repair (and in some cases replace) it. Progressivity, tax expenditures, particularly those related to economic growth, and to health care and retirement savings; integration of the corporate and personal income taxes; the effects and fairness of the tax on the family, including non-traditional families; efficiency; international competetiveness; and privacy. Funding Social Security system. Take-home examination or paper (student's choice); paper may satisfy the advanced legal writing requirement. Limited enrollment.

295. Securities Regulation II (2)
Discussion—2 hours. Prerequisite: course 213 or 215, or consent of instructor; course 236 recommended. Principal focus is the Securities Exchange Act of 1934 and the regulation of securities markets. Topics include the evolution of securities markets, market efficiency, continuous reporting, institutional investors, shareholder voting and going-private transactions, regulation of securities markets and securities professionals, responsibilities of securities lawyers, transactional securities fraud, and enforcement of the securities acts.

296. Copyright (3)
Discussion—3 hours. Detailed look at the law of Copyright, with emphasis on its application to literary, musical and artistic works, and to motion pictures, television, and theater. Some related issues, including the protection of titles and characters, and the right of publicity.

297. Dispute Resolution and Lawyers (2)
Discussion—2 hours. Not open to students previously or concurrently enrolled in courses 278 or 209 or 213. Course uses a series of role-playing exercises and class discussions to introduce students to a set of non-trial skills basic to the practice of law. Exercises include interviewing, counseling, negotiations, arbitration and mediation. Limited enrollment.

Professional Courses

408. Community Education Seminar (3)
Seminar/clinic—3 hours. Trains students to educate the community about basic legal rights and responsibilities. Students attend an initial four-hour orientation, followed by weekly seminars that will prepare students to teach in a local high school at least two times per week. Paper or journal required, to be determined by instructor. Limited enrollment. (S/U grading only.)

409. Environmental Law Moot Court Competition (1)
During the first eight weeks of fall semester, students research and submit briefs as appellants, respondents, or third parties on a problem of environmental law that is prepared by the National Environmental Law Moot Court Board. Students attend four to six classes (including guest lectures) on aspects of appellate advocacy, legal writing, and environmental law. Members of the spring environmental law moot court team will be selected on the basis of performance in class. (S/U grading only.)

410A. Appellate Advocacy (Moot Court) (1)
Program includes classroom instruction in appellate procedure and appellate advocacy skills and participation in the moot court program. Participants in 410A work on three oral advocacy problems and argue six times before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (S/U grading only.)

410B. Appellate Advocacy (Moot Court) (1)
Prerequisite: course 410A. Continuation of course 410A. Participants in 410B research and write an appellate brief and argue the case twice before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (S/U grading only.)

411. Journal of International Law and Policy (1)
The Editor-in-Chief of the Journal receives one credit for each semester of service. Only one person may receive this credit in any one semester. (S/U grading only.)

412. Carr Intraschool Trial Advocacy Competition (1)
Competition—1 hour. Named after the late Justice Frances Carr, this competition is open to second- and third-year students. A preliminary round is followed by quarter-finals, semi-finals, and a final round. Students participate in mock trials presided over by judges and critiqued by experienced litigators. Limited enrollment. (S/U grading only.)

413. Interschool Competition (1-3)
Prerequisite: consent of appropriate faculty adviser. Participation in interschool moot court and lawyering skills competitions. Enrollment is limited to students actually representing the School in the interschool competitions. Competition must be authorized by the appropriate faculty adviser. The faculty adviser may condition the award of academic credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement. (S/U grading only.)

414. Moot Court Board (1)
Prerequisite: courses 410A-410B. Members of Moot Court Board may receive one credit for each semester of service on the board, up to maximum of two. Credit awarded only after certification by Moot Court Board and approval of the faculty advisers to Moot Court Board. Limited enrollment. (S/U grading only.)

415. Trial Practice Honors Board (1)
Members of the Trial Practice Honors Board administer the Frances Carr competition. Members are nominated by their individual Trial Practice I adjuncts. Students receive one credit for serving on the Board, awarded upon approval of the faculty adviser. (S/U grading only.)

416. *Law Review* Writer (1-2)
Writing of an editorship quality law review article under the editorial supervision of editors of the *Law Review.* Minimum of 40 hours contribution to the *Review's* publication is also required. Credit may be obtained only upon achieving status as a member of the *Law Review*, which requires that the student have made substantial progress toward completing an editorship article. Credit is awarded only after certification by the Editor-in-Chief of the *Law Review* and approval of the faculty advisers to the *Law Review.* One unit of credit is earned the first semester. Two units are earned the second semester upon completing an editorship draft. One unit is earned second semester if only a membership draft is completed. (S/U grading only.)

417. *Law Review* Editor (1-2)
Editors must have completed an editorship article and must perform editorial duties requiring a substantial time commitment. Credit awarded only after certification by the Editor-in-Chief of the *Law Review* and approval of the faculty advisers to the *Law Review.* Students may receive four credits over two semesters for service as an editor. [In exceptional cases, students may petition to participate for one semester only and receive two credits.] (S/U grading only. Deferred grading pending only, pending completion of sequence.)

418. *Environs* Editor (1)
The Editor-In-Chief of *Environs* receives one credit for each semester of service. Only one person may receive this credit in any one semester. (S/U grading only.)

419. Advanced Writing Project (1-4)
Completion of a writing project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. Writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten, double-spaced pages, excluding footnotes. Project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). Advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirement. Number of units for the writing project shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (Grading may be on S/U or letter-grade basis at the faculty supervisor's discretion.)

420. Civil Rights Clinical Program (2-6)
Clinical program. Prerequisite: prior or concurrent enrollment in course 267 and 219. Provides practical experience in providing legal services to indigent clients who have filed civil rights actions in the United States District Court for the Eastern District of California. Students will work on clinic cases under the supervision of the clinic director and supervising attorney. Limited enrollment. (S/U grading only.)

425. Judicial Clinical (2 to 6 or 12)
Clinical program. Prerequisite: course 261 required for full-time clinical students and recommended for part-time clinical students. Students may arrange judicial clerkship clinical programs with an approved list of state and federal judges through the Clinical Office and under the sponsorship of the faculty member in charge. All students must complete weekly time records and bi-weekly journals. Full-time clinical students must complete an evaluative final paper of approximately 10 pages. (S/U grading only.)

430. Clinical Program in Federal Taxation (2-6)
Clinical program. Prerequisite: course 220. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. Journals and attendance at group meetings are required. (S/U grading only.)

440. Immigration Law Clinical (2 to 6 or 12)
Clinical program. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4 and maximum is 12. Each unit assumes four hours work per week, including participation in the seminar, conference, and case research and development. Students who have completed course 292 may take the clinic for a minimum of 2 units. Limited enrollment. (S/U grading only.)

445. Legislative Process Clinical (2-4)
Clinical program. Prerequisite: prior or concurrent enrollment in course 231 or 210, or consent of instructor. Provides students with practical experience in the operation of the office of a legislator or a legislative committee. The major thrust of the program is to enable students to become familiar with the give and take realities of making laws, as contrasted with their interpretation and enforcement. Journals are required. (S/U grading only.)

450. Environmental Law Clinical (2-6)
Clinical program. Practical experience in environmental law. Students will work under the direct supervision of a government or private lawyer engaged in some form of environmental law work for a minimum of 8 office hours per week. Students will also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience. (S/U grading only.)

455. Employment Relations (2 to 6)
Clinical program. Prerequisite: prior or concurrent enrollment in course 251 or 260. Practical experience in employment relations: private and public sector labor law, or employment discrimination. Students work under the direct supervision of a government or private lawyer and have the opportunity to participate in a range of activities associated with their specific office, with emphasis on observation and participation in actual investigation, interviewing, drafting of pleadings, and attendance at hearings. Journals and attendance at one or more small group meetings are required. Clinical students must complete an evaluative final paper of approximately 8 pages. (S/U grading only.)

460. Public Interest Law Clinical (2-6)
Clinical program. Prerequisite: prior or concurrent enrollment in course 293 recommended. Students work with a public interest practitioner in a nonprofit organization. Journals and attendance at two group meetings are required. Clinical students must complete an evaluative final paper of approximately 8 pages. Hours completed in public interest setting may be applied toward the practicum requirement for the Public Interest Law Program. (S/U grading only.)

465. Clinical Program in Administrative Law (2-6)
Clinical program. Prerequisite: course 235 (may be taken concurrently) or consent of instructor. For students interested in a work experience in an administrative law setting. Students will work under the direct supervision of an administrative law judge, hearing officer, or government attorney. Placement assistance will be provided by the instructor. A goal of this clinical will be a breadth of experience in the areas of formal adjudication, informal adjudication, rulemaking, and judicial review. Students will be required to meet monthly as a group to share experiences and maintain observational journals. (S/U grading only.)

470. Administration of Criminal Justice (2 to 6 or 12)
Clinical program. Prerequisite: courses 219, 227 (may be taken concurrently); course 263 recommended (may be taken concurrently). This program affords students the opportunity to gain practical experience working full or part time in a District Attorney's or Public Defender's office in one of several surrounding counties or in a Federal Public Defender or U.S. Attorney's Office. Students enrolled in the program engage in the full range of activities associated with their specific office with emphasis on observation and participation in factual investigation, interviewing, counseling, negotiating, motion practice, and trials under State Bar rules. Note: students wishing to practice must qualify for a certification by the relevant state or federal jurisdiction. Journals and seminar attendance are required. Limited enrollment. (S/U grading only.)

480. Clinical Program in Prison Law (2-6)
Clinical program. Provides practical experience in providing legal services to real clients who have various problems related to their incarceration in state prison. The services require analysis and application of Constitutional Law, state statutory law, agency regulations, and the rules of professional responsibility. Students will work under the direct supervision of the Prison Law clinical director and will be assigned a portion of the director's case load. Students will be required to follow the law office procedure of the clinic and employ skills such as interviewing, research, writing, negotiating, and possibly, the preparation of legal documents to be filed in court. (S/U grading only.)

495. Instruction in Legal Research and Legal Writing Skills (1-2)
Participants will assist in instructing legal research and writing for first-year students under the direction of the legal research and writing instructors. Approval of the research and writing instructors is required for enrollment. Participants may assist once in the legal research program and once in the legal writing program. One unit will be given in the fall semester for legal research instruction and two units in the spring for legal writing instruction. (S/U grading only.)

498. Group Study (1-4)
Groups of students (not fewer than 4 or more than 10) with common interest in studying a stated legal problem may plan and conduct their own research and seminar program, subject to the following regulations: *(1)* the program may extend over no more than two semesters; *(2)* the plan for the program and the list of members of the group must be submitted to Dean's Office at least 4 weeks prior to opening of the semester in which the program is to begin; *(3)* a three-member faculty board will be appointed for each group proposed and will have authority to approve or disapprove the program and the amount of credit sought; *(4)* changes in the program or in membership

of the group must be approved by the faculty board and normally will be approved only prior to the semester involved; *(5)* group members must conduct a weekly seminar session to be arranged by them; *(6)* each member of the group must submit an individual paper or an approved alternative growing out of the seminar subject to the faculty board; *(7)* S/U grading only unless the entire group requests letter grades in advance.

499. Research in Legal Problems (1-4)
Students may receive credit for individual research projects, subject to the following regulations: *(1)* the project may extend over no more than two semesters; *(2)* each project will be under the supervision of a faculty member; *(3)* an outline of the project must be approved by the supervising faculty member in advance of the semester in which it is to be undertaken; *(4)* normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; *(5)* each student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.) In exceptional cases, with prior approval of a professor and an associate dean, students may arrange for directed research in foreign and/or international legal problems by working abroad under the supervision of a UC Davis Law School faculty member and an attorney or faculty member at a foreign or international government agency or educational institution (4 up to 12 units). S/U grading only unless letter grading requested in advance.

Linguistics

(College of Letters and Science)

Steven G. Lapointe, Program Director

Program Office, 108 Sproul Hall (916-752-9933)

Committee in Charge

Wilbur A. Benware, Ph.D. *(Linguistics)*
Diane Brentari, Ph.D. *(Linguistics)*
Patrick Farrell, Ph.D. *(Linguisitics)*
Steven G. Lapointe, Ph.D. *(Linguisitics)*
Martha Macri, Ph.D. *(Anthropology, Native American Studies)*
Maria I. Manoliu-Manea, Ph.D. *(French)*
Almerindo E. Ojeda, Ph.D. *(Linguistics)*
Mary Schleppegrell, Ph.D. *(Linguistics)*
Lenora A. Timm, Ph.D. *(Linguistics)*
Máximo Torreblanca, Ph.D. *(Linguisitics)*

Faculty

Wilbur A. Benware, Ph.D., Professor
Robert Blake, Ph.D., Professor *(Spanish)*
Diane Brentari, Ph.D., Associate Professor
Cecilia Colombi, Ph.D., Assistant Professor *(Spanish)*
Patrick Farrell, Ph.D., Associate Professor
Jeffrey King, Ph.D., Associate Professor *(Philosopy)*
Steven G. Lapointe, Ph.D., Associate Professor
Debra L. Long, Ph.D., Associate Professor *(Psychology)*
Martha Macri, Ph.D., Associate Professor *(Anthropology, Native American Studies)*
Maria I. Manoliu-Manea, Ph.D., Professor *(French)*
Barbara J. Merino, Ph.D., Professor *(Education)*
Almerindo E. Ojeda, Ph.D., Associate Professor
Winfried Schleiner, Ph.D., Professor *(English)*
Mary Schleppegrell, Ph.D., Assistant Professor
Janet S. Smith, Ph.D., Professor *(Anthropology)*
Lenora A. Timm, Ph.D., Professor
Máximo Torreblanca, Ph.D., Professor
Carolyn F. Wall, Ph.D., Lecturer *(Anthropology)*
Karen A. Watson-Gegeo, Ph.D., Professor *(Education)*
Aram Yengoyan, Ph.D., Professor *(Anthropology)*

Emeriti Faculty

David L. Olmsted, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus
Gwendolyn Schwabe, M.A., Senior Lecturer Emerita

Affiliated Faculty

Nina F. Dronkers, Ph.D., Associate Adjunct Professor
Janet Lane, Lecturer
Ellen Lange, M.A., Lecturer
Mary Lowry, M.A., Lecturer
John Samsel, M.A., Lecturer
Robin Shay, B.A., Lecturer
Kathleen Ward, Ph.D., Lecturer

The Major Program

Linguistics is the systematic study of human language. It focuses on theories of language structure, variation, and use, description of contemporary languages, and the examination of language change through time. Because of the pervasive influence of language in our everyday lives, work in lingusitics interacts in important ways with studies carried out in many other fields, including psychology, anthropology, neuroscience, philosophy, computer science, sociology, literature, language teaching, communication and education.

The Program. An introductory lower division course provides students with basic concepts and some of the methods needed to analyze language in a systematic way. Upper division courses probe more deeply into specific aspects of language structure, language use, and the relationship of language to other realms of human activity.

Career Alternatives. Majors in linguistics find practical outlets for their linguistic training in various areas of employment: for example, in the computer science industry; in teaching English as a second language; in foreign language teaching; in elementary and secondary level bilingual-bicultural programs; in missionary work; in bilingual-bicultural curriculum development (for example, in publishing houses); in legal work; in speech therapy; or as lexicographers (for dictionaries). All these types of employment share an interest in persons skilled in the analysis of language, spoken and/or written—linguistics equips its students with just such skills.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**4-24**
Linguistics 1	4
Foreign language, one course beyond the 15-unit requirement of the College of Letters and Science in the same language used to fulfill the college requirement	0-20
Depth Subject Matter	**44**
Linguistics 103A, 103B, 111, 112, 121, 131, 141, 151, 152	36
At least eight upper division units from the following courses	8
Any other Linguistics course not included in the 36-unit requirement above, Anthropology 112, 113, 117, 119, 120, Education 151, English 105B, French 160, 161, German 105, 106, 107, 108, Human Development 101, Philosophy 137, Psychology 132, Rhetoric 105, Russian 160, Spanish 111N, 112N, 113, 114N.	
The student should note that a number of these courses have prerequisites. Since it is usual to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.	
Total Units for the Major	**48-68**

Major Adviser. W. Benware.

Grading Recommendation. Though not required, it is recommended that all courses offered in satisfaction of the Linguistics major be taken for a letter grade.

Minor Program Requirements:

The minor in Linguistics provides the student with a basic knowledge of linguistic analysis. It is appropriate for students interested in any aspect of language use.

	UNITS
Linguistics	**24**
Linguistics 1, 103A, 103B	12
One course from Linguistics 111, 112, 121, 131, 141, 151, 152	4
Additional units of upper division Linguistics courses, chosen in consultation with an adviser	8

Minor Adviser. Same as Major adviser.

Honors and Honors Program. The honors program consists of six units of 194H credit normally taken in the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Specific eligibility criteria may be obtained from the major adviser. For general information regarding graduation with honors and Dean's Honors Lists, please refer to the Academic Information section of this catalog.

Graduate Study. The Linguistics Graduate Group offers study and research leading to the M.A. degree. Detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.

Graduate Adviser. A.E. Ojeda.

Courses in Linguistics (LIN)

Lower Division Courses

1. Introduction to Linguistics (4) I, II, III. Brentari, Farrell, Timm, Benware, Lapointe, Ojeda
Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. GE credit: ArtHum or SocSci, Wrt.

4. Linguisitics for Students of Literature (4) III. Manoliu
Lecture—3 hours; term paper. Prerequisite: course 1 recommended. Introduction to basic linguistic concepts and models needed for the interpretation of literary texts. Topics include meaning in texts, lexical meaning, linguistic variation in texts, sound systems and poetry.

10. Elementary American Sign Language (5) I. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to American Sign Language grammar and vocabulary, with emphasis on conversational skills.

11. Elementary American Sign Language (5) II. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 10. Continuation of course 10.

12. Elementary American Sign Language (5) III. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 11. Continuation of course 11.

***13. Intermediate American Sign Language** (5) I. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 12. Grammar review and vocabulary development; enhancement of conversational skills.

***14. Intermediate American Sign Language** (5) II. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 13. Emphasis on classifier and numeral systems in American Sign Language; conversational practice.

***15. Advanced American Sign Language** (5) III. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 14. Study of American deaf culture through conversation and narratives; dialects of American Sign Language; deaf education.

20. Oral English for Undergraduate ESL Students (3) III. The Staff (Lowry in charge)
Lecture/discussion—3 hours. Prerequisite: consent of instructor; limited primarily to students who have fulfilled their Subject A requirement or have completed course 23. Intensive practice in oral English for undergraduate ESL students. Students will learn to identify and modify features of their pronunciation which limit their ability to communicate clearly. Students will also

*Course not offered this academic year.

learn and practice strategies for effective participation in academic tasks. (P/NP grading only.)

21. Introduction to Reading and Composition for Non-Native Speakers (5) I, II. The Staff (Lowry in charge)
Lecture/discussion—5 hours. Prerequisite: admission by placement examination only. Provides undergraduate students whose native language is not English with intensive work in reading and in writing organized, coherent, and grammatically correct paragraphs and short academic essays. (Former course English 21.) (P/NP grading only.)

22. Intermediate Reading and Composition for Non-Native Speakers (4) I, III, III. The Staff (Lowry in charge)
Lecture/discussion—4 hours. Prerequisite: admission by placement examination or by successful completion of course 21. Provides undergraduate students whose native language is not English with experience in writing essays in recognized rhetorical modes. Students will also read to develop fluency and critical thinking and will study grammar needed for academic writing. (Former course English 22.) (P/NP grading only.)

23. Advanced Reading and Composition for Non-Native Speakers (4) I, II, III. The Staff (Lowry in charge)
Lecture/discussion—4 hours. Prerequisite: admission by placement examination or by successful completion of course 22. Provides undergraduate students whose native language is not English with experience writing persuasive essays related to reading passages. Students will also read for tone, style, context, and assumptions and will study advanced grammar needed for persuasive essays. (Former course English 23.) (P/NP grading only.)

25. English for International Graduate Students I (5) I, II. The Staff (Lane in charge)
Lecture—3 hours; laboratory—6 hours. Prerequisite: admission by placement examination; admission limited to international graduate students and limited status (international) undergraduate students. Develops skills needed for studying on the graduate level: notetaking on lectures and on written academic material, writing logically and accurately under time pressure, giving oral presentations, systematically extending vocabulary, and writing a research paper. May be repeated for credit with consent of coordinator. (Former course English 25.) (P/NP grading only.)

26. Writing for International Graduate Students (3) II. The Staff
Lecture—3 hours. Prerequisite: satisfactory completion of course 25 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.)

50. Languages of the World (4) III. Benware, Timm
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 1 or Anthropology 4 recommended. Survey of the world's languages, their classification, distribution, and interrelationships; structural similarities and differences; accounts of the origin of human language; sign languages, pidgin/creoles, "universal" languages, endangered languages, and languages of global significance.GE credit: ArtHum or SocSci, Wrt.

96. Directed Group Study in English as a Second Language (1-5) I, II, III. The Staff (Schleppegrell in charge)
Variable—1-5. Prerequisite: consent of instructor. Directed group study of a topic in English as a Second Language (ESL) which is not provided for in other ESL courses offered by the Linguistics Program. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

Upper Division Courses

103A. Linguistic Analysis I: Phonetics, Phonology, Morphology (4) I, II. Brentari, Benware
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed course 139.

103B. Linguistic Analysis II: Morphology, Syntax, Semantics (4) I, II. Lapointe, Farrell, Ojeda
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed course 140.

***104. English Grammar** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of present-day English grammar from the perspective of contemporary linguistics. Focus on major syntactic and morphological constructions, their uses, and variation across dialects, styles, and registers. Not open for credit to students who have completed English 105A.

105. Topics in Language and Linguistics (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. Offered in alternate years.

111. Introduction to Phonological Theory (4) II. Brentari
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to contemporary phonological theory, with emphasis on autosegmental, metrical, and lexical theory. Not open for credit to students who have completed course 164.

112. Phonetics (4) II. Brentari
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. Detailed examiniation of articulatory and acoustic phonetics. Not open for credit to students who have completed course 109.

121. Morphology (4) III. Lapointe, Farrell
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. Not open for credit to students who have completed course 142.

131. Introduction to Syntactic Theory (4) II. Farrell, Lapointe
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. Not open for credit to students who have completed course 165.

141. Semantics (4) I. Ojeda
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. Introduction to the linguistic study of the meanings of words and phrases. Survey of the meanings expressed by lexical items and derivational and inflectional morphology, as well as the contribution of argument structure, quantification, and coordination to meaning. Not open for credit to students who have completed course 120. GE credit: Wrt.

151. Historical Linguistics (4) III. Benware
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. Not open for credit to students who have completed course 102.

152. Language Universals and Typology (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. Investigation into common features of all human languages and the classification of languages in terms of their structural features; theories of universal grammar; detailed discussion of non-Indo-European languages and comparison with English. Not open for credit to students who have completed course 170. GE credit: Wrt.

163. Language, Gender, and Society (4) II. Timm
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. Not open for credit to students who have completed course 113. GE credit: SocSci, Div, Wrt.

***166. The Spanish Language in the United States** (4) III. Torreblanca
Lecture—3 hours; term paper. Prerequisite: course 1 or Spanish 111N; and Spanish 23 or the equivalent. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. Not open for credit to students who have completed course 116. GE credit: Div, Wrt.

***167. Chicano Sociolinguistics** (4) I. Timm
Lecture—3 hours; term paper. Prerequisite: course 1; Spanish 3 or the equivalent. Topics covered include the linguistic features of Chicano Spanish, Spanish-English code-switching, regional and social diversity in Chicano Spanish, Chicano English, acquisition of bilingualism, language choice and use, attitudes about Spanish and English, Spanish language maintenance, Chicano bilingualism and education. Not open for credit to students who have completed course 115. GE credit: Div, Wrt.

***171. Introduction to Psycholinguistics** (4) II. Lapointe
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; courses 103A, 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. Not open for credit to students who have completed course 135. Offered in alternate years. GE credit: SocSci.

***173. Language Development** (4) II. Lapointe
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor; courses 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. Not open for credit to students who have completed course 138. GE credit: SocSci.

175. Biological Basis of Language (4) III. Dronkers
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SciEng.

192. Internship in Linguistics (1-12) I, II, III. The Staff (Timm in charge)
Internship—3-36 hours; two written reports. Prerequisite: course 1 or the equivalent. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organi-

zations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Director in charge)
Independent study—1-5 hours. Prerequisite: open only to linguistics majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. (P/NP grading only.)

197T. Tutoring in Linguistics (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion—1-4 hours. Prerequisite: upper division standing, consent of instructor, and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (P/NP grading only.)

Graduate Courses

203A. Modern Linguistic Theory: Structuralism (4) II. Manea-Manoliu
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. History of thought in grammatical theory from de Saussure to 1950 with emphasis on critical examination of major theoretical problems in the field. Not open for credit to students who have completed course 225A. Offered alternate years.

203B. Modern Linguistic Theory: Generative Grammar (4) III. Ojeda, Farrell
Lecture—3 hours; term paper. Prerequisite: courses 111, 131. History of thought in grammatical theory from 1950 to the present with emphasis on critical examination of major theoretical problems in the field. Not open for credit to students who have completed course 225B. Offered in alternate years.

205A-205B-205C-205D. Topics in Linguistic Theory and Methods (4) I, II, III. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs.

211. Advanced Phonological Theory and Analysis (4) III. Brentari
Lecture—3 hours; term paper. Prerequisite: course 111. Critical examination of current phonological theories. Not open for credit to students who have completed course 239. Offered in alternate years.

***212. Advanced Phonetics** (4) III. Brentari
Lecture—3 hours; term paper. Prerequisite: course 112. Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Not open for credit to students who have completed course 209. Offered in alternate years.

***231. Advanced Syntactic Theory and Analysis** (4) III. Farrell, Lapointe
Lecture—3 hours; term paper . Prerequisite: course 131. Critical survey of contemporary theories of syntax. Not open for credit to students who have completed course 265. Offered in alternate years.

241. Advanced Semantic Theory and Analysis (4) II. Ojeda
Lecture—3 hours; term paper. Prerequisite: course 141 or consent of instructor. Advanced critical exploration of contemporary theories of linguistic semantics. Not open for credit to students who have completed course 210. Offered in alternate years.

251. Principles of Historical Linguistics (4) I. Manea-Manoliu, Torreblanca
Lecture—3 hours; term paper. Prerequisite: course 151. Advanced analysis of the theory and methods of historical linguistics. Not open for credit to students who have completed course 202. Offered in alternate years.

***252. Romance Linguistics** (4) I. Manea-Manoliu
Lecture—3 hours; term paper. Prerequisite: course 151. Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of methods of historical and comparative linguistics in particular areas of structural change in Romance. Not open for credit to student who have completed course 220. Offered in alternate years.

280. Theory of English as a Second Language (4) I. The Staff
Lecture—3 hours; term paper. Theoretical issues that have influenced the teaching of English as a second language. Contributions of collateral disciplines—psycholinguistics, sociolinguistics, and cognitive psychology—to English as a second language instruction.

281. Research on Second Language Acquisition (4) II. The Staff
Lecture—2 hours; laboratory—1 hour; term paper; computer projects. Prerequisite: upper division or graduate standing. Analysis of theory/research on L2 acquisition. Topics include: contrast of L1/L2 acquisition; current theories of L2 such as the natural order and input hypotheses, as well as effects of individual variation, cognition, motivation on L2; research design and basic statistical analyses.

282. Individual and Social Aspects of Bilingualism (4) III. Timm
Lecture—3 hours; term paper. Broad overview of bi- and multilingualism, with focus on theoretical and descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states.

297T. English as a Second Language Teaching/Tutoring (1-4) I, II, III. Schleppegrell
Tutoring—1-4 hours. Prerequisite: course 300, 301, or 302 (may be taken concurrently). Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. (S/U grading only.)

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (S/U grading only.)

Professional Courses

300. The Teaching of English as a Foreign Language (4) I. Schleppegrell
Lecture—3 hours; laboratory—3 hours. Prerequisite: English 105A or course 109 or consent of instructor. Methods of teaching English to nonnative speakers, stressing particularly recent linguistic methodology and techniques.

301. Materials of TESOL (4) II. Schleppegrell
Lecture—4 hours. Prerequisite: course 300 or consent of instructor. Designing and evaluating ESL curricula and proficiency assessment instruments in all areas of language acquisition (pronunciation, reading, listening comprehension, etc.). Developing lessons, teaching and tutoring in selected language acquisition areas in the UCD ESL clinic. Evaluating (and adapting) published ESL materials.

302. Recent Research and Special Projects in TESOL (4) III. Schleppegrell
Lecture—4 hours. Prerequisite: courses 300 and 301. Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UCD ESL clinic. Each student also designs and reports on a classroom research project.

391. Oral English for ESL Students (3) II, III. The Staff
Lecture—2 hours; laboratory—2 hours. Prerequisite: open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Course may be repeated for credit with consent of coordinator. (S/U grading only.)

*Course not offered this academic year.

Linguistics (A Graduate Group)

Steven G. Lapointe, Ph.D., Chairperson of the Group

Group Office, 108 Sproul Hall (916-752-9933)

Faculty. The Group includes faculty from eight departments in the College of Letters and Science.

Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. degree. There are two tracks within the program, one concentrating on applied linguistics and TESOL, and the other on general linguistics. Within the general linguistics track, the following areas are emphasized: *(a)* grammatical analysis and theory in syntax, morphology, semantics, and phonology, *(b)* sociolinguistics, *(c)* psycholinguistics and neurolinguistics, and *(d)* linguistic description (contemporary or historical) of a particular language or group of languages.

In general, the M.A. in Linguistics at UC Davis serves as preparation for advanced graduate work at the Ph.D. level, as a supplement to studies in related fields—especially anthropology, psychology, philosophy, the various languages—or as a major component in the training for a professional career (such as TESOL, speech therapy, and foreign language teaching). The program places considerable emphasis on interdisciplinary studies, thereby increasing the breadth of the candidate's knowledge, and providing a wider and more flexible variety of options to pursue thereafter.

Preparation. Applicants to the M.A. program who do not have a bachelor's degree in Linguistics must complete the following courses in Linguistics from the undergraduate program. Applicants to the *Applied Track* must complete 103A and 103B (introduction to linguistic analysis I and II), 141 (semantics), and 151 (historical linguistics). Applicants to the *General Track* must complete all of the above four courses, plus 111 (introduction to phonological theory), 112 (phonetics), and 131 (introduction to syntactic theory).

Requirements. The requirements for the two tracks differ. The track in general linguistics falls under the Plan I set of requirements. Thirty units of upper division and graduate course work above and beyond the prerequisite courses listed under Preparation (above) must be completed, and a thesis is required. The track in applied linguistics and TESOL operates under either Plan I or Plan II. The Plan I requirements are the same as those listed above. Under Plan II, thirty-six units of upper division and graduate course work above and beyond the prerequisite courses are required, and at the end of the course work a student must pass a written comprehensive examination. Students in both tracks must pass a foreign language reading examination.

Graduate Adviser. A.E. Ojeda *(Linguistics).*

Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

Chinese

*10. Modern Chinese Literature (in English)
11. Great Books of China
*50. Introduction to the Literature of China and Japan

*104. Twentieth-Century Chinese Fiction (in English)
*105. Western Influences on Twentieth-Century Chinese Literature (in English)
106. Chinese Poetry (in English)
107. Traditional Chinese Fiction (in English)
*108. Poetry of China and Japan (in English)
*109A-I. Topics in Chinese Literature (in English)
110. Great Writers of China: Texts and Context (in English)
132. Readings in Modern Chinese Poetry

Classics

140. Homer and Ancient Epic
141. Greek and Roman Comedy
142. Greek and Roman Novel
*143. Greek Tragedy

Comparative Literature

1. Great Books of Western Culture: The Ancient World
2. Great Books of Western Culture: From the Middle Ages to the Enlightenment
3. Great Books of Western Culture: The Modern Crisis
4. Major Books of the Contemporary World
5. Fairy Tales, Fables and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and their Transformations
*9. The Short Story and Novella
10A-N. Master Authors of World Literature
12. Introduction to Women Writers
*13. Dramatic Literature
14. Introduction to Poetry
*15. The Spiritual Quest
20. Man and the Natural World
*25. Ethnic Minority Writers in World Literature
*53A. Literature of China and Japan
*53B. Literature of India and Southeast Asia
*120. Writing Nature: 1750 to the Present
135. Women Writers
*138. Gender and Interpretation
*140. Thematic and Structural Study of Literature
141. Literary Theory and Criticism
*142. Critical Reading and Analysis
*144. The Grotestque
*145. Representations of the City
*146. Myth in Literature
152. Literature of the Americas
153. The Forms of Asian Literature
157. War and Peace in Literature
*158. The Detective Story as Literature
159A-G. Special Topics in Comparative Literature
160A. The Modern Novel
*160B. The Modern Drama
*161A. Tragedy
*161B. Comedy
163. Biography and Autobiography
164A. The Middle Ages
164B. The Renaissance
164C. Baroque and Neoclassicism
164D. The Enlightenment
166A. The Epic
166B. The Novel
*167. Comparative Study of Major Authors
*168A. Romanticism
*168B. Realism and Naturalism
*169. The Avant-Garde
*170. The Contemporary Novel
*180. Selected Topics in Comparative Literature
*195. Senior Seminar

Dramatic Art

20. Introduction to Dramatic Art
156A. History of Theatre and Dance: Ancient to 1650
156B. History of Theatre and Dance: 1650-1900
156C. History of Theatre and Dance: The Twentieth Century
159. Contemporary Experimental Theatre and Drama

English

171A. The Bible as Literature: The Old Testament
*171B. The Bible as Literature: Prophets and New Testament

French

*25. Introduction to French Literature
*112. Masterpieces of French Drama
*113. Masterpieces of French Novel
*114. French Philosophical Literature

German

47. Erasmus and Christian Humanism
48. Myth and Saga in the Germanic Cultures
49. Freshman Colloquium
50. Survey of German Culture
51. Introduction to Literary Analysis
110. Older German Literature
111A-H. Studies of Major Writers
112A-C. Topics in German Literature
113. Goethe's *Faust*
114. The *Faust* Tradition before and after Goethe
115A. German Literature since 1945
115B. German Literature since 1945
116. From Goethe's *Werther* to Today's *Werthers*
117A. The Tristan Tradition: Medieval, Musical, Modern
117B. The Nibelungen Tradition: Medieval, Musical, and Modern
117C. The Parzival Tradition: Medieval, Musical, and Modern
118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire)
118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism
118C. Germany under the Third Reich
118E. Contemporary German Culture
119. From German Fiction to German Film
130. Modernity and its Discontents: The Tradition of German Cultural Critique
140. German Political Literature from the Middle Ages to the Present
141. The Holocaust and its Literary Representation
142C. New German Cinema: From Oberhausen to the Present

Italian

*139B. Boccaccio, Petrarch and the Renaissance
*140. Italian Literature in English Translation: Dante, *Divine Comedy*

Japanese

10. Masterworks of Japanese Literature (in English)
*15. Introduction to Traditional Japanese Culture
*50. Introduction to the Literature of China and Japan
101. Japanese Literature in Translation: The Early Period
102. Japanese Literature in Translation: The Middle Period
103. Japanese Literature in Translation: The Modern Period
*104. Modern Japanese Literature: War and Revolution
105. Modern Japanese Literature: Hero and Anti-Hero
106. Japanese Culture through Films
*107. Modern Japanese Autobiographics (in English)
*108. Poetry of China and Japan

Native American Studies

181A. Native American Literature (the novel and fiction)
181B. Native American Literature (non-fiction works by native authors)
181C. Native American Literature (traditional literature and poetry)
188. Special Topics in Native American Literary Studies

Russian

41. Survey of Nineteenth-Century Russian Literature
42. Survey of Twentieth-Century Russian Literature
44. Children's Literature in Russia
121. Nineteenth-Century Russian Prose
*123. Twentieth-Century Russian Prose
*126. The Russian Theater
130. Contemporary Soviet Culture
*131. Literature of Revolution
*132. Nature and Culture in the Soviet Union
140. Dostoevsky
*141. Tolstoy
*150. Russian Culture
151. Soviet Writers and Censorship
*154. Russian Folklore
166. Representations of Sexuality in Russian Literature

Spanish

149. Latin-American Literature in Translation

Management, Graduate School of

Robert H. Smiley, Ph.D., Dean

Michael W. Maher, Ph.D., Associate Dean

School Office, 106 AOB 4 (916-752-7399)

Faculty

Brad Barber, Ph.D., Associate Professor
Nicole W. Biggart, Ph.D., Professor *(Management, Sociology)*
George Bittlingmayer, Ph.D., Professor
David S. Bunch, Ph.D., Associate Professor
Richard P. Castanias, Ph.D., Associate Professor
Peter K. Clark, Ph.D., Professor
Masako Darrough, Ph.D., Associate Professor
Scott Davis, Ph.D., Assistant Professor
Eitan Gerstner, Ph.D., Professor
Paul A. Griffin, Ph.D., Professor
Michael Hagerty, Ph.D., Associate Professor
John Lyon, Ph.D., Associate Professor
Prasad Naik, Ph.D., Assistant Professor
Donald Palmer, Ph.D., Professor
David M. Rocke, Ph.D., Professor
Donald M. Topkis, Ph.D., Professor
Chih-Ling Tsai, Ph.D., Professor
Gary M. Walton, Ph.D., Professor *(Management, Economics)*
David Woodruff, Ph.D., Assistant Professor

Emeriti Faculty

Richard C. Dorf, Ph.D., Professor Emeritus
Alexander F. McCalla, Ph.D., Professor Emeritus
Jerome J. Suran, B.S., Ph.D. (hon.), Senior Lecturer Emeritus

Courses in Management (MGT, MGP)

Lower Division Courses

11A. Elementary Accounting (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles.

11B. Elementary Accounting (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Product costing; using accounting information for decision making; planning and performance evaluation.

Upper Division Course

100. Introduction to Financial Accounting (3) The Staff
Lecture—3 hours. Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Introduction to the concepts, methods, and uses of accounting and financial reporting. Preparation of financial statements, including balance sheet and statements of income and cash flow, as well as their analysis by investors and managers.

Graduate Courses

(Core Courses)

200A. Financial Accounting (3) I. Lyon
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations.

200B. Managerial Accounting (3) III. Darrough
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations.

201A. The Individual and Group Dynamics (3) I. Palmer
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building.

201B. Organizational Structure and Strategy (3) II. Biggart
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Analysis of structural properties of organization including differentiation and vertical and horizontal integration. Alternative structural arrangements including functional, divisionalized, matrix, and hybrid structures. Relationship between environment, structure, and strategic objectives. Organization life cycles and change.

202A. Markets and the Firm (3) I. Bittlingmayer
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied.

202B. Business, Government, and the International Economy (3) II. Clark
Lecture—3 hours. Prerequisite: course 202A. Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance.

203A. Data Analysis for Managers (3) I. Tsai
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy.

203B. Forecasting and Managerial Research Methods (3) II. Rocke, Tsai
Lecture—3 hours. Prerequisite: course 203A. Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy.

204. Marketing Management (3) III. Hagerty
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales.

205. Financial Theory and Policy (3) III. Barber
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging.

206. Decision Making and Management Science (3) II. Bunch
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment.

207. Management Information Systems (3) II. Topkis, Woodruff
Lecture—3 hours. Prerequisite: graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security.

(Second-Year Courses)

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.

215. Business Law (3) The Staff
Lecture—3 hours. Prerequisite: completion of Administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law.

216. Managing Professionals, Budgets, Controls and Ethics (3) I. The Staff
Lecture—3 hours. Prerequisite: graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants.

220. Public Budgeting and Finance (3) The Staff
Lecture—3 hours. Fiscal role of government in a mixed economy and democratic society; economics and politics of taxation and resource allocation; intergovernmental financial relations; budgeting activities of local governments.

223. Power and Influence in Management (3) Palmer
Seminar—3 hours. Prerequisite: consent of instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics.

***224. Human Resources Management** (3) Biggart
Lecture—3 hours. Problems of recruiting, training, motivating, compensating, and separating workers in contemporary organizations. Topics include design of incentive systems, career management, professionalization, alienation, worker burnout, organizational deviance, and current issues such as affirmative action and the unionization of public employees.

***225. Labor Relations** (3) The Staff
Lecture—3 hours. Course deals with labor organization, employment relationships, employer-employee negotiations, contracts, and litigation. Worker and management rights, and collective bargaining in the public and private sectors will be explored.

227. Managing a Diverse Workforce (3) I. Biggart
Lecture—3 hours. Prerequisite: graduate student. Reviews recent demographic changes such as increased ethnic diversity and an aging population in the regional and national labor force. The impact of these changes on hiring practices, internal labor markets, compensation and benefits issues, and non-traditional work arrangements.

228. Statistical Quality Control and Productivity Improvement (3) Rocke
Lecture—3 hours. Prerequisite: Statistics 106. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector. Methods covered include statistical quality control techniques such as control charts and acceptance sampling, reliability, and graphical tools. (Same course as Statistics 228.)

229. Global Strategy (3) Biggart
Lecture—3 hours. Examines recent restructurings in the world economy including the European Economic community, East Asian economies of Japan, Taiwan, and South Korea, and changes in Eastern Europe.

***232. Urban Policy and Planning** (3) The Staff
Lecture—3 hours. Analysis of public policy in an urban setting, focusing on the efficiency effects of such policies. Topics include urban spatial structure, growth-management policies, housing, transportation, environmental quality, local government finance, and urban planning.

***233. Regulation and Policy in Agriculture** (3) The Staff
Lecture—3 hours. Implications for management of regulation and public policy on agricultural production choices, practices, processing, and marketing; influences on management strategy, organization, business practices, and resource productivity; trends in regulation and policy and their potential for management strategies are explored.

240. Management Policy and Strategy (3) I. Suran, Hagerty
Lecture—3 hours. Prerequisite: first-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real "client" organizations, in the private and public sectors, are assigned to student teams as the subjects of study.

241. Managerial Decision Making (3) Bunch
Lecture—3 hours. Develops analytical skills for evaluating decisions and solving problems in various managerial settings. Emphasis is on problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

244. New and Small Business Ventures (3) Dorf
Lecture—3 hours. Emphasizes starting a new business venture or managing a small, ongoing business during its formative stages. The business plan. Legal forms, financial considerations, the management team. The entrepreneur. Students develop a detailed business plan.

245. International Marketing (3) II. Hagerty
Lecture—3 hours. Prerequisite: graduate student and course 204. Teaches marketing strategy and tactics applied across national borders. Includes lectures and cases on import/export, joint ventures, off-shore subsidiaries, management contracts, transfer pricing, and currency exchange. Gives methods of market research and competitor intelligence in diverse cultures.

246. Negotiation and Team Building (3) III. Hagerty
Lecture—3 hours. Prerequisite: courses 202, 205. Teaches basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier.

248. Marketing Strategies (3) Gerstner
Lecture—3 hours. Examines process by which organizations develop strategic marketing plans. Includes

definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing.

249. Marketing Research (3) Hagerty
Lecture—3 hours. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.

250. Technology Management (3) Suran
Lecture—3 hours. Management of the engineering and technology activity. Functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Research and development activity. Project planning and organization. Manufacturing issues. Case studies.

251. Management of Innovation (3) Dorf
Lecture—3 hours. Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics.

252. Production and Operations Management (3) Woodruff
Lecture—3 hours. Explores methods of increasing operational efficiency in production and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queueing, and network models.

260. Financial Management (3) Castanias
Lecture—3 hours. Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure.

261. Investment Analysis (3) Barber
Lecture—3 hours. Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance.

262. Money and Security Markets (3) Bittlingmayer
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets.

263. Options and Futures Markets (3) Clark
Lecture—3 hours. Studies the behavior of options, futures, and other derivatives securities markets; how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, swaps, and financial futures contracts. Price determination in options and futures markets is also examined.

264. Business Taxation (3) Blumenfeld
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.

265. Theory of Financial Decision Making (3) Castanias
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Theory of financial decision making.

266. International Finance (3) Castanias
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

268. Management Communications (3) Kennedy
Lecture—3 hours. The theories, strategies, and skills necessary for effective communication in management. Students will learn to improve their business writing, and will deliver business presentations orally.

270. Corporate Financial Reporting (3) Griffin
Lecture—3 hours. Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers.

271. Accounting and Budgeting for Management Control (3) Maher
Lecture—3 hours. Examines concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

272. Evaluation of Financial Information (3) Griffin
Lecture—3 hours. Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed.

273. Accounting and Reporting for Government Nonprofit Entities (3) Maher
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies.

274. Auditing, Internal Control, and Public Accounting (3) Lyon
Lecture—3 hours. Concentrates on role of the independent public accountant as auditor and consultant, from the perspective of an enterprise manager. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also given to current issues confronting the accounting profession.

276. Real Estate, Finance and Development (3) II. The Staff
Lecture—3 hours. Prerequisite: course 201A and 207. Focus on single family, attached, detached, multifamily, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending.

***280. Data and File Management** (3) Topkis
Lecture—3 hours. Concepts of information storage and retrieval on digital computers. Emphasis on file structures and their uses within organizations; applications drawn from both the public and private sector.

281. Systems Analysis and Design (3) Woodruff
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation.

***283. Optimization Theory and Applications** (3) Topkis
Lecture—3 hours. Introduces applied optimization theory. Examines linear, nonlinear, discrete, and dynamic programming; optimality conditions; transportation, networks, and large-scale systems; and computer implementation. Applications are made to problems in private and public management.

284. Applied Linear Models for Management (3) Tsai
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems.

285. Time Series Analysis and Forecasting (3) Tsai
Lecture—3 hours. Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control.

286. Telecommunications and Computer Networks (3) Topkis
Lecture—3 hours. Prerequisite: course 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks.

287. Database Systems (3) Topkis
Lecture—3 hours. Prerequisite: course 280. Hierarchical, network, and relational models for database systems. Design and implementation of models. Performance evaluation and benchmarking. Query structures and languages. Data security and integrity. Application to managerial decision making and decision support systems.

***288. Special Topics in Management of Information Systems** (3) Topkis
Lecture—3 hours. Managerial aspects of information systems. Topics stressing applications in organizations chosen from: economics of computers and information systems, decision support systems, management of computer-based information systems, office automation.

290. Seminar in Management (3)
Seminar—3 hours. Interdisciplinary case study of a real business or government enterprise.

298. Directed Group Study (1-5) The Staff
Prerequisite: consent of instructor.

299. Individual Study (1-12) The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Master of Education (M.Ed.) (A Graduate Group)

James Grieshop, Ph.D., Chairperson of the Group

Group Office, 1303 Hart Hall (916-752-1926)

Faculty. This interdisciplinary graduate group consists of faculty from departments such as Biological and Agricultural Engineering, Human and Community Development, Consumer Science, Division of Education, Environmental Design, Environmental Horticulture, Epidemiology and Preventive Medicine, Native American Studies, Nutrition, Plant Science, Psychology, Rhetoric and Communication, Textiles and Clothing, and Vegetable Crops.

Graduate Study. The Master of Education Graduate Group is housed in the Department of Human and Community Development. Master of Education (M.Ed.) degree students are preparing for leadership and professional roles in community and development education related to planning, organizational change, and evaluation. Areas of study include health education planning; community services planning and program management; community and non-formal education; international development education; program design and evaluation; organizational decisionmaking; leadership development, communication and change; extension education; environmental education; agricultural development education; and consumer behavior.

Requirements. The M.Ed. degree requires 36 units minimum of upper division and graduate courses. A minimum of 18 of these units must be graduate level courses; and at least eight units must be related to research methods and/or statistics. Students submit a required Program of Study Plan in the area of intended specialization by the end of the first quarter of graduate study. A research-based field project and comprehensive oral examination are required for completion of this degree.

Graduate Adviser. Contact Group office.

Mathematics

(College of Letters and Science)

Craig A. Tracy, Ph.D., Chairperson of the Department

John K. Hunter, Ph.D., Vice Chairperson of the Department (Graduate Matters)

Abigail Thompson, Ph.D., Vice Chairperson of the Department (Undergraduate Matters)

Department Office, 565 Kerr Hall (916-752-0827)

Faculty

David W. Barnette, Ph.D., Professor
Carlos R. Borges, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor
Angela Y. Cheer, Ph.D., Professor
James R. Diederich, Ph.D., Professor
Allan L. Edelson, Ph.D., Professor
C. Albert Fannjiang, Ph.D., Assistant Professor
Dmitri B. Fuchs, Ph.D., Professor
Janko Gravner, Ph.D., Assistant Professor
Joel Hass, Ph.D., Professor
John K. Hunter, Ph.D., Professor
Arthur J. Krener, Ph.D., Professor
Gregory J. Kuperberg, Ph.D., Assistant Professor
Yingchen Li, Ph.D., Assistant Professor
E. O. Milton, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Alexander I. Mogilner, Assistant Professor
Motohico Mulase, Ph.D., Professor
Bruno L. Nachtergaele, Ph.D., Associate Professor
E. Gerry Puckett, Ph.D., Associate Professor
Jeremy D. Quastel, Ph.D., Assistant Professor
G. Thomas Sallee, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Albert Schwarz, Ph.D., Professor
Evelyn M. Silvia, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
David M. Stuart, Ph.D., Assistant Professor
J. Blake Temple, Ph.D., Professor
Abigail Thompson, Ph.D., Associate Professor
William P. Thurston, Ph.D., Professor
Craig A. Tracy, Ph.D., Professor
Roger J-B. Wets, Ph.D., Professor

Emeriti Faculty

Henry L. Alder, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Dallas O. Banks, Ph.D., Professor Emeritus
Donald C. Benson, Ph.D., Professor Emeritus
Gulbank D. Chakerian, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Doyle O. Cutler, Ph.D., Professor Emeritus
Robert D. Glauz, Ph.D., Professor Emeritus
Shirley A. Goldman, M.S., Lecturer Emerita
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Kurt Kreith, Ph.D., Professor Emeritus
Melven R. Krom, Ph.D., Professor Emeritus
Gary J. Kurowski, Ph.D., Professor Emeritus
David G. Mead, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Donald A. Norton, Ph.D., Professor Emeritus
Washek F. Pfeffer, Ph.D., Professor Emeritus
Sherman K. Stein, Litt.D. (hon.), Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Robert W. Stringall, Ph.D., Professor Emeritus
Takayuki Tamura, D.Sc., Professor Emeritus
Howard J. Weiner, Ph.D., Professor Emeritus

Affiliated Faculty

John R. Chuchel, Ph.D., Lecturer
Ali A. Dad-Del, Ph.D., Lecturer
Carole L. Hom, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Duane A. Kouba, Ph.D., Lecturer
Lawrence J. Marx, Ph.D., Lecturer
Josef Mattes, Ph.D., Visiting Research Assistant Professor
Ramin Naimi, Ph.D., Visiting Research Assistant Professor
Gregory S. Spradlin, Ph.D., Visiting Research Assistant Professor
Pol C. Vanhaecke, Ph.D., Visiting Research Assistant Professor

The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus, students plan an upper division program in consultation with a faculty adviser. This individualized program can lead to graduate study in pure or applied mathematics, to elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computer science, statistics, or applied mathematics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in addition to teaching. For instance, operations research, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 37-41
Mathematics 12 (or high school equivalent) 0-3
Mathematics 21A, 21B, 21C, 21D, 22A, 22B 22
Computer Science Engineering 30 or Engineering 5 3-4
Physics 9A 4
Additional non-Mathematics courses chosen from natural sciences 8

Depth Subject Matter 36
Mathematics 108 4
Mathematics 127A, 127B 8
Mathematics 149A, 149B; or 150A, 150B ...8
Choose one Track from the following two...16

Track 1: Secondary Teaching
Mathematics 115A 3
Mathematics 141 3
Additional upper division units 10
Recommended: Mathematics 115B, 115C, 116, 167, 168; Mathematics 131 and Statistics 131B or Statistics 131A-131B or Statistics 130A-130B; Computer Science Engineering 110, 122.

Track 2: General Mathematics
Additional upper division units 16

Total Units for the Major 73-77

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 30-41
Mathematics 12 (or high school equivalent) 0-3
Mathematics 21A, 21B, 21C, 21D, 22A, 22B 22
Computer Science Engineering 30 or Engineering 5 3-4
Physics 9A, 9B, 9C (Tracks 1 and 2 only) ..12
Physics 9A (Track 3 only) 4
Statistics 13, 32, or 102 (Track 4 only) 3-4

Depth Subject Matter 45
Mathematics 108 4
Mathematics 127A, 127B 8
Choose one Track from the following four 33

Track 1: Preparation for Graduate Study in Mathematics
Mathematics 127C 4
Mathematics 150A, 150B, 150C 12
One course from Mathematics 125, 126, 147 3
Additional upper division units 14
Recommended: Mathematics 118A, 118B, 119, 125, 126, 141, 147, 185A, 185B.

Track 2: Applied Mathematics
Mathematics 150A, 150B 8
Mathematics 167 3
Two courses from Mathematics 128A, 128B, 128C 8
Additional upper division units 14
Recommended: Mathematics 118A, 118B, 118C, 119, 145, 168, 185A, 185B, Statistics 131 or Mathematics 131A, Computer Science Engineering 110, 122, up to 8 units of courses outside of mathematics department related to area of interest.

Track 3: Mathematics for Secondary Teaching
Mathematics 115A 3
Mathematics 141 3
Mathematics 149A, 149B; or 150A, 150B ...8
Additional upper division units 19
Recommended: Mathematics 115B, 115C, 167, 168, Statistics 130A, 130B, or 131 and Statistics 131B or Statistics 131A, 131B, Computer Science Engineering 110, 122.

Track 4: General Mathematics
Mathematics 149A, 149B; or 150A, 150B ...8
Additional upper division units 25

Total Units for the Major 75-86

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Depth Subject Matter Requirements. Certain mathematically oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 36-unit or 45-unit requirements with prior departmental approval. For the 190-level courses, *(1)* a maximum of one unit of 190, 192, 197TC, 198, and 199 courses may be counted towards mathematics major requirements; *(2)* up to 3 units of Mathematics 194H may be counted towards mathematics major requirements. No combination of *(1)* and *(2)* are to be allowed.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year, each prospective mathematics major should choose, in consultation with an adviser, one of the tracks as suggested by the adviser, prepare a statement of his or her mathematics objectives, and have a proposed program satisfying the requirements of the chosen track. The form to be used for this statement is available from the Department, and must be submitted in time to receive final approval prior to the last day of instruction of the first quarter of the junior year. Prospective mathematics majors transferring to the University at the upper division level should consult an adviser immediately upon arrival.

Major Advisers. D.W. Barnette, J.R. Diederich, J. Gravner, C. Hom, E.O. Milton, M. Mulase, E.M. Silvia.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics should be obtained from a major adviser. In addition, students seeking information pertaining to the application of mathematics to the biological or social sciences or computer science may contact the appropriate special area adviser.

Students preparing for an A.B. degree for secondary teaching or general mathematics, or an B.S. degree for graduate study, biological sciences, physical sciences, secondary teaching, or general mathematics should consult an undergraduate adviser.

Qualifying Examination. Among the prerequisites for taking Mathematics 12, 16A, 21A, 21AH, 36, and 63 is a passing score on the Qualifying Examination, and, in the cases of all the above courses except Mathematics 12, a passing score on the examination's trigonometric component. This examination is to be taken on this campus. Students are responsible for finding out their scores, which are available within 72

*Course not offered this academic year.

hours of the examination, at the Learning Skills Center, and for retaining the printout of their scores. Students who do not pass the examination will be administratively dropped from the courses mentioned above. Dates and times when the examination is offered are posted at the Mathematics Department.

Prerequisite Credit. No student may repeat a course, if that course is a prerequisite for a course which has already been completed with a grade of C– or better.

Minor Program Requirements:

UNITS

Mathematics 20

Upper division units in mathematics (exclusive of Mathematics 192, 197TC, 198, 199) 20

Three of these units could be from Mathematics 36.

Teaching Credential Subject Representative. G.T. Sallee. See also under Teacher Education Program.

Graduate Study. The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

Courses in Mathematics (MAT)

Lower Division Courses

B. Elementary Algebra (no credit) I. The Staff
Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $45.)

C. Trigonometry (no credit) I, II. The Staff
Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $30.)

***D. Intermediate Algebra** (no credit) I, II.
The Staff
Lecture—3 hours. Basic concepts of algebra, designed to prepare the student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $15.)

12. Precalculus (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Qualifying Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses 16A, 16B, 16C, 21A, 21B, or 21C with a C– or better.

(Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses.)

16A. Short Calculus (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination and its trigonometric component. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have received credit for course 21A. GE credit: SciEng.

16B. Short Calculus (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 16A or 21A. Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have received credit for course 21B. GE credit: SciEng.

16C. Short Calculus (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have received credit for course 21C. GE credit: SciEng.

21A. Calculus (4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 12, and obtaining required score on Precalculus Qualifying Examination and its trigonometric component. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Only two units of credit will be allowed to students who have credit for course 16A. Not open for credit to students who have completed course 16B. GE credit: SciEng.

***21AH. Honors Calculus** (4) I. The Staff
Lecture/discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A. GE credit: SciEng.

21AL. Emerging Scholars Program Calculus Workshop (2) I. The Staff
Workshop—6 hours. Prerequisite: concurrent enrollment in course 21A. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials, L'Hopital's rule. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

21B. Calculus (4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed to students who have received credit for course 16B or 16C. GE credit: SciEng.

***21BH. Honors Calculus** (4) II. The Staff
Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21A or 21AH. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. GE credit: SciEng.

21BL. Emerging Scholars Program Calculus Workshop (2) II. The Staff
Workshop—6 hours. Prerequisite: course 21A or 21AH, concurrent enrollment in course 21B. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

21C. Calculus (4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 21B or 21BH. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems. GE credit: SciEng.

***21CH. Honors Calculus** (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21B or 21BH. More intensive treatment of material covered in course 21C. GE credit: SciEng.

21CL. Emerging Scholars Program Calculus Workshop (2) III. The Staff
Workshop—6 hours. Prerequisite: course 21B or 21BH, concurrent enrollment in course 21C. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

21D. Vector Analysis (4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 21C. Vector algebra, vector calculus, scalar and vector fields. Line and surface integrals. Green's theorem, Stokes' theorem, divergence theorem. (Former course 22C.)

***21M. Accelerated Calculus** (5) I. The Staff
Lecture/discussion—4 hours; discussion/laboratory—1 hour. Prerequisite: grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Qualifying Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed course 21A or 21B; only 3 units of credit will be allowed to students who have completed course 16A and only 2 units of credit will be allowed to students who have completed course 16B. GE credit: SciEng.

22A. Linear Algebra (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms.

22B. Differential Equations (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: courses 21C, 22A. Solutions of elementary differential equations.

***36. Fundamentals of Mathematics** (3) I.
The Staff
Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have received credit for course 108. Recommended for non-math majors. GE credit: SciEng.

***63. Ideas from Mathematics** (3) II. The Staff
Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. In-depth treatment of some mathematical ideas, selected from all branches of mathematics, and their applications. Concepts, techniques of rigorous proofs and problem solving are emphasized. Intended for students who want to think about some deeper aspects of mathematics. Not open for credit to students who have taken course 108. GE credit: SciEng.

71A-71B. Explorations in Elementary Mathematics (3-3) I-II. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. (Deferred grading only, pending completion of sequence.)

90. Elementary Problem Solving Seminar (1) I, II, III. Quastel
Seminar—1 hour. Prerequisite: high school mathematics. Students solve and present solutions to challenging and interesting problems in elementary mathematics at the board. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

108. Introduction to Abstract Mathematics (4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 21B or consent of instructor. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics arguments. GE credit: Wrt.

***114. The Theory of Convex Sets** (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 21C, 22A, 108; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in alternate years.

115A. The Theory of Numbers (3) I. The Staff
Lecture—3 hours. Prerequisite: course 108. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers.

***115B. The Theory of Numbers** (3) II. The Staff
Lecture—3 hours. Prerequisite: course 108. Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in alternate years.

***115C. The Theory of Numbers** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in alternate years.

***116. Metric Differential Geometry** (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 21D; or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in alternate years.

118A. Partial Differential Equations: Elementary Methods (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 22B, 21D. Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one-dimensional wave equation; solution of nonhomogeneous equations.

118B. Partial Differential Equations: Eigenfunction Expansions (3) II. The Staff
Lecture—3 hours. Prerequisite: course 118A. Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations.

118C. Partial Differential Equations: Green's Functions and Transforms (3) III. The Staff
Lecture—3 hours. Prerequisite: course 118B. Green's functions for one-dimensional problems and Poisson's equation; Fourier Transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations.

119A-119B. Ordinary Differential Equations and Dynamical Systems (3-3) II-III. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 22B. Scalar and Planar Autonomous Systems—nonlinear systems and linearization. Phase plane analysis. Classification of singular points. Scalar and Planar maps. Bifurcations and the implicit function theorem. Notions of stability and Liapunov's method. Periodic orbits and their bifurcations. Poincare Bendixon theory.

121A. Advanced Calculus for the Sciences (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 21D, 22A, 22B. Functions of a single real variable; power series, convergence, continuity, differentiation, integration, interchange of limiting procedures, Fourier series, integral transforms. Intended primarily for students majoring in science and engineering.

***121B. Advanced Calculus for the Sciences** (3) II. The Staff
Lecture—3 hours. Prerequisite: course 121A. Functions of several real variables; continuity, differentiation, implicit functions, integration, calculus of variations, vector analysis. Elementary single complex variable theory. Intended primarily for students majoring in science and engineering.

***125. Introduction to Mathematical Logic** (3) I. The Staff
Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in alternate years.

***126. Introduction to the Theory of Sets** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 127A or 150A. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in alternate years.

127A-127B-127C. Advanced Calculus (4-4-4) I, II-II, III-III, I. The Staff
Lecture/discussion—4 hours. Prerequisite: courses 21D, 22A, 108. Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

128A. Numerical Analysis (4) I. The Staff
Lecture—3 hours; term project. Prerequisite: course 21C; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Error analysis, approximation, interpolation, numerical differentiation and integration.

128B. Numerical Analysis in Solution of Equations (4) II. The Staff
Lecture—3 hours; term project. Prerequisite: courses 21C and 22A; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems.

128C. Numerical Analysis in Differential Equations (4) III. The Staff
Lecture—3 hours; term project. Prerequisite: courses 22A, 22B, and a knowledge of a programming language such as Pascal, FORTRAN or BASIC. Difference equations, operators, numerical solution of ordinary and partial differential equations.

131. Methods of Mathematical Probability (4) II. The Staff
Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics; discrete, continuous distributions; random variables; joint, marginal conditional densities; transformation; expectation; sums and moments; inequalities; laws of large numbers; central limit law; probability models via conditioning; tables. Students who have taken Statistics 131A may not receive credit for this course.

132A-132B. Introduction to Stochastic Processes (3-3) III-I. The Staff
Lecture—3 hours. Prerequisite: course 131 or Statistics 131A. Markov chains, Poisson process, birth and death processes, renewal theory, queueing theory, Brownian motion, stationary processes. Course 132B is offered in alternate years.

141. Euclidean Geometry (3) II. The Staff
Lecture—3 hours. Prerequisite: course 108. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries.

145. Combinatorial Mathematics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 108. Combinatorial methods using basic graph theory counting methods, generating functions, and recurrence relations.

147. Topology (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: courses 108, 127A. Basic notions of point-set and combinatorial topology. Offered in alternate years.

149A-149B. Topics in Discrete Mathematics (4) II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: courses 22A and 108. Coding theory and counting theory and the algebraic concepts needed in their development.

150A-150B-150C. Introduction to Abstract Algebra (4-4-4) I, II, III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 108. Basic concepts of groups, rings, and fields. Emphasizes the techniques used in the proofs of the ideas (Lemmas, Theorems, etc.) developing these concepts. Develops precise thinking, precise writing, and the ability to deal with abstraction.

***160. Mathematical Foundations of Database Theory, Design, and Performance** (3) I. Diederich
Lecture—3 hours. Prerequisite: course 108 and familiarity with one high-level computer language. The relational model; relational algebra; relational calculus; normal forms; functional and multivalued dependencies. Separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses: buffering; operating system contention; CPU intensive operations.

***164. Mathematical Foundations of Fifth Generation Computing** (3) II. Milton
Lecture—3 hours. Prerequisite: course 108 and a knowledge of a modern high-level computer language. Study of the uses of predicate and various logics in knowledge-based systems. Resolution and non-resolution deduction, forward and backward deduction systems, logic programming, symbolic integration, problem solving strategies, functions in search strategies, mathematical treatment of uncertainty in expert systems.

167. Linear Algebra and Applications (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 22A. Introduction to linear algebra: linear equations, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors. Applications to physics, engineering, economics, biology and statistics.

168. Mathematical Programming (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 21C, and 22A or 167; knowledge of a programming language. Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization.

180. Special Topics: Pure and Applied Mathematics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: course 22A and 22B, or consent of instructor. Special topics from various fields of pure and applied mathematics, such as: analysis, algebra, applied mathematics, geometry, topology, computer science, logic, history. May be repeated for credit when topic differs.

185A. Functions of a Complex Variable with Applications (3) II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 21D. Complex number systems, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

185B. Functions of a Complex Variable with Applications (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 185A or consent of instructor. Analytic functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. Offered in alternate years.

190. Advanced Problem Solving Seminar (1) I, II, III. Quastel
Seminar—1 hour. Prerequisite: two years of college mathematics. Students solve and present solutions to challenging and unusual problems at the board. The problems require a background in, at most, second-year university mathematics. May be repeated once for credit. (P/NP grading only.)

192. Internship in Applied Mathematics (1-3) I, II, III. The Staff (Chairperson in charge)
Internship; final report. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised work experience in applied mathematics. May be repeated for credit for a total of 10 units. (P/NP grading only.)

194. Undergraduate Thesis (3) I, II, III. The Staff
Prerequisite: consent of instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be

*Course not offered this academic year.

repeated with consent of Vice Chairperson. (P/NP grading only.)

197TC. Tutoring Mathematics in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours; laboratory—2-6 hours. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

201A-201B-201C. Analysis (4-4-4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 127 or 203C. Metric and topological spaces. Banach and Hilbert spaces. Completion. Compactness. Abstract measure space. Lebesgue measures and integrals. LP spaces. Distributions and the Fourier transform. Operators.

***202. Functional Analysis** (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 201A-201B-201C. The theory of Fredholm operators. Examples of Fredholm operators (singular integral operators, elliptic operators in Sobolev spaces). Index theory for Fredholm operators. Unbounded self-adjoint operators. Schrodinger operators and other differential operators. The spectral theorem for these and for unitary operators. Offered in alternate years.

203A-203B-203C. Modern Applied Analysis (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Classical mathematical foundations leading to modern analysis. Linear and metric spaces; Hilbert space; operator theory. Applications to integral and differential equations. Variational methods.

***204. Applied Asymptotic Analysis** (3) I. The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Asymptotic analysis and perturbation theory, with applications to optimization, differential equations, and scaling. Offered alternate years.

205. Complex Analysis (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Theory of holomorphic functions. Riemann mapping theorem and analytic continuation.

210A. Topics in Geometry (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced geometry related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

210AL. Topics in Geometry: Discussion (1) I. The Staff (Chairperson in charge)
Lecture/discussion—1 hour (to be arranged). Prerequisite: course 210A (concurrently); consent of instructor. Special topics related to course 210A which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

210B. Topics in Algebra (3) II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced algebra related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

210BL. Topics in Algebra: Discussion (1) II. The Staff (Chairperson in charge)
Lecture/discussion—1 hour (to be arranged). Prerequisite: course 210B (concurrently); consent of instructor. Special topics related to course 210B which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

210C. Topics in Analysis (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced analysis related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

210CL. Topics in Analysis: Discussion (1) III. The Staff (Chairperson in charge)
Lecture/discussion—1 hour (to be arranged). Prerequisite: course 210C (concurrently); consent of instructor. Special topics related to course 210C which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

***215A-215B-215C. Topology** (4-4-4) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point-set topology, homotopy theory, and homology theory. Offered in alternate years.

***218A-218B. Partial Differential Equations** (3-3) II-III. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 127C. Initial and boundary value problems for elliptic, parabolic and hyperbolic partial differential equations; existence, uniqueness and regularity for linear and nonlinear equations; maximum principles; weak solutions, Holder and Sobolev spaces, energy methods; Euler-Lagrange equations.

***219. Ordinary Differential Equations** (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: courses 22A, 22B, 127C. Existence and uniqueness theorems for ordinary differential equations; linear systems; Sturm-Liouville theory; nonlinear ordinary differential equations. Offered in alternate years.

221A-221B. Mathematical Fluid Dynamics (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: course 118B. Dynamics of fluid motion, perfect fluids, rotational and irrotational motion, two-dimensional and three-dimensional axisymmetric flows, compressible and incompressible viscous fluids. Offered in alternate years.

222. Introduction to Biofluid Dynamics (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: Population Biology 231/Ecology 231 and Neurobiology, Physiology and Behavior 245 or consent of instructor. The basic principles of fluid dynamics are introduced in the first half of the course by describing various phenomena studies from a biofluids perspective. The equations of fluid motion associated with these phenomena are derived and studies in the second half.

227. Scientific Computation Applied to Problems in Biology (4) I. The Staff
Lecture—4 hours. Prerequisite: graduate standing or consent of instructor. Numerical solution of differential equations is studied using programming environments such as Maple, Mathematica and Matlab. Emphasis on understanding why numerical algorithms work. Particular attention to the application of these algorithms to problems in biology.

***228A-228B-228C. Numerical Solution of Differential Equations** (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 128C. Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Offered in alternate years.

229A-229B. Numerical Methods in Linear Algebra (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Computational methods for the solution of linear algebraic equations and matrix eigenvalue problems. Analysis of direct and iterative methods. Special methods for sparse matrices. Offered in alternate years.

235A-235B-235C. Probability Theory (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 127C and Statistics 131A-131B or the equivalent. Measure theoretic foundations, abstract integrations, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Statistics 235A-235B-235C.)

***236A-236B. Stochastic Dynamics and Applications** (3-3) I-II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 201C or 235B. Stochastic processes including Gaussian, Markov and stationary processes. Diffusion, martingales, stochastic differential equations. Applications and advanced topics.

240A-240B-240C. Differential Geometry (3-3-3) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 116 or consent of instructor. Introduction to differentiable manifolds, the tangent bundle, tensor fields, differential forms. DeRham cohomology, connections, Lie groups, Riemannian geometry. Offered in alternate years.

250A-250B-250C. Algebra (4-4-4) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in Mathematics or consent of instructor. Theory of groups, rings, and fields.

258A. Optimization I (3) II. The Staff
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimality conditions, linear programming and unconstrained optimization (gradient, Newton, conjugate directions and minimax algorithms), convergence and rate of convergence, selected topics. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 258A.)

***258B. Optimization II** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, linearly and nonlinearly constrained optimization problems, projection, feasible directions and reduced gradient algorithms, interior point methods, Lagrangian theory, duality, augmented Lagrangians, sequential quadratic programming, selected topics. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 258B.)

***261A-261B. Lie Groups and Their Representations** (3-3) II-III. The Staff
Lecture—3 hours. Prerequisite: courses 215A, 240A, 250A-250B. Mathematical theory of Lie groups and Lie algebras, including the classification of semi-simple Lie groups. Representations of Lie groups, weights and characters, the Weil character formulas. Infinite-dimensional Lie groups, Kac-Moody algebras and the Virasoro algebra. Offered in alternate years.

280. Topics in Pure and Applied Mathematics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs.

290. Seminar (1-6) I, II, III. The Staff (Chairperson in charge)
Advanced study in various fields of mathematics, including the following: algebraic theory of semigroups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Professional Course

390. Methods of Teaching Mathematics (3) I, II, III. The Staff
Lecture—1 hour; discussion—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Practical experience in methods and problems of the teaching of mathematics at the university level. Includes discussion of lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and related topics. Required of departmental teaching assistants. May be repeated for credit. (S/U grading only.)

Medical Microbiology

See Medicine, School of

Medical Pharmacology and Toxicology

See Medicine, School of

Medicine

See Medicine (School of); and Medicine and Epidemiology (Veterinary Medicine)

Medicine, School of

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James J. Castles, M.D., Executive Associate Dean
Fitz-Roy Curry, Ph.D., Associate Dean
Lindy Kumagai, M.D., Assistant Dean
Ernest L. Lewis, M.D., Associate Dean
Frank J. Loge, M.B.A., Associate Dean
Brian O'Neill, M.D., Assistant Dean
Margaret S. Steward, Ph.D., Associate Dean
Donal A. Walsh, Ph.D., Associate Dean
Dean's Office, Medical Sciences 1C (916-752-0331)

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Jerry Powell, M.D., Professor *(Internal Medicine)*
Pamela T. Prescott, M.D., Assistant Professor *(Internal Medicine)*
Thomas P. Prindiville, M.D., Associate Professor *(Internal Medicine)*
George T. Rab, M.D., Professor *(Orthopaedic Surgery)*
Robert Rafal, M,D,. Professor *(Neurology)*
Arun Rangaswami, M.D., Assistant Professor *(Pediatrics)*
Bruce Reed, Ph.D., Assistant Adjunct Professor *(Neurology)*
Stanley B. Reich, M.D., Professor *(Radiology)*
Debra Reilly, M.D., Assistant Professor *(Surgery)*
John A. Reitan, M.D., Professor *(Anesthesiology)*
Michael P. Remler, M.D., Professor *(Neurology)*
Tressa Reynolds, M.D., Assistant Clinical Professor *(Internal Medicine)*
Gary Rhodes, Ph.D., Associate Adjunct Professor *(Pathology)*
John Richards, M.D., Assistant Professor *(Internal Medicine)*
Steven Richeimer, M.D., Assistant Professor *(Anesthesiology, Psychiatry)*
Carol Richman, M.D., Associate Professor *(Internal Medicine)*
David P. Richman, M.D., Professor *(Neurology)*
Jonathan Riegler, M.D., Assistant Professor *(Internal Medicine)*
Dick L. Robbins, M.D., Professor *(Internal Medicine)*
John A. Robbins, M.D., Professor *(Internal Medicine)*
Gary Roberts, M.D., Assistant Clinical Professor *(Internal Medicine)*
Lynn Robertson, Ph.D., Adjunct Professor *(Neurology)*
Juan J. Rodrigo, M.D., Professor *(Orthopaedic Surgery)*
Patrick Romano, M.D., Assistant Professor *(Internal Medicine)*
John Rose, M.D., Assistant Professor *(Internal Medicine)*
Carl J. Rosenquist, M.D., Professor *(Radiology)*
Frederick Royce, M.D., Assistant Professor *(Pediatrics)*
Christine Rozance, M.D., Assistant Professor *(Epidemiology and Preventive Medicine)*
Robert B. Rucker, Ph.D., Professor *(Biological Chemistry)*
Steven Rudich, M.D., Ph.D., Assistant Professor *(Surgery)*
Douglas Rudisill, M.D., Assistant Clinical Professor *(Internal Medicine)*
Michael Russell, M.D., Assistant Professor *(Anesthesiology)*
John Rutledge, M.D., Associate Professor *(Internal Medicine)*
Janice Ryu, M.D., Assistant Professor *(Radiation Oncology)*
Amira Safwat, M.B.B.C.A., Professor *(Anesthesiology)*
John Sakles, M.D., Assistant Professor *(Internal Medicine)*
Steven J. Samuels, Ph.D., Associate Adjunct Professor *(Epidemiology and Preventive Medicine, Obstetrics and Gynecology)*
Earl T. Sawai, Ph.D., Assistant Adjunct Professor *(Pathology)*
Saul Schaefer, M.D., Associate Professor *(Internal Medicine)*
Marc B. Schenker, M.D., Professor *(Epidemiology and Preventive Medicine)*
Barbara Schneeman, Ph.D., Professor *(Internal Medicine)*
Philop Schneider, M.D., Ph.D., Professor *(Surgery)*
Ivan Schwab, M.D., Professor *(Ophthalmology)*
Robert J. Scibienski, Ph.D., Associate Professor *(Medical Microbiology and Immunology)*
Sidney A. Scudder, M.D., Associate Professor *(Hematology, Oncology)*
Leigh Segel, Ph.D., Professor *(Surgery)*
James A. Seibert, Ph.D., Professor *(Radiology)*
Michael Seldin, M.D., Ph.D., Professor *(Biological Chemistry)*
Craig W. Senders, M.D., Associate Professor *(Otolaryngology)*
Mark Servis, M.D., Assistant Professor *(Psychiatry)*
Masud Seyal, M.B.B.S., Associate Professor *(Neurology)*
Neil Sharkey, Ph.D., Assistant Professor *(Orthopedic Surgery)*
David Shelton, M.D., Associate Professor *(Diagnostic Radiology)*
Claire Sherman, Ph.D., Assistant Adjunct Professor *(Epidemiology and Preventive Medicine)*
David Siegel, M.D., M.P.H., Professor *(Internal Medicine)*
Allan D. Siefkin, M.D., Professor *(Internal Medicine)*
Karen A. Sigvardt, Ph.D., Associate Adjunct Professor *(Neurology)*
Joseph Silva, M.D., Professor *(Internal Medicine)*
Rakesh Sindhi, M.D., Assistant Professor *(Surgery)*
Jeffrey Skilling, M.D., Assistant Professor *(Obstetrics and Gynecology)*
Robert Slater, M.D., Assistant Professor *(Orthopaedic Surgery)*
Brian Smith, M.D., Assistant Clinical Professor *(Anesthesiology)*
Lloyd Smith, M.D., Associate Professor *(Obstetrics and Gynecology)*
J. Stuart Soeldner, M.D., Professor *(Internal Medicine)*
Peter Sokolove, M.D., Assistant Professor *(Internal Medicine)*
Jay Solnick, M.D., Assiatnt Professor *(Internal Medicine)*
Robert C. Stadalnik, M.D., Professor *(Radiology)*
Larry G. Stark, Ph.D., Professor *(Pharmacology)*
Charles L. Stebbins, Ph.D., Associate Professor *(Internal Medicine, Human Physiology)*
Moni Stein, M.D., Assistant Professor *(Radiology)*
Judith Stern, Ph.D., Professor *(Internal Medicine)*
Robin Stern, Ph.D., Assistant Professor *(Radiation Oncology)*
Frazier Stevenson, M.D., Assistant Professor *(Internal Medicine)*
Thomas Stevenson, M.D., Professor *(Surgery)*
Dennis Stewart, Ph.D., Associate Adjunct Professor *(Obstetrics and Gynecology)*
Anthony R. Stone, M.D., Associate Professor *(Urology)*
Leslie Stuart, M.D., Assistant Clinical Professor *(Anesthesiology)*
Dennis Styne, M.D., Professor *(Pediatrics)*
Andrew Swanson, M.D., Assistant Clinical Professor *(Psychiatry)*
Amir Sweha, M.D., Assistant Clinical Professor *(Family and Community Medicine)*
Diane Swick, Ph.D., Assistant Adjunct Professor *(Neurology)*
Arthur Swislocki, M.D., Associate Professor *(Internal Medicine)*
Jonathan Sykes, M.D., Associate Professor *(Otolaryngology)*
Michael Syvanen, Ph.D., Professor *(Medical Microbiology and Immunology)*
Robert M. Szabo, M.D., Professor *(Orthopaedic Surgery)*
Jeffrey L. Tanji, M.D., Associate Professor *(Family and Community Medicine)*
Alice Tarantal, Ph.D., Assistant Adjunct Professor *(Pediatrics)*
Suzanne Teuber, M.D., Assistant Professor *(Internal Medicine)*

R. Steven Tharratt, Associate Professor *(Internal Medicine)*
Jerold H. Theis, D.V.M., Ph.D., Professor *(Medical Microbiology and Immunology)*
Charles Thirkill, Ph.D., Assistant Adjunct Professor *(Ophthalmology)*
William Tom, M.D., Assistant Clinical Professor *(Anesthesiology)*
Jose Torres, Ph.D., Assistant Professor *(Medical Microbiology and Immunology)*
Dena Towner, M.D., Assistant Professor *(Obstetrics and Gynecology)*
Frederic A. Troy II, Ph.D., Professor *(Biological Chemistry)*
Richard Tucker, Ph.D., Associate Professor *(Cell Biology and Human Anatomy)*
Judith L. Turgeon, Ph.D., Professor *(Human Physiology)*
Samuel Turnipseed, M.D., Assistant Clinical Professor *(Anesthesiology)*
Joseph Tuscano, M.D., Assistant Professor *(Internal Medicine)*
Maria Udekwu, M.B.B.S., Assistant Clinical Professor *(Anesthesiology)*
Viviane Ugalde, M.D., Assistant Professor *(Physical Medicine and Rehabilitation)*
Cheryl Vance, M.D., Assistant Clinical Professor *(Internal Medicine)*
Catherine Vandevoort, Ph.D., Assistant Adjunct Professor *(Obstetrics and Gynecology)*
Brent Van Hoozen, M.D., Assistant Professor *(Internal Medicine)*
David Vera, Ph.D., Associate Adjunct Professor *(Radiology)*
Zakauddin Vera, M.D., Professor *(Internal Medicine)*
Nazhiyath Vijayan, M.D., Clinical Professor *(Neurology)*
Amparo Villablanca, M.D., Assistant Professor *(Internal Medicine)*
Philip J. Vogt, M.D., Associate Clinical Professor *(Pathology)*
Franklin C. Wagner, M.D., Professor *(Neurological Surgery)*
Susan Walker, M.D., Assistant Professor *(Dermatology)*
Donal A. Walsh, Ph.D., Professor *(Biological Chemistry)*
Richard Walters, Ph.D., Professor *(Pathology)*
William Wara, M.D., Professor *(Radiation Oncology)*
Craig Warden Ph.D., Assistant Professor *(Pediatrics)*
Nancy Warden, M.D., Assistant Professor *(Pediatrics)*
David Weber, Ph.D., Professor *(Radiology)*
Robert Weiss, M.D., Assistant Professor *(Internal Medicine)*
Jeanna Welborn, M.D., Associate Professor *(Internal Medicine)*
Wanda M. Wenman, M.D., Professor *(Pediatrics)*
Daniel C. West, M.D., Assistant Professor *(Pediatrics)*
Thomas P. Whetzel, M.D., Assistant Professor *(Surgery)*
Charles Whitcomb, M.D., Assistant Clinical Professor *(Internal Medicine)*
David A. White, M.D., Associate Professor *(Anesthesiology)*
Richard H. White, M.D., Professor *(Internal Medicine)*
Jean Wiedeman, M.D., Ph.D., Assistant Professor *(Pediatrics)*
Richard Wilder, M.D., Assistant Professor *(Radiation Oncology)*
Lynn M. Wiley, Ph.D., Professor *(Cell Biology and Human Anatomy, Obstetrics and Gynecology)*
Hibbard E. Williams, M.D., Professor *(Internal Medicine)*
Sharon Wilson, M.D., Assistant Clinical Professor *(Internal Medicine)*
Mark Wineinger, M.D., Assistant Professor *(Physical Medicine and Rehabilitation)*
Garen Wintemute, M.D., Professor *(Epidemiology and Preventive Medicine)*
David H. Wisner, M.D., Professor *(Surgery)*
Erik Wisner, D.V.M., Assistant Professor *(Radiology)*
Hanspeter Witschi, M.D., Professor *(Internal Medicine)*
Bruce M. Wolfe, M.D., Professor *(Surgery)*
David L. Woods, Ph.D., Adjunct Professor *(Neurology)*
Reen Wu, Ph.D., Professor *(Internal Medicine)*
Theodore Wun, M.D., Assistant Professor *(Internal Medicine)*
Richard Yarvis, M.D., Clinical Professor *(Psychiatry)*
Jane Yeun, M.D., Assistant Professor *(Internal Medicine)*
Douglas Zatzick, M.D., Assistant Professor *(Psychiatry)*
Vincent Ziboh, Ph.D., Professor *(Dermatology, Biological Chemistry)*
Rebecca Zulim, M.D., Assistant Clinical Professor *(Surgery)*

Emeriti Faculty

Charles F. Abildgaard, M.D., Professor Emeritus
C. Robert Ashmore, Ph.D., Professor Emeritus
Neil C. Andrews, M.D., Professor Emeritus
Len H. Andrus,M.D., Professor Emeritus
Alexander Barry, Ph.D., Professor Emeritus
Charles J. Beauchamp, M.D., Ph.D., Professor Emeritus
William F. Benesek, Ph.D., Professor Emeritus
Eli Benjamini, Ph.D., Professor Emeritus
Edmund Bernauer, Ph.D., Professor Emeritus
Kay H. Blacker, M.D., Professor Emeritus
Robert J. Bolt, M.D., Professor Emeritus
George H. Cardinet III, D.V.M., Ph.D., Professor Emeritus
Marion A. Carnes, M.D., Professor Emeritus
Willard R. Centerwall, M.D., Professor Emeritus
Robert S. Chang, M.D., D.Sc., Professor Emeritus
Loring F. Chapman, Ph.D., Professor Emeritus
Gerald L. DeNardo, M.D., Professor Emeritus
Pierre M. Dreyfus, M.D., Professor Emeritus
John H. Eisele, M.D., Professor Emeritus
Allen C. Enders, Ph.D., Professor Emeritus
William M. Fowler, Jr., M.D., Professor Emeritus
Charles Frey, M.D., Professor Emeritus
Murray B. Gardner, M.D., Professor Emeritus
Michael C. Geokas, M.D., Ph.D., Professor Emeritus
Eli Gold, M.D., Professor Emeritus
Elliot Goldstein, M.D., Professor Emeritus
Edward C. Gomez, M.D., Ph.D., Professor Emeritus
Jerry F. Green Ph.D., Professor Emeritus
Paul F. Gulyassy, M.D., Professor Emeritus
Crystalenia C. Halsted, M.D., Professor Emeritus
Anthony J. Hance, Ph.D., Professor Emeritus
Frederick W. Hanson, M.D., Professor Emeritus
Paul G. Hattersley, M.D., Professor Emeritus
Glenn Hawkes, Ph.D., Professor Emeritus
Paul D. Hoeprich, M.D., Professor Emeritus
Robert L. Hunter, Ph.D., Professor Emeritus
Edward J. Hurley, M.D., Professor Emeritus
Gordon Jensen, M.D., Professor Emeritus
David Katz, Ph.D., Professor Emeritus
Eva K. Killam, Ph.D., Professor Emerita
Keith Killam, Ph.D., Professor Emeritus
Lindy F. Kumagai, M.D., Professor Emeritus
Jerry Lewis, M.D., Professor Emeritus
Alvin E. Lewis, M.D., Professor Emeritus
Glen A. Lillington, M.D., Professor Emeritus
Paul R. Lipscomb, M.D., Professor Emeritus
George H. Lowrey, M.D., Professor Emeritus
Malcolm R. MacKenzie, M.D., Professor Emeritus
Arnold Meadow, Ph.D., Professor Emeritus
Kenneth R. Niswander, M.D., Professor Emeritus
Lois F. O'Grady, M.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Ronan O'Rahilly, M.D., Professor Emeritus
Richard H. Oi, M.D., Professor Emeritus
Philip E.S. Palmer, M.D., F.R.C.P., Professor Emeritus
Lawrence Rabinowitz, Ph.D., Professor Emeritus
Eugene M. Renkin, Ph.D., Professor Emeritus
Alan Roth, M.D., Professor Emeritus
Boris Ruebner, M.D., Professor Emeritus
Ethelda N. Sassenrath, Ph.D., Professor Emerita
Robert Scobey, M.D., Professor Emeritus
Robert E. Smith, Ph.D., Professor Emeritus
Elizabeth M. Smithwick, M.D., Professor Emeritus
Margaret S, Steward, Ph.D., Professor Emeritus
Robert E. Stowell, M.D., Ph.D., Professor Emeritus
Raymond L. Teplitz, M.D., Professor Emeritus
Henry Tesluk, M.D., Professor Emeritus
W. E. Toreson, M.D., Ph.D., Professor Emeritus
Duane E. Townsend, M.D., Professor Emeritus
Robert R. Traut, Ph.D., Professor Emeritus
John D. Trelford, M.D., Professor Emeritus
Walter Trudeau, M.D., Professor Emeritus
Makepeace Tsao, Ph.D., Professor Emeritus
Joe P. Tupin, M.D., Professor Emeritus
C. John Tupper, M.D., Professor Emeritus
Worden Waring, Ph.D., Professor Emeritus
Edward J. Watson-Williams, M.D., Professor Emeritus
Sefton R. Wellings, M.D., Ph.D., Professor Emeritus
Richard P. Wennberg, M.D., Professor Emeritus
Theodore C. West, Ph.D., Professor Emeritus
Lowell D. Wilson, M.D., Professor Emeritus
Wallace Winters, M.D., Ph.D., Professor Emeritus
Earl F. Wolfman, Jr., M.D., Professor Emeritus
Hiroshi Yamauchi, M.D., Professor Emeritus
Julian R. Youmans, M.D., Ph.D., Professor Emeritus

Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also the School of Medicine chapter of this catalog.

Courses in the School of Medicine

Curriculum for the School of Medicine

The curriculum for the M.D. degree at the UC Davis School of Medicine is a four-year program to provide comprehensive training for the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research. While the first two years emphasize the basic science basis of medicine, the student is exposed even from the onset to questions of patient management, thus providing a natural transition from the entry pregraduate training into the clinical training of the final two years.

The first-year program is for three quarters, beginning in the fall. The basic sciences (anatomy, physiology, biochemistry, histology, endocrinology, neurosciences, immunology, general pathology) are blended with social sciences (the behavioral aspects of medicine), and students are introduced to the art of communicating with patients, and emergency medicine.

The second-year program is for four quarters, but with the Summer Quarter abbreviated to six weeks. The Summer Quarter provides a transition between basic and clinical sciences with the presentation of systematic pathology, and courses on the integumentary system and reproductive system. In the remaining three quarters, the students complete their training in basic sciences (pharmacology, microbiology) and are then, from an organ system approach, presented the pathophysiological basis of disease (endocrine, hematopoietic/lymphoreticular, gastrointestinal, nutrition, musculoskeletal, neuromuscular, respiratory, nephrology). During the second year, students continue training in physical diagnosis and are presented with issues in community health, occupational medicine, psychopathology, and human sexuality.

The third-year program is comprised of required clerkship rotations in the clinical specialties: eight weeks each of surgery, medicine, obstetrics/gynecology, pediatrics, primary care plus (four weeks family practice, two weeks each orthopaedics and urology) and psychiatry. Either obstetrics/gynecology or psychiatry may be deferred until the fourth year.

The fourth year features built-in flexibility to allow students to begin to individualize their medical careers. All students are required to take two weeks of physical medicine and rehabilitation, two weeks of neurology, two weeks of opthalmology, two weeks of otolaryngology, four weeks of emergency care and 18 weeks of clinical selectives. A two-week course on responsibilities of medical practice (medical ethics, jurisprudence and medical economics) is also required. The fourth-year curriculum also provides 12 weeks of undesignated time.

To satisfy the M.D. degree program, the student must successfully complete the required course work and clerkships. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute required courses with electives of equal credit. In addition to the fourth-year elective program available, there is some opportunity for selecting electives during the first two years, in particular during the interim period between the first and second years.

Coordination with other Advanced Degree Programs

The curriculum for the M.D. degree provides flexibility and encourages coordination with other advanced degree programs (Ph.D., M.S., M.A., M.B.A., and M.P.H.). These programs offer a wide breadth of study areas and draw upon the considerable expertise of the entire campus faculty. In addition, the UC Berkeley School of Public Health offers an M.P.H. program in conjunction with the M.D. program.

School of Medicine administrators enthusiastically support students interested in pursuing advanced degree programs. The dual-degree program for the M.D./Ph.D. is targeted to train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care. Students are encouraged to seek degrees in any of the campuswide Ph.D. programs, including those in social sciences and humanities. The UC Davis School of Medicine awards two competitive fellowships each year to students enrolled in the M.D./Ph.D. program.

The Sierra Health Foundations MD/MBA Fellows Program attracts academically outstanding students who are committed to a career in health care leadership and who desire to remain in Northern California. Selected students will embark upon a six-year course that will result in a degree in Medicine from the UC Davis School of Medicine and an M.B.A. in Health Services Management from the UC Davis Graduate School of Management. Students receive funding for tuition and fees for the full six years of the program.

Required Curriculum for the M.D. Degree

The following listing is the typical sequencing of all courses required for earning the M.D. degree. Course descriptions are given under the individual departmental course offerings.

First-Year Required Courses

UNITS

Quarter I: Fall
Biological Chemistry 410A, Molecular and Cell Biology 4.5
Family Practice 400A, Introduction to Patient Evaluation....2
Cell Biology and Human Anatomy 400, Developmental, Gross and Radiologic Anatomy 9
Psychiatry 401, Medicine and the Mind....2

Quarter II: Winter
Biological Chemistry 410B, Cell Biology and Metabolism....3.5
Cell Biology and Human Anatomy 402, Human Microscopic Anatomy....5
Human Physiology 400, Human Physiology...8
Family Practice 400B, Introduction to Patient Evaluation....2

Quarter III: Spring
Biological Chemistry/Human Physiology 418, Mammalian Endocrinology and Homeostasis....4.5
Cell Biology and Human Anatomy/Human Physiology 403, Neurobiology 5
Medical Microbiology 480A, Medical Immunology 2.5
Pathology 410A, General Systemic Pathology 4.5
Family Practice 400C, Introduction to Patient Evaluation....2

Second-Year Required Courses

Quarter IV: Summer
Pathology 410B, General Systemic Pathology 7.5
Obstetrics and Gynecology, Human Reproduction 2
Dermatology 420, Integumentary System...2
Internal Medicine 400A, Physical Diagnosis1

Quarter V: Fall
Medical Microbiology 480B, Pathogenic Microbiology....6.5
Internal Medicine 420A, Hematopoietic and Lymphoreticular System....5
Orthopaedic Surgery 420, Musculoskeletal System 2.5
Medical Pharmacology and Toxicology 400A, Principles of Pharmacology A....2.5
Community and International Health/Internal Medicine 421, Principles of Epidemiology, Occupational Medicine and Geriatrics2.5
Internal Medicine 400B, Physical Diagnosis3

Quarter VI: Winter
Medical Pharmacology and Toxicology 400B, Principles of Pharmacology B....6
Internal Medicine 420C, Respiratory System 4
Internal Medicine 420D, Cardiovascular System 3.5
Neurology 420, Clinical Neurosciences 4
Psychiatry 403, Psychopathology 3.5
Psychiatry 402, Human Sexuality....1
Internal Medicine 400C, Physical Diagnosis 3

Quarter VII: Spring
Internal Medicine 420F, Metabolic–Regulatory System 3.5
Internal Medicine 420B, Gastrointestinal System 3.5
Internal Medicine/Biological Chemistry 419, Basic and Clinical Nutrition 2
Internal Medicine 420E, Nephrology....4

Third and Fourth Year Required Courses

Third Year Clerkships
Internal Medicine 430, Medicine Clerkship....8 weeks
Surgery 430, Surgery Clerkship....8 weeks
Pediatrics 430, Pediatrics Clerkship ....8 weeks
Family Practice 430, Primary Care Plus Clerkship....8 weeks

Third or Fourth Year Clerkships
Obstetrics and Gynecology 430, Obstetrics and Gynecology Clerkship....8 weeks
Psychiatry 430, Psychiatry Clerkship....8 weeks

Fourth Year Requirements
Physical Medicine and Rehabilitation 440, Physical Medicine and Rehabilitation Clerkship....2 weeks
Medical Sciences 440, Responsibilities of Medical Practice....2 weeks
Neurology Clerkship....2-4 weeks
Ophtalmology....2 weeks
Otolaryngology....2 weeks
Emergency Care ....4 weeks
Clinical Selectives ....18 weeks
Clinical selectives are chosen by the student in consultation with, and with approval of, the Fourth Year Oversight Committee. Of the 18 weeks of selective time, at least eight weeks must be in medicine, four weeks in surgery, and four weeks in an ambulatory setting. The ambulatory requirement can be met concurrently while taking medicine or surgery. Clinical selectives may be taken at an approved away site.

The fourth year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.)

Medical Sciences (MDS)

Undergraduate Course

192. Medical Education Internship for Advanced Undergraduates (1-12) I, II, III, summer. Walsh
Internship—3-36 hours. Prerequisite: competency with computers. Enrollment dependent on availability of intern positions. Participate in projects related to curriculum development in support of curriculum for M.D. degree. Gain work experience and appreciation for innovative approaches to learning in basic and clinical sciences of medical education. May be repeated for credit for up to 12 units. (P/ NP grading only.)

Professional Courses

401. Applications of Computers to Medical Practice (2) I, II, III, IV. Huntley
Autotutorial—2 hours. Prerequisite: enrollment in medical school. Proficiency in computer applications relative to practice of medicine, with emphasis on e-mail, literature searching, file transfer, and hospital information services. Course given online, at home or in lab; time and place determined by student. (S/U grading only.)

440. Responsibilities of Medical Practice (3) II. Loewy and staff
Lecture/discussion—60 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address nonbiological components of the patient-physician relationship (medical ethics, medical jurisprudence, medical economics, alcoholism and drug abuse, etc.) and critically explore social, ethical and cultural issues arising in medical practice. (S/U grading only.)

450. Introduction to UCD Medical Center (1) III. The Staff
Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (S/U grading only.)

480. Insights in Clinical Research (1) II. Walsh
Lecture—1 hour. Prerequisite: medical students in good standing. Clinical research presented by School of Medicine faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (S/U grading only.)

489. Directed Studies (9) I, II, III, IV. Lewis
Independent study—40 hours weekly. Prerequisite: individual directed studies in extended preparation for USMLE Part I, and/or as required by Promotion Board. Independent studies to review material from Years I and II in the curriculum in preparation for taking USMLE Part I in the fall, and for remediation course work directed by the Promotion Board. Students are expected to spend 8 to 12 hours per day on these studies. Faculty consultation and tutoring available on individual basis. May be repeated for credit. (S/U grading only.)

495. Medicine Literature Review (1-9) I, II, III, IV. Walsh
Discussion—3-27 hours. Prerequisite: medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study: topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (S/U grading only.)

499. Research in Medical Education and Curriculum Development (4-9) I, II, III, IV. Walsh
Independent study—10-36 hours. Prerequisite: medical student in good standing and competency with computers. Research and development of an independent project related to expanding computer-assisted resources in support of the M.D. curriculum at UC Davis. (S/U grading only.)

Departmental Courses:

Anesthesiology (ANE)

Upper Division Course

192. Internship in Anesthesiology (1-6) I, II, III, IV. The Staff
Internship—3 to 18 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesia and related fields. (P/NP grading only.)

*Course not offered this academic year.

Professional Courses

460. Anesthesiology Clinical Clerkship (3-18) I, II, III, IV. (Hotz in charge)
Full-time clinical activity (3 full days per unit). Prerequisite: third- and fourth-year medical students. Provides experience in total anesthetic management including application of physiologic and pharmacologic principles to preoperative, operative and postoperative management of patients. Considers choice and management of general and regional anesthesia techniques, resuscitation, artificial ventilation, inhalation and fluid-electrolyte therapy and pain problems. Students electing portions of the course for credit must receive consent of instructor. Limited enrollment.

462. Airway and Mechanical Ventilation (3) I, II. Hotz
Clinical activity—full time. Prerequisite: third- and fourth-year medical students. Introduces medical students to endotracheal intubation and airway management. Includes pharmacology of drugs used and basic principles of anesthesiology.

463. Medical and Surgical Pain Management (2) I, II, III, IV. Richeimer
Clinical activity—20 hours; lecture/discussion—1 hour. Prerequisite: medical students in good standing, with consent of instructor. Round mornings with Acute Pain Service (5 half days/week for 2 weeks.) Rounds are interactive and instructional for understanding acute pain and treatment regimes. Chronic Pain Clinic follows, to observe a wider range of pain conditions and management strategies. (S/U grading only.)

498. Individual or Group Study (1-5) I, II, III, IV. Richeimer and staff
Discussion—1-5 hours; laboratory—2-10 hours. Prerequisite: interns and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

499. Anesthesiology Research (4-18) I, II, III, IV. Gronert and staff
Laboratory—12-54 hours. Prerequisite: third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and/or laboratory research. (S/U grading only for medical students.)

Biological Chemistry (BCM)

Lower Division Course

92. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff
Internship—3-36 hours; final report. Prerequisite: consent of instructor. Supervised work experience in biological chemistry and related fields. (P/NP grading only.)

Upper Division Courses

***131. Introduction to Magnetic Resonance in Biology** (2) III. Jue
Lecture—2 hours. Prerequisite: Chemistry 8B or 118B or 128B. Fundamental concepts in magnetic resonance and their application to protein structure determination. Theoretical and experimental methods. Two-dimensional NMR techniques. Offered in alternate years.

192. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (P/NP grading only.)

198. Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. For undergraduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

209. Prostaglandins/Leukotrienes and Related Lipids (2) II. Ziboh (Dermatology)
Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B. Oxidative desaturation/elongation of poyunsaturated fatty acids. Biosynthesis of prostaglandins/leukotrienes from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiological implications; pharmacological and clinical relevance. Offered in alternate years.

214. Molecular Medicine (1) II. Seldin
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance. (S/U grading only.) (Same course as 414.)

***217. Molecular Genetics of Fungi** (3) II. Holland
Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; Botany 119; Plant Pathology 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. Offered in alternate years. (Same course as Plant Pathology 217.)

222. Mechanisms of Translational Control (2) II. Hershey
Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 201C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eucaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Offered in alternate years.

230. Practical NMR Spectroscopy and Imaging (1) I. The Staff
Lecture—1 hour. Prerequisite: Chemistry 107A-107B, Physics 5A-5B-5C or 9A-9B-9C, or consent of instructor. Basic theory, experimental methods, and instrumentation of NMR. Enables students to understand NMR spectroscopy and imaging experiments. (S/U grading only.)

***231. Biological Nuclear Magnetic Resonance** (3) III. Jue
Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. Offered in alternate years. (Same course as Biophysics 231.)

298. Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

410A. Molecular and Cell Biology (4.5) I. Matthews, Holland
Lecture—5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic biochemistry of proteins and nucleic acids is presented, followed by molecular genetics, regulation of gene expression, enzymes and structural proteins. Applications to clinically relevant systems are emphasized, particularly sickle cell anemia, thalassemias, immunoglobulins and monoclonal antibodies, oncogenes, cell proliferation control.

410B. Cell Biology and Metabolism (3.5) II. Jue
Lecture—4 hours (for 9 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to transport of small molecules and ions across membranes is followed by study of energy metabolism and biosynthetic processes in humans. Membrane receptors are considered as they relate to basic metabolic processes. Correlations to human disease are made throughout.

414. Molecular Medicine (1) II. Seldin
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance, and are intended to be of interest to medical students. (S/U grading only.) (Same course as 214.)

418. Mammalian Endocrinology and Homeostasis (4.5) III. Walsh and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system at both the cellular and systemic level. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Human Physiology 418.)

419. Introduction to Clinical Nutrition (3) III. Phinney (Internal Medicine, Clinical Nutrition and Metabolism), Rucker, and staff
Lecture—5 hours; lecture/discussion—1.5 hours; laboratory/discussion—0.5 hour (for 4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. A 28-hour course that integrates basic and clinical concepts of human nutrition. The course emphasizes nutrient homeostasis and regulation and current perspectives on the role of nutrition in disease. Format is partly lectures, partly discussion/case study. (Same course as Internal Medicine 419.)

497T. Tutoring in Biological Chemistry (1-5) I, II, III, IV. The Staff
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.)

498. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical students with consent of instructor. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical students with consent of instructor. (S/U grading only.)

Cell Biology and Human Anatomy (CHA)

Upper Division Courses

101. Human Gross Anatomy (4) II. Gross
Lecture—4 hours. Prerequisite: Biological Sciences 1B; concurrent enrollment in course 101L strongly recommended. A detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. GE credit: SciEng.

101L. Human Gross Anatomy (3) II. Gross
Laboratory—6 hours; lecture/discussion—3 hours. Prerequisite: course 101 (may be taken concurrently). A detailed study of prosected human cadavers in small group format with extensive hands-on experience. GE credit with concurrent enrollment in 101: Wrt.

192. Internship in Morphology (1-12) I, II, III, IV. The Staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (P/NP grading only.)

197T. Tutoring in Cell Biology and Human Anatomy (1-5) II. The Staff
Discussion—1 hour; laboratory—6-9 hours. Prerequisite: completion of course 101 with a grade of B or better and consent of instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (S/U grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Discussion—1-10 hours. Prerequisite: consent of instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Gross Anatomy (8) I. Tucker
Lecture—3.5 hours; discussion—1 hour; laboratory—10.5 hours. Prerequisite: graduate student and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structural relationships through dissection and lecture and to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

202. Human Microscopic Anatomy (5) II. Meizel
Lecture—3 hours; laboratory—6 hours. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of sectioned material at the light microscopic and ultrastructural levels.

203. Neurobiology (6) III. Kumari
Lecture—5 hours; laboratory—3 hours. Prerequisite: consent of instructor. Gross and microscopic anatomy of the central nervous system; motor and sensory pathways; neurophysiology, and cognitive functions.

250. Biology of Neuroglia (2) III. Kumari
Lecture/discussion—1.5 hours. Prerequisite: consent of instructor. The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response. Offered in alternate years. (Same course as Neuroscience 250.) (S/U grading only.)

290. Seminar (1) I, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

290C. Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate student with research experience (may be taken concurrently); consent of instructor. Discussion of problems, progress and literature relevant to current research undertaken by laboratory groups in Human Anatomy. (S/U grading only.)

292. Fertilization and Gamete Literature Critique (1) I, II, III. Meizel
Discussion—1 hour. Prerequisite: consent of instructor. Critical evaluation of current journal articles dealing with cell biology and biochemistry of gametes and fertilization. Selected papers will be presented and discussed in detail by students and faculty. May be repeated for credit. (S/U grading only.)

298. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400. Developmental, Gross, and Radiologic Anatomy (9) I. Tucker and staff
Lecture—6 hours; laboratory—12 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Integrated presentation of developmental, gross, and radiologic anatomy. Four students are assigned to a cadaver and dissect the entire body. Embryology and radiology are correlated with the dissections. Embryology is covered from implantation to birth.

402. Human Microscopic Anatomy (5) II. Meizel and staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of section material at the light microscopic and ultrastructural levels.

403. Neurobiology (5) III. Kumari and staff
Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Physiology 403.)

497T. Tutoring in Human Anatomy (1-5) I, II, III, IV. The Staff
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (S/U grading only.)

498. Advanced Group Study (1-12) I, II, III, IV. The Staff
Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Clinical Psychology (CPS)

Graduate Course

299. Research (1-12) I, II, III, IV. Morrison
Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (S/U grading only.)

Dermatology (DER)

Upper Division Courses

192. Internship in Cutaneous Biology (1-4) I, II, III, IV. Isseroff
Internship—8-20 hours; final report. Prerequisite: upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. (P/NP grading only.)

199. Special Study in Cutaneous Biology (1-4) I, II, III, IV. The Staff (Isseroff in charge)
Prerequisite: advanced undergraduate standing and/or consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (P/NP grading only.)

Graduate Course

299. Research in Cutaneous Biology (1-12) I, II, III, IV. The Staff (Isseroff in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.)

Professional Courses

420. Integumentary System (2) IV. Huntley and staff
Lecture/discussion—4 hours (for 6 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Covers cell biology, pathology, and physical diagnosis of the skin and is designed to prepare medical students for clinical service. Recognition of normal variations, and common or important dermatoses is emphasized. Patient demonstrations of select conditions are included.

460. Dermatology Clinical Clerkship (6) I, II, III, IV. Lynch
Clinical activity (inpatient/outpatient service)—40 hours for four weeks. Prerequisite: completion of three years of medical school; or consent of instructor. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UCD Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

480. Insights in Dermatology (1-3) I, II, III, IV. Huntley
Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (S/U grading only.)

498. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (Lynch in charge)
Independent study—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (S/U grading only.)

499. Research in Cutaneous Biology (1-12) I, II, III, IV. The Staff (Isseroff in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (S/U grading only.)

Epidemiology and Preventive Medicine (EPP)

(Formerly courses in Community and International Health)

Lower Division Course

92. Internship in Community Health (1-12) I, II, III, IV. The Staff
Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.)

Upper Division Courses

101. Perspectives in Community Health (3) III. Schenker and staff
Lecture—3 hours. Prerequisite: undergraduate standing. Covers comprehensively the responsibilities, obligations, roles and professional activities of various health care disciplines in the community; provides students with perspectives on preventive medicine in society.

160. Health Education (1-5) I, II, III, IV. The Staff (Student Health Center)
Lecture—1-3 hours; laboratory—3-15 hours. Prerequisite: consent of instructor. Preparation for field work in the area of health education. Planning and presentation of programs on health issues. Peer counseling in the areas of sexuality and alcohol/drug abuse. (P/NP grading only.)

180. Aging and Health (3) III. Gilmer
Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. Emphasis on nature and determinants of health in the elderly. Current social and personal strategies for enhancing and maintaining health in old age.

190C. Research Conference in Community and International Health (1) I. Gold; II. Beaumont; III. Haan
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress, and techniques in Community and International Health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.)

192. Internship in Community Health Practice (1-12) I, II, III, IV. The Staff
Internship—3-36 hours. Prerequisite: upper division and graduate students; consent of instructor. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.)

198. Study in Community and International Health (1-5) I, II, III, IV. The Staff
Prerequisite: undergraduate standing and consent of instructor. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.)

199. Research in Community and International Health (1-5) I, II, III, IV. The Staff
Prerequisite: undergraduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.)

Graduate Courses

298. Study in Community and International Health (1-5) I, II, III, IV. The Staff
Prerequisite: graduate student in good academic standing and consent of instructor. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.)

299. Research in Community and International Health (1-12) I, II, III, IV. The Staff
Prerequisite: graduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only for graduate students.)

Professional Courses

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. McCurdy
Lecture—7.5 hours for 4 weeks; discussion—1.5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals of epidemiology and epidemiologic study design, including measures of morbidity, mortality, and risk. Occupational medicine component covers the evaluation of occupational illness, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system.

455. Multidisciplinary Clinical Preceptorship (4.5) IV. The Staff
Clinical activity—full time (3 weeks). Prerequisite: second-year student in good academic standing. Students will be introduced to basic principals of geriatric health care and provided with opportunities for clinical observation and experience in a variety of facilities that serve older adults. Multidisciplinary nature of geriatrics will be emphasized. (S/U grading only.)

460. Geriatrics in Community Health (6-12) I, II, III, IV. Rozance/Gilmer
Discussion—4 hours; clinical activity—full time (4-8 weeks); clinical setting and community needs assessment. Prerequisite: fourth-year medical student. Opportunity to participate in state-of-the-art geriatric programs ranging from well elderly to severely infirm.

461. Clerkship in Community Health Group Practice (3-9) I, II, III, IV. Gilmer
Clinical activity—full time (2-6 weeks). Prerequisite: third- or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (S/U grading only.)

465. Community Health Preceptorship (3-18) I, II, III, IV. The Staff
Clinical activity—full time (2-12 weeks). Prerequisite: fourth-year medical student. Students participate at the California Department of Health Services in ongoing investigations into current public health problems, e.g., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer's disease, and smoking and tobacco use control.

466. Occupational and Environmental Medicine Elective (6-12) I, II, III, IV. Schenker
Clinical and laboratory experience—full time (4 to 8 weeks). Prerequisite: fourth-year medical student and consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Also participate in Ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center. (S/U grading only.)

470. Clinical Selective in Occupational and Environmental Medicine (3) I, II, III, IV. McCurdy and staff
Clinical activity—full time. Prerequisite: fourth-year medical students in good academic standing, with consent of instructor. Outpatient clinical experience in Occupational and Environmental Medicine at UCDMC and in local industries. Participants will gain experience in evaluating occupational and environmental medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles.

480. Insights in Occupational and Environmental Medicine (1-3) I, II, III, IV. Schenker
Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. Students will observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Students develop and present small individual research projects. (Former course Occupational and Environmental Health 480.) (S/U grading only.)

481. Senior Partnership (1-3) I, II, III, IV. Gilmer
Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student or consent of instructor. Introduction to concepts of geriatric health care. Students are matched with elderly patients from the community for a project on health and aging; field experiences in clinical geriatrics; attendance at SOM lectures concerning geriatrics or the elderly patient. (Former course 480.) (S/U grading only.)

495. International Health Care (1) I. Schenker
Lecture/discussion—1 hour. Prerequisite: medical student in good academic standing. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (S/U grading only.)

498. Study in Community and International Health (1-5) I, II, III, IV. The Staff
Prerequisite: medical student in good academic standing and consent of instructor. Study and experience for medical students in any number of areas in community and international health. (S/U grading only.)

499. Research in Community and International Health (1-9) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only.)

Family and Community Medicine (FAP)

(Formerly Family Practice.)

Lower Division Course

92C. Primary Care Clinics (2) I, II, III, IV. Arevalo, Day
Clinical activity—6-8 hours; seminar—2 hours; lecture—1-2 hours. Prerequisite: consent of instructor, enrollment at the UC Davis campus, for freshman and sophomore students. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience exposes lower division students to health care delivery, patient histories, physical examinations, health promotion, disease prevention, diagnosis; treatment of episodic, acute, chronic illness; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)

Upper Division Courses

192A. Internship in Family Practice (1-12) I, II, III, IV. The Staff
Internship—3–36 hours. Prerequisite: upper division standing and consent of instructor. Work experience supervised in the Department of Family Practice. Upper division students provided an opportunity to acquire research experience in a clinical laboratory setting. (P/NP grading only.)

192C. Primary Care Clinics (2) I, II, III, IV. Arevalo, Day
Clinical activity—6-8 hours; seminar—2 hours; lecture—1-2 hours. Prerequisite: consent of instructor, enrollment at the UC Davis campus, upper division standing. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience introduces students to health care delivery; patient histories and physical examinations; health promotions and disease prevention; diagnosis and treatment of episodic, acute, and chronic illness; basic laboratory testing; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)

195. Health Care to Underserved Populations (1) II. Nesbitt
Lecture—1 hour. Prerequisite: sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinician's perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. (P/NP grading only.)

Graduate Courses

240A-240B-240C-240D-240E-240F. Clinical Preceptorship (1-13) I, II, III, IV. Hess, De Amicis
Clinical activity—9-36 hours. Prerequisite: enrollment in the Master's Track of the FNP Certificate Program, and successful completion of each preceding 240A-F section. Diagnosis and treatment of patients of all ages in an ambulatory care setting, under the supervision of a preceptor. May be repeated twice for credit. (P/NP grading only.)

242A-242B-242C. Clinical Role Seminar (1-1-1) I, II, III. Hess, De Amicis, Leveque
Seminar—1 hour. Prerequisite: enrollment in course 240 and in the Master's Track of the FNP Certificate Program. Course accompanies course 240 and provides a small group forum for students to explore role development and clinical management issues based on nursing theories and research. (P/NP grading only.)

252A. Nurse Practitioner Role Development (1) III. Collins
Seminar—1 hour. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Provides opportunity to discover strategies for promoting role development and role satisfaction via discussions of pertinent issues, theory and research.

252B. Nurse Practitioner as Leader (1) III. Mikal-Flynn
Seminar—1 hour. Prerequisite: course 252A and enrollment in the Master's Track of the FNP Certificate Program. Critical analysis of theories, issues, and research related to nurse practitioner role development in primary care. Emphasis on leadership and entrepreneurial aspects of practice development, maintenance, and evaluation.

264. Psychosocial Concepts and Issues in Primary Care (2) II. Collins
Lecture/discussion—2 hours. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track

of the FNP Certificate Program. Introduces the principles of effective communication in establishing the therapeutic provider-patient relationship. Provides an examination of relevant psychosocial concepts and issues related to primary care. Research and theory are emphasized.

266A. Health Maintenance/Promotion (2) I. De Amicis
Lecture—2 hours. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Focuses on the health and wellness of individuals throughout the lifespan. Critical analyses of nursing interventions in health promotion and maintenance based on nursing and other theoretical frameworks and research data are emphasized.

266B. Family Nursing Theory (2) II. Mentink
Lecture—2 hours. Prerequisite: course 266A and enrollment in the Master's Track of the FNP Certificate Program. Exploration of family theories as related to advanced primary care nursing practice.

266C. Family Nursing Interventions (2) III. Mikal-Flynn
Lecture—2 hours. Prerequisite: course 266B and enrollment in the Master's Track of the FNP Certificate Program. Course integrates family theoretical and therapeutic concepts to focus on nursing assessment and intervention strategies for family problems in health and illness.

266D. Community Assessment and Intervention (1) II. Trolinger
Lecture—1 hour. Prerequisite: enrollment in the Master's Track of the FNP Certificate Program. The relationship between advanced primary care nursing practice and community is explored. Community assessment and intervention strategies appropriate for the family nurse practitioner are discussed. May be repeated twice for credit.

Professional Courses

The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant (FNP/PA) Program.

340A-340B-340C-340D. Clinical Preceptorship for FNP/PA Students (1-18) I-II-III-IV. Hasselbach, White
Clinical activity—3-40 hours. Prerequisite: registered student in FNP/PA Program. Student spends 3-40 hours per week with an approved physician preceptor in patient care developing clinical skills necessary to assess and manage patients with common medical problems seen in primary care and long-term care facilities. May be repeated twice for credit.

341A-341B-341C-341D. Advanced Clinical Preceptorship for FNP/PA Students (1-18) I-II-III-IV. Hasselbach, Tully, White
Clinical activity—3-40 hours. Prerequisite: registered student in FNP/PA Program, and course 340A-340B-340C. Student spends 3 to 40 hours per week in an approved clinical setting to build on clinical skills in primary care learned in course 340A-340B-340C. Assessment and management of patients with complex and multiple problems. May be repeated twice for credit. (P/NP grading only.)

343. Inpatient Clinical Experience for FNP/PA Students (5) I, III, III, IV. Trolinger/Morris
Clinical activity—15 hours. Prerequisite: registered student in the FNP/PA Program, successful completion of course 340A-340B-340C, and consent of instructor. Student clerkships in the inpatient setting in Family Practice, Surgery, and Medical/Surgical subspecialty electives at UCDMC and/or affiliated institutions. Exposes students to inpatient management and acquaints students with FNP/PA role in the inpatient setting. May be repeated for credit. (P/NP grading only; Deferred grading only, pending completion of sequence.)

346. Clinical Geriatrics (3) I-II-III-IV. Trolinger/Stewart
Clinical activity—90 hours. Prerequisite: registered student in the FNP/PA program and successful completion of course 340A-340B-340C and 354A-354B-354C and 365A-365B-365C or consent of instructor. Application of principles of geriatric care in the outpatient, nursing home, acute hospitals and community settings that provide services for the elderly, including visits to patients' homes. (P/NP grading only; Deferred grading only, pending completion of sequence.)

350. Ethics and Trends in Health Care for FNP/PA Students (2) III. Collins, Hasselbach
Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Trends and ethical issues in health care, review of the process and policies for ethical decisionmaking in patient care. These issues, trends, and processes will be related to the role of the Family Nurse Practitioner/Physician Assistant.

352A-352B. Professional Development of the Physician Assistant (1-1) II. Hasselbach, Tully
Lecture/discussion—1 hour. Prerequisite: registered student in the Physician Assistant Program. Study of the role of the physician assistant and its historical evolution, and of the organizational responsibilities and legal considerations.

353. Geriatric Medicine for FNP/PA Students (1) II. Trolinger/Silveria
Lecture—1 hour. Prerequisite: registered student in the FNP/PA Program. Introduction to advanced concepts in geriatric medicine. Comprehensive assessment, decision making, and management of selected medical problems encountered in primary care. Appropriate consultation and referral are discussed. May be repeated twice for credit.

354A-354B-354C. Fundamentals of Primary Health Care for FNP/PA Students (4-5-4) I-II-III. Mikal-Flynn, Embler, Hasselbach, Collins, Stewart
Lecture/discussion—4-5 hours. Prerequisite: registered student in FNP/PA Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary health care. May be repeated for credit.

355A-355B-355C-355D. Advanced Principles of Health Care for FNP/PA Students (4-4-4-4) I-II-III. Collins, Morris, Mikal-Flynn, Embler, DeAmicis
Lecture/discussion—4 hours. Prerequisite: registered student in the FNP/PA Program; course 354A-354B-354C. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings. May be repeated for credit.

358A. Pharmacology (1) I, II, III, IV. Embler, Hasselbach
Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Core knowledge in clinical pharmacology and therapeutics; facts that are necessary to make rational and optimal therapeutic plans in an ambulatory, primary care setting. May be repeated twice for credit.

358B. Pharmacology (1) I, II, III, IV. Embler, Hasselbach
Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Core knowledge in clinical pharmacology and therapeutics; facts that are necessary to make rational and optimal therapeutic plans in an ambulatory, primary care setting. May be repeated twice for credit.

358C. Pharmacology (2) I, II, III, IV. Embler, Hasselbach
Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Pharmacologic considerations and treatments for various diseases including, but not limited to, the following: Cardiac, Hematology, mood disorders, substance abuse, movement disorders, HIV, TB, drug interactions, toxicology, and sleep disorders. May be repeated twice for credit.

361. Family Theory and Assessment (1) II. Trolinger, Stewart
Lecture—1 hour. Prerequisite: registered student in the FNP/PA Program. Examines the family using a family system framework within the context of its internal dynamics, relationship to community and cultural variations. May be repeated twice for credit.

362A-362B. Professional Development of the Nurse Practitioner (1-1) II. Mikal-Flynn, Tully, Hasselbach
Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program. Study of the role of the nurse practitioner and its historical evolution, and of the organizational responsibilities and legal consideration.

367A. Family Practice and Community Health for FNP/PA Students (2) I. Trolinger/Stewart
Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Examines pediatric and adolescent concepts of growth and development as related to primary health care. Primary health care issues and needs will be assessed in relationship to family and community. Health promotion and disease concepts. May be repeated twice for credit.

367B. Family Practice and Community Health for FNP/PA Students (1) III. Trolinger/Stewart
Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Examines concepts of adult growth and development as related to primary health care. Issues and needs of the adult are examined in relationship to family and community, health promotion, disease prevention and wellness concepts. May be repeated twice for credit.

367C. Family Practice and Community Health for FNP/PA Students (1) I. Trolinger/Stewart
Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Examines concepts of development in the elderly as related to primary health care. Health care issues and unique needs are presented with an emphasis on health promotion and disease prevention. May be repeated twice for credit.

368A. Behavioral Science for FNP/PA Students (2) I. Tully/Stewart
Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Principles of effective communication in therapeutic provider-patient relationship. Students will develop history-taking techniques that foster empathy and respect. Biopsychosocial model of health care discussed; lecture corresponds to small group application. May be repeated twice for credit.

368B. Behavioral Science for FNP/PA Students (2) I. Tully/Stewart
Lecture—2 hours. Prerequisite: registered student in the FNP/PA Program. Multicultural perspective to educating patients about healthy lifestyle choices and changing addictive behaviors. Compliance barriers are explored. Encourages students to learn about traditional health beliefs and healing practices of several California cultures. May be repeated twice for credit.

368C. Behavioral Science for FNP/PA Students (2) I, II, III, IV. Tully, Stewart
Lecture—2 hours. Prerequisite: registered student in the FNP/PA Program. Basic principles of crisis assessment and management for the treatment of patients of all age groups in the primary care setting who have experienced interpersonal violence, abuse or common mental health problems (such as anxiety, depression and panic disorder). May be repeated twice for credit.

368D. Behavioral Science for FNP/PA Students (1) I, II, III, IV. Tully, Stewart
Lecture—1 hours. Prerequisite: registered student in the FNP/PA Program. Basic principles of assessment, counseling and treatment of individual patients, their families and support systems as they experience the effects of chronic illnesses, chronic pain, terminal diseases, death and grieving, Students are strongly encouraged to explore their coping styles. May be repeated twice for credit.

399. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. Davidson
Prerequisite: consent of instructor. Flexibility to develop and pursue research and clinical interests to enhance education in Family Practice. (P/NP grading only.)

Professional Courses

400A-400B-400C. Introduction to Patient Evaluation (2-2-2) I, II, III. Callahan, Day, Morgan
Lecture/discussion—18 hours total; clinical activity—6 hours total; conference or laboratory—4-8 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Using a problem-based format and simulated patients each student will practice dealing with communication problems and learn basic physical examination skills through small group interactions. A continuity preceptorship and introduction to emergency medicine will also be offered. (Deferred grading only, pending completion of sequence.)

401. Preceptorship in Family Practice (1-9) I, II, III, IV. Morgan
Preceptorship—part time (one 4-hour day per week; 10 weeks) or full-time (40-hour week per 1.5 units; 4 to 6 weeks). Prerequisite: medical students with consent of instructor. Student preceptorship in family physician's office as an introduction to clinical medicine.

402. Introductory Medical Spanish (2) II, III. Meizel
Lecture/discussion—2 hours. Prerequisite: restricted to medical students in good standing. Teaches the vocabulary needed to conduct a basic history and physical examination in Spanish. (S/U grading only.) (Deferred grading only, pending completion of sequence.)

407. Davis Community Clinic (2) I, II, III, IV. Tanji
Clinical activity—5-6 hours. Prerequisite: second-year medical student in good academic standing. Students learn to diagnose and treat common medical problems as seen at a community clinic, under the direct supervision of a physician. (S/U grading only.)

430. Primary Care Plus Clerkship (12) I, II, III, IV. Morgan
Clinical activity—45 hours; lecture/discussion—2 hours; workshop—2 hours. Prerequisite: completion of first-year and second-year curriculum for the M.D. degree. A required eight-week primary care clerkship for third-year medical students. The clerkship will be a four-week primary care experience with an additional four weeks in Ophthalmology, Otolaryngology, Orthopaedics and Urology clinics (each providing a primary care focus).

433. Primary Care Plus Continuum Clerkship (6) I, II, III, IV. Morgan
Clinical activity—45 hours (4 weeks). Prerequisite: completion of all required course work of the first-year and second-year medical curriculum. Four week experience in primary care or in Ophthalmology, Otolaryngology, Orthopaedics and Urology clinics (each providing a primary care focus).

434. Primary Care Clinics (1-12) I, II, III, IV. Arevalo, Day
Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Prerequisite: open to medical students in all four years of medical school. Medical students will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (S/U grading only.)

434A-434B-434C-434D-434E-434F-434G-434H. Primary Care at Clinica Tepati (3-3-3-3-3-3-3-3) I-II-III-IV-I-II-III-IV. Arevalo
Clinical activity—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions. Prerequisite: first- and second-year (full-time) medical students with consent of instructor; pre-application processed. Exposure to episodic and acute disease; learn physical examination and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (S/U grading only.)

445. Sports Medicine from a Primary Care Perspective (6) I, II, III, IV. Tanji
Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing. Students spend full time in outpatient clinic settings in family practice, orthopaedic surgery, physical education, internal medicine, and a community private practice. Students learn principles and practice of sports medicine from a primary care perspective.

462. Family Practice Preceptorship (3-18) I, II, III, IV. Morgan
Clinical activity—full time. Prerequisite: completion of third year of medical school or medical student with consent of instructor. Preceptorships with primary care physicians in a variety of settings. Involvement in direct patient care and daily activities under supervision of physician-preceptor.

463. Selected Readings in Family Practice (1-9) I, II, III, IV. The Staff
Discussion—3-27 hours. Prerequisite: medical student in good academic standing. Increase understanding of family practice through assigned reading and thorough discussion with faculty member.

468. Family Practice in a Foreign Culture (6-18) I, II, III, IV. Davidson
Clinical activity. Prerequisite: completion of third year in medical school. Visit a family practitioner in a foreign country (arranged in advance by Department), accompany and participate in clinic activities of preceptor and analyze and report characteristics of the practice.

469. Family Practice Clerkship (3-18) I, II, III, IV. Morgan
Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor (third-year students may elect to enroll for second half of spring quarter). Involvement in comprehensive primary medical care of patients in a family setting and observe the team approach to health care.

480. Insights in Family Practice (1-3) I, II, III, IV. The Staff
Clinical activity—3 to 9 hours; required readings. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to family practice in outpatient clinical setting. Three to nine hours per week spent with a community physician preceptor who is a member of the clinical faculty. (S/U grading only.)

498. Directed Group Study in Family Practice (1-9) I, II, III, IV. The Staff
Discussion—3-37 hours. Prerequisite: medical students with consent of instructor. Directed study on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected innovative health care programs. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (S/U grading only.)

Human Physiology (HPH)

Upper Division Courses

192. Internship in Human Physiology (1-12) I, II, III, IV. The Staff (Curry in charge)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Curry in charge)
To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Curry in charge)
Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.)

Graduate Courses

200. Human Physiology (6) II. Curry, Carlsen, and staff
Lecture—48 hours total; discussion—12 hours total. Prerequisite: graduate standing and consent of instructor. General cellular and organ system physiology, including neural, cardiovascular, respiratory, gastrointestinal and urinary systems in the human. Lectures concurrent with course 400; research/discussion and laboratory/demonstration sessions, and examinations separate.

***210. Advanced General Physiology** (3) III. Curry, Cala
Lecture—3 hours. Prerequisite: Physiology 100B; Biochemistry 101B; Chemistry 107B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue level. Offered in alternate years.

***231. Renal Physiology** (3) I. Rabinowitz
Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of biological transport, fluid and electrolyte homeostasis, comparative renal physiology, and pathophysiology of the kidney in humans. Offered in alternate years.

***250. Circulatory Transport and Fluid Exchange** (3) I. Curry and staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112, 113 and 114, or courses 400, 403 and 418, or the equivalent; or consent of instructor. Lectures, assigned reading and discussion of principles of microcirculatory exchange; blood, interstitial fluid and lymph dynamics; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in alternate years.

***285. Peripheral Circulation** (3) III. Gray/O'Donnell
Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 111A, 113; or course 200 and consent of instructor. Lectures and critical analysis of papers on peripheral vascular function, including: structure/function and pressure/flow relationships, innervation, receptor pharmacology, endothelial and smooth muscle interactions, signal transduction, ion transport, permeability, paracrine mediators and disease mechanisms. Offered in alternate years.

298. Group Study (1-5) I, II, III, IV. The Staff (Curry in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12) I, II, III, IV. The Staff (Curry in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400. Human Physiology (8) II. Carlsen, O'Donnell and staff
Lecture—6 hours; laboratory—6 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. General, cellular and systemic physiology of cardiovascular, respiratory, gastrointestinal and urinary systems.

403. Neurobiology (5) III. Vijayan, Carlsen, Watson
Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Cell Biology and Human Anatomy 403.)

418. Mammalian Endocrinology and Homeostasis (4.5) III. Turgeon and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Princi-

ples that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

497T. Tutoring in Human Physiology (1-5) I, II, III, IV. Curry
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.)

498. Directed Reading and Group Study (1-4) I, II, III, IV. Curry and staff
Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (S/U grading only.)

499. Research (1-6) I, II, III, IV. Curry and staff
Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.)

Internal Medicine (IMD)

Lower Division Courses

92. Internship (1-4) I, II, III, IV. Last
Internship—3-12 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship in internal medicine and related fields. (P/NP grading only.)

98. Directed Group Study (1-2) I, II, III, IV. Last
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)

99. Undergraduate Research in Medicine: Molecular and Cell Biology (1-3) I, II, III, IV. Last
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

192. Internship in Internal Medicine (1-12) I, II, III, IV. The Staff
Internship—3-36 hours; final report. Prerequisite: upper division standing. Supervised work experience in internal medicine and related fields. (P/NP grading only.)

194. Practicum in Community Health Clinics (1-3) I, II, III, IV. Kumagai
Clinical activity—5-15 hours on Saturday mornings and during the week as necessary, excluding holidays. Prerequisite: consent of instructor. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of the organization, administration, and problem-solving capabilities of these primary care facilities. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-2) I, II, III, IV. Last
Seminar—1-2 hours. Prerequisite: consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Professional Courses

401A-401B-401C. Physical Diagnosis Practicum (1-3-3) IV-1-II. Bonekat
Fieldwork—2 hours; lecture/discussion—1 hour; practice—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides second-year students with an overall framework for performance of a history and physical exam and with identification of abnormal physical findings. (Deferred grading only, pending completion of sequence.)

419. Introduction to Clinical Nutrition (3) III. Halsted, Rucker and staff
Lecture—5 hours; lecture/discussion—1.5 hours; laboratory/discussion—0.5 hours (for 4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. A 28-hour course that integrates basic and clinical concepts of human nutrition. The course emphasizes nutrient homeostasis and regulation and current perspectives on the role of nutrition in disease. Format is partly lectures, partly discussion/case study. (Same course as Biological Chemistry 419.)

420A. Hematology (4) I. Powell
Lecture—4 hours (for five weeks); laboratory—6 hours; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Topics include normal hematopoiesis and basic disorders of blood cells, transfusion therapy, immunoglobulin disorders, and hemostasis. Laboratory exercises cover normal and abnormal blood cells and the interpretation of common laboratory tests and are staffed by clinical hematologists.

420B. Gastrointestinal System (3.5) III. Lee
Lecture/discussion—36 hours (over a 4-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgements can be developed. Emphasis on pathophysiologic basis of gastroenterological and hepatic disorders, with case discussions and symposia presented to exemplify basic principles.

420C. Respiratory System (4) II. Louie
Lecture—38 hours; discussion—10 hours (48 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Lectures, demonstrations and small group case discussions of respiratory pathophysiology. Includes review of certain clinical aspects of respiratory anatomy, physiology and pathology; introduction to diagnostic procedures; and description of the major respiratory diseases.

420D. Cardiovascular System (3.5) II. Laslett and staff
Lecture—28 hours; discussion—8 hours (36 hours total). Prerequisite: medical student and approval by Committee on Student Evaluation and Promotion; or graduate student and Animal Physiology 113, Human Physiology 200, or the equivalent, and consent of instructor. Introduction to principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system, including ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. Lectures and small group discussions are employed.

420E. Nephrology (2.5) III. Kaysen
Lecture—4 hours; laboratory—2 hours (over a 6-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamental aspects of *(a)* disorders of body water, electrolytes and acid/base balance; *(b)* major categories and mechanisms of parenchymal renal diseases; *(c)* urinary tract infections.

420F. Metabolic Regulatory System (3.5) III. Soeldner
Lecture—4 hours; discussion—2 hours (over 8-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic understanding of pathophysiological processes in organs and tissues primarily involved in metabolic regulation and sufficient factual base so that clinical and laboratory findings, diagnosis, and elementary management of patients with endocrinological disorders can be rationalized.

430. Medicine Clerkship (12) I, II, III, IV. Lawrence
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Clerkship is divided into two four-week blocks, one each at UCDMC and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. Ongoing patient write-ups, rounds, conferences are required.

433. Internal Medicine Continuum Clerkship (6) I, II, III, IV. Lawrence
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first- and second-year medical curriculum. Four-week internal medicine clerkship at either UCDMC or Kaiser Hospitals. Direct patient care situations under the guidance of faculty. Ongoing patient write-ups, rounds, conferences are required.

440. Ambulatory Medicine Clerkship (3-12) I, II, III, IV. Desmul
Clinical activity—full time (2 to 8 weeks). Fourth-year medicine clerkship. Two- to eight-week ambulatory medicine experience in an internal medicine setting. Students learn to evaluate and treat patients with common ambulatory medical problems in an urban acute-care setting. This will occur within the "fast track" area of the UCDMC Emergency Department.

459. Oncology: Research and Treatment of Cancer (2) I. DeGregorio
Lecture/discussion—2 hours. Prerequisite: second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treatment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer. Emphasis on epidemiology, molecular biology, and pharmacology. (S/U grading only.)

460. Correctional Health Care Clerkship (1-4) I, II, III, IV. Silva, Shepard
Clinical activity—full time. Prerequisite: fourth-year medical student in good academic standing. Covers Correctional Health delivery and the effects of detention and incarceration on health status. Special emphasis on problems unique to health care delivery in a prison setting. Student will spend time in clinical settings at three prison facilities.

461. Problems in Internal Medicine (6 or 9) I, II, III, IV. Laughlin
Clinical activity—full time (4 or 6 weeks). Prerequisite: satisfactory completion of third year of medical school; consent of instructor. Study of inpatients hospitalized on Medical Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, mornings with instructor, Monday through Friday; afternoons patient assignments. Teaching conferences and combined radiology-pathology medicine seminars. Weekly allied specialty conference.

462. Externship in Medicine (1-21) I, II, III, IV. Fitzgerald and staff
Externship—full time (4, 8, or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Student assumes role of acting intern and will be primary physician on medical ward under direction of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth night. Limited enrollment.

463. Acting Internship in Medicine Intensive Care Unit (MICU) (9) I, II, III, IV. Albertson
Clinical activity—full time. Prerequisite: completion of third year in medical school; consent of Director of MICU. At UCDMC, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every third night. Limited enrollment.

494. Practicum in Community Health Clinics (1-3) I, II, III. Kumagai
Clinical activity—5-40 hours. Prerequisite: medical student with consent of instructor. Students are assigned to clinical settings that demonstrate ethnic, urban/rural, or other related aspects of clinical community health. Through active participation in health care delivery, students are able to relate conceptual with practical aspects of primary health care. May be repeated for credit.

498. Group Study in Internal Medicine (1-18) I, II, III, IV. The Staff (Silva in charge)
Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDMC or off campus by specific arrangement. (S/U grading only.)

Internal Medicine—Cardiology (CAR)

Upper Division Courses

192. Internship in Cardiology (1-12) I, II, III, IV. Longhurst and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by pre-

ceptor prior to internship. Supervised work experience in cardiology. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Cardiology Research (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Special study by individual arrangement in cardiovascular medicine. Work will include directed readings, laboratory and discussions. (P/NP grading only.)

Graduate Course

***220. Basic Science in Cardiology** (1) III. Kaufman
Lecture—1 hour. Prerequisite: graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. Offered in alternate years. (S/U grading only.)

Professional Courses

401. Clinical Cardiology Clerkship: Kaiser (3-18) I, II, III, IV. The Staff
Clinical activity (4 weeks)—8-12 hours (hospital); 1-5 hours (clinics). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. The roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. Limited enrollment.

460. Cardiology Clinical Clerkship (3-18) I, II, III, IV. The Staff
Clinical activity—full time (2-12 weeks). Prerequisite: Internal Medicine 430, third- and fourth-year medical students in good academic standing with consent of instructor. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. Two outpatient clinics per week. May be repeated for credit. Limited enrollment.

461. Management of Coronary Artery Disease: Coronary Care Unit (3-18) I, II, III, IV. The Staff
Clinical activity (inpatient service)—full time (4 weeks). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. Includes acute coronary care, hemodynamic monitoring, stress testing, cardiac catheterization, pathologic correlations and the modern approach to therapy, both medical and surgical, based on pathophysiologic mechanisms. May be repeated for credit. Limited enrollment.

464. Preventive Cardiology (3-6) I, II, III, IV. Amsterdam
Seminar—2 hours (for 2-4 weeks); clinical activity—full time (2-4 weeks). Prerequisite: completion of third year of medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease. Will be carried out in Lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services.

480. Insights in Cardiology (1-3) I, II, III, IV. The Staff
Clinical activity—3-9 hours. Prerequisite: medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia. Introduction to the diagnosis/treatment of common cardiovascular problems. (S/U grading only.)

498. Special Group Study: EKG Unit (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Special study—2-week sessions. Prerequisite: medical students with advance approval by monthly attending faculty. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. Limited enrollment. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: approval by Division of Cardiology. (S/U grading only.)

Internal Medicine—Clinical Nutrition and Metabolism (NCM)

Upper Division Course

192. Internship in Clinical Nutrition (1-12) I, II, III, IV. Halsted and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

290C. Clinical Nutrition Research Conference (1) I, II, III. Halsted, Davis
Seminar—1 hour. Weekly seminar presented by a graduate student, taking the form of research completed or in progress, topic review or journal review from current journal. (S/U grading only.)

Professional Courses

461. Nutrition Clinical Clerkship (3-18) I, II, III, IV. Halsted and staff
Lecture—2 hours; clinical activity—full time (2 to 12 weeks). In-depth experience in assessment and monitoring of nutritional support of adult patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of patients attending the Nutrition Clinic with problems in under-nutrition due to various illnesses.

480. Insights in Clinical Nutrition (1-3) I, II, III, IV. Halsted and staff
Clinical activity—3-9 hours. Prerequisite: student in good standing; consent of instructor. Student will attend weekly clinical nutrition consult rounds (four evenings) and/or Nutrition Clinic (one day). Introduction to diagnosis and treatment of common nutritional problems. (S/U grading only.)

499. Research in Nutrition (9-18) I, II, III, IV. Halsted, Davis
Prerequisite: medical student in good standing; consent of instructor. Participation in ongoing clinical or basic nutrition research. Student may devise own project depending upon time commitments.

Internal Medicine—Emergency Medicine (EMR)

Upper Division Course

192. Internship in Emergency Medicine (1-12) I, II, III, IV. Sakles and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in emergency medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses

401. Preceptorship in Emergency Medicine (1-4) I, II, III, IV. Sakles
Clinical activity—6 hours; tutorial—2 hours. Prerequisite: consent of instructor. Exposure to the specialty of Emergency Medicine and observation of a wide array of patients in the Emergency Department. A literature review of an Emergency Medicine topic of interest to the student must be performed and discussed. (S/U grading only.)

430. Introduction to Medical Toxicology (3) I, II, III, IV. Horowitz
Independent study—24 hours; lecture/discussion—4 hours; fieldwork—12 hours. Prerequisite: fourth-year medical student with consent of instructor. Student will become familiar with the resources available to manage exposure and poison cases. Hands-on training in the use of Poisindex® computer database. Additional readings from medical literature required.

440. Emergency Medicine Required Clerkship (6) I, II, III, IV. Sakles
Clinical activity—46 hours; lecture/discussion—8 hours. Prerequisite: satisfactory completion of Medicine, Surgery, and Pediatric Clerkship. Student will see patients primarily in the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis will be on the recognition and management of acute life threats, as well as the treatment of common medical and surgical conditions.

450. Ambulatory Medicine Clerkship (3-12) I, II, III, IV. Sakles
Clinical activity—2-8 weeks. Prerequisite: Medicine and Surgery clerkships. Ambulatory care experience in the "fast track" area of the Emergency Department. Exposure to patients with minor illnesses and injuries. Emphasis on wound management and treatment of orthopedic injuries.

465. Acting Internship in Emergency Medicine (6) I, II, II, IV. Sakles
Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: satisfactory completion of Medicine, Surgery, Pediatric and Emergency Medicine Clerkship. The student will function as an Acting Intern and treat a wide variety of patients and problems under the supervision of the Emergency Medicine Attending.

499. Research (2-18) I, II, III, IV. Kuppermann
Laboratory—full time (1 to 12 weeks). Prerequisite: consent of instructor. Elective where topics may be selected in either basic or clinical research areas of Emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor. (S/U grading only.)

Internal Medicine—Endocrinology and Metabolism (ENM)

Upper Division Course

192. Internship in Endocrinology (1-12) I, II, III, IV. Prescott and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff (Prescott in charge)
Prerequisite: consent of instructor. Endocrinology research. (S/U grading only.)

Professional Courses

460. Endocrinology Clinical Clerkship (3-18) I, II, III, IV. Prescott and staff
Clinical activity (inpatient-outpatient service)—full time (3 days per unit). Prerequisite: Internal Medicine 430 and/or consent of instructor. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Limited enrollment.

480. Insights in Endocrinology (1-3) I, II, III, IV. Prescott and staff
Clinical activity—3-9 hours; oral presentation. Prerequisite: student in good academic standing and consent of instructor. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (S/U grading only).

499. Research (1-12) I, II, III, IV. The Staff (Prescott in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Internal Medicine—Gastroenterology (GAS)

Upper Division Course

192. Internship in Gastroenterology (1-12) I, II, III, IV. Leung and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

299. Research (1-12) I, II, III, IV. Pimstone
Research in gastroenterology. (S/U grading only.)

Professional Courses

460. Clinical Clerkship (3-18) I, II, III, IV. Leung and staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of third year of medical school. Work-up, manage, and follow-up new patients on active inpatient consulting service. Gastroenterology/Hepatology patients. Daily rounds with attending physician.

480. Insights in Gastroenterology (1-3) I, II, III, IV. Leung, Hsu
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. To gain insight in clinical activities of Gastroenterology Division through attendance at any of the following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (S/U grading only.)

499. Research (1-12) I, II, III, IV. Leung, Pimstone, Prindiville, Lee, Hsu. Lam
Clinical activity—varied. Prerequisite: medical student status; consent of instructor. Part-time participation in active clinical and basic research projects. Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. May be repeated for credit. (S/U grading only.)

Internal Medicine—General Medicine (GMD)

Upper Division Course

192. Internship in General Medicine (1-12) I, II, III, IV. J. Robbins and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses

460. General Medicine Consults (1-18) I, II, III, IV. The Staff (Division Chief in charge)
Clinical activity (inpatient-outpatient service)—40 hours. Prerequisite: fourth-year medical students with consent of instructor; a general medicine clerkship. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. Limited enrollment.

480. Insights in General Medicine (1-3) I, II, III, IV. Robbins
Clinical activity—one to nine 4-hour sessions; rounds—one to nine 2- to 4-hour sessions. Prerequisite: student in good academic standing and consent of instructor. Student will observe work-up, diagnostic evaluation and management of common general internal medicine problems in ambulatory and inpatient settings; be supevised by attending physician while attending General Medicine Clinic and/or Consult Rounds; and make brief presentations to consult service. (S/U grading only.)

499. General Medicine Research (1-18) I, II, III, IV. The Staff
Discussion—3 hours; clinical research—8-40 hours. Prerequisite: consent of instructor. Student will be involved in a clinical research problem within the areas, interest and expertise of members of Division of General Internal Medicine. Alternatively, the research effort will be directed toward investigation of a clinical problem of general medical interest. May be repeated for credit.

Internal Medicine—Hematology-Oncology (HON)

Upper Division Course

199. Research in Hematology–Oncology (1-5) I, II, III, IV. Powell and staff
Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

Graduate Courses

298. Topics in Hematology (1-4) I, II, III, IV. Meyers and staff
Prerequisite: one year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students.

299. Research (1-12) I, II, III, IV. Meyers and staff
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

Professional Courses

460. Hematology–Oncology Acting Internship (6-18) I, II, III, IV. Meyers and staff
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic standing. Acting intern on inpatient hematology/oncology ward service. May be repeated for credit. Limited enrollment.

461. Hematology–Oncology Consult Clerkship (6-12) I, II, III, IV. Meyers and staff
Clinical activity—full time (4-8 weeks). Prerequisite: fourth-year medical student in good academic standing. Student is an integral member of the inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division. May be repeated for credit. Limited enrollment.

462. Hematology–Oncology Ambulatory Clerkship (6-18) I, II, III, IV. Meyers and staff
Clinical activity (inpatient/outpatient service)—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations in related clinics. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of the patient with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment.

490. Practicum in Care for the Terminally Ill (3-6) I, II, III, IV. Meyers and staff
Clinical activity—full time (2-4 weeks); three 4-hour seminars included. Prerequisite: fourth-year medical student and an interview with Program Medical Director. Work with hospice interdisciplinary team. Direct experience in the care of patients with illnesses where no cure is possible. Emphasis on symptom relief, end of life issues, physician-assisted suicide. Fulfills the Ambulatory Care requirement.

499. Research (1-12) I, II, III, IV. Meyers and staff
Prerequisite: consent of instructor. (S/U grading only.)

Internal Medicine—Infectious Diseases (IDI)

Upper Division Courses

141. Infectious Diseases of Humans (1) I. Dandekar
Lecture—1 hour. Prerequisite: introductory knowledge in biology and chemistry recommended. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.)

192. Research Internship in Internal Medicine (1-12) I, II, III, IV. Lawrence and staff
Internship—3-36 hours; final report. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Infectious Diseases Research (1-5) I, II, III, IV. The Staff (Lawrence in charge)
Prerequisite: chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred); and consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.)

Graduate Courses

280. Molecular Pathobiology for Diagnosis and Therapy of Human and Animal Diseases (3) III. Dandekar
Lecture—3 hours. Prerequisite: graduate standing. Presentation of molecular pathobiology of human and animal viruses. Emphasis on molecular diagnostics at cellular/tissue level, and therapy including vaccines and gene transfer using recombinant DNA technology. Offered in alternate years.

299. Research in Infectious Diseases (1-12) I, II, III, IV. The Staff (Lawrence in charge)
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

Professional Courses

440. Introduction to AIDS and Related Disorders (2) I, II, III, IV. Flynn
Clinical activity—30 hours; discussion—10 hours. Prerequisite: first- and second-year medical students in good academic standing and consent of instructor. Familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinic research as well as examine alternative life styles. May be repeated for credit. (S/U grading only.)

460. Infectious Diseases Clinical Clerkship (3-6) I, II, III, IV. Lawrence
Clinical activity. Prerequisite: successful completion of two years of study in an accredited medical school. Limited enrollment with priority to fourth-year medical students. Patients ill with infectious diseases, including AIDS, will be evaluated and presented at rounds and case conferences. Patients are also seen in the Infectious Diseases Clinic. Instruction in clinical microbiology and the proper use of the laboratory will be provided.

471. Clinical Care of the HIV-Infected Patient (6-8) I, II, III, IV. Lawrence and staff
Clinical activity—full time (4-6 weeks). Prerequisite: successful completion of Medical Sciences 431. Participation in evaluation and management of HIV-infected individuals at all stages of their disease in both inpatient and outpatient settings. Includes consultations, attendance at HIV and Infectious Disease Clinics and multidisciplinary conferences.

499. Research Topics in Infectious Disease (2-12) I, II, III, IV. The Staff (Lawrence in charge)
Prerequisite: successful completion of the first year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (S/U grading only.)

Internal Medicine—Nephrology (NEP)

Upper Division Course

192. Internship in Nephrology (1-12) I, II, III, IV. Kaysen and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses

460. Nephrology and Fluid Balance (6-12) I, II, III, IV. Kaysen and staff
Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of instructor. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. Limited enrollment.

499. Research in Nephrology (3-18) I, II, III, IV. Kaysen
Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. (S/U grading only.)

Internal Medicine—Pulmonary Medicine (PUL)

Upper Division Course

192. Internship in Pulmonary Medicine (1-12) I, II, III, IV. Albertson and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Courses

210. Grant and Scientific Paper Writing (1) I, II, III, IV. Last
Discussion—2 hours. Basics of scientific writing for grants and papers. Each student will prepare a grant or paper for critique and tutorial feedback.

299. Pulmonary Disease Research (1-12) I, II, III, IV. Cross
Laboratory. Prerequisite: by arrangement only. Pulmonary disease research activity with focus in inhalation toxicity, oxidants or lung biochemistry, and cell and molecular biology. (S/U grading only.)

Professional Courses

***460. Pulmonary and Critical Care Medicine Clinical Clerkship** (6-18) I, II, III, IV. Albertson and staff
Clinical activity—full time (4-12 weeks). Prerequisite: Medical Sciences 431. At UCD Medical Center participating and rounding with Pulmonary/Critical Care Medicine fellows and consultation staff. Also includes pulmonary function test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conferences.

462. Pulmonary Clinical Clerkship (3-12) I, II, III, IV. Bonekat
Clinical activity—full time (2-8 weeks). Prerequisite: completion of second year of medical school and/or consent of instructor. Participation at the Sacramento VA clinic with members of the subspecialty service in initial clinical evaluation, workup, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic processes. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Albertson
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Internal Medicine—Rheumatology-Allergy (RAL)

Lower Division Course

99. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)

Upper Division Courses

192. Internship in Rheumatology-Allergy (1-12) I, II, III, IV. Gershwin and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)

Graduate Courses

***281. Clinical Immunology and Immunopathology** (4) III. Gershwin, Leung
Lecture—4 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 270, or consent of instructor. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infections, genetics, transplantation, allergy and autoimmunity. Offered in alternate years.

298. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Library and/or laboratory work as required. (S/U grading only.)

299. Research in Autoimmune Disease (1-12) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjögren's syndrome, polymyositis and drug hypersensitivity. (S/U grading only.)

Professional Courses

460. Rheumatology Clinical Clerkship (1-18) I, II, III, IV. Leek and staff
Clinical activity (inpatient-outpatient service)—full time. Prerequisite: Medical Sciences 431 and consent of instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases.

461. Allergy Clinical Clerkship (3-18) I, II, III, IV. Teuber and staff
Clinical activity (inpatient-outpatient service)—full time (2 to 12 weeks). Prerequisite: completion of second year of medical school and consent of instructor. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis.

480. Insights in Rheumatology (1-3) I, II, III, IV. Leek
Clinical activity—3–9 hours. Prerequisite: student in good academic standing and consent of instructor. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Gershwin in charge)
Prerequisite: medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures. Students can gain experience in clinical medicine and clinical investigation. (S/U grading only.)

Medical Microbiology (MMI)

Upper Division Courses

107. Chemical and Cellular Immunology (4) II. Scibienski
Lecture—4 hours. Prerequisite: Biological Sciences 101 and 102 or consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (Same course as 407.)

115. Ecological Parasitology (3) II. Theis
Lecture—3 hours. Study of humankind's influence on environmental factors, behavior, geography that affect the development and spread of parasitic agents.

116. Parasitology for Wildlife Biologists (2) III. Theis
Lecture—2 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the role diseases and parasites play in wildlife dynamics. Lectures on techniques of collection, preservation and methods of surveying wildlife for parasites and the pathogenesis, ecology and zoonotic potential of parasites encountered by wildlife biologists.

***130. Medical Mycology** (2) II. Pappagianis
Lecture—2 hours. Prerequisite: a course in pathogenic microbiology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 430.)

192. Internship in Medical Microbiology (1-12) I, II, III, IV. The Staff (Beaman in charge)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.)

198. Group Study in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.)

199. Research in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses

200D. Mechanisms for Microbial Interactions with Hosts (3) II. Beaman
Lecture/discussion—3 hours. Prerequisite: Microbiology 200A or consent of instructor. Study of mechanisms involved in microbial interactions within a host environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense.

209. Current Immunology (2) I, II, III. Van de Water
Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. May be repeated for credit. (Same course as 409.) (S/U grading only.)

***215. Medical Parasitology** (5) I. Theis
Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate student with consent of instructor. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods

of medical importance. Offered in alternate years. (Same course as 415.)

220. Current Concepts in Bacterial Ultrastructure (2) III. Beaman
Discussion—2 hours; student presentations; term paper. Prerequisite: Microbiology 105 or consent of instructor. Critical evaluation of current literature dealing with all aspects of bacterial ultrastructure. Discussion of selected and assigned reading and formal student presentations of assigned topics.

298. Group Study in Medical Microbiology and Immunology
(1-5) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. (Sections 1, 2, 4, 5: S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Beaman in charge)
Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

Professional Courses

407. Chemical and Cellular Immunology (4) II. Scibienski
Lecture—4 hours. Prerequisite: medical student with consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (S/U grading only.) (Same course as 107.)

409. Current Immunology (2) I, II, III.
Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (Same course as 209.) May be repeated for credit. (S/U grading only.)

***415. Medical Parasitology** (5) I. Theis
Lecture—3 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Approved for graduate degree credit. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (S/U grading only.) (Same course as 215.)

420. Current Concepts in Bacterial Ultrastructure (2) III. Beaman
Discussion—2 hours; formal presentation or term paper. Prerequisite: medical students with consent of instructor. Evaluation of current status of bacterial ultrastructure with an emphasis on host-parasite interactions through discussions and assigned readings. (S/U grading only.)

***430. Medical Mycology** (2) II. Pappagianis
Lecture—2 hours. Prerequisite: a course in pathogenic microbiology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 130.)

480A. Medical Immunology (2.5) III. Scibienski
Lecture—7 hours (four weeks only). Prerequisite: approval by Committee on Student Evaluation and Promotion. Presents the structure and function of the molecules, cells, and tissues involved in immunity, and their interactions in health and disease.

480B. Pathogenic Microbiology (6.5) I. Beaman
Lecture—7 hours (for 9 weeks); laboratory—20 hours per quarter. Prerequisite: approval by Committee on Student Evaluation and Promotion. The biology of pathogenic microorganisms with emphasis on their role in human disease.

497T. Tutoring in Medical Microbiology (1-5) I, II, III, IV. Beaman and staff
Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.)

498. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: medical students with consent of instructor. (S/U grading only.)

Medical Pharmacology and Toxicology (PHA)

Lower Division Courses

92. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Internship—3-36 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: lower division standing. (P/NP grading only.)

Upper Division Courses

100. Survey of Pharmacology (2) I. Hollinger
Lecture—2 hours. Prerequisite: introductory physiology and biochemistry or consent of instructor. Survey of the principles underlying the action of drugs; consideration of the pharmacology of prescription and non-prescription drugs commonly used to treat medical conditions; pharmacological aspects of drug dependency and related topics.

192. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Advanced General Pharmacology (3) I. Hance and staff
Lecture—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of the major classes of drugs.

200B. Advanced General Pharmacology (4) II. Stark and staff
Lecture—4 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human pharmacology designed for graduate and medical students. The actions, use and toxicity of major classes of drugs. Continuation of course 200A.

203. Pharmacology of the Nervous System: Stimulants and Anticonvulsants (2) II. Stark
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsant agents and their evaluation in animal models. Offered in alternate years.

204. Pharmacology of the Nervous System: Drug Alteration of Behavior (1-3) II. K.F. Killam
Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacologic agents, hallucinogens, antidepressants. Offered in alternate years.

206. Pharmacokinetics (2) I. Henderson
Lecture—2 hours. Prerequisite: courses 200A, 200B. Physiochemical and physiological factors affecting absorption, distribution, metabolism and excretion of drugs. Mathematical and graphical methods for determining pharmacokinetic parameters. Calculation of dose regimens. Offered in alternate years.

206L. Pharmacokinetics Laboratory (2) I. Henderson
Laboratory—6 hours. Prerequisite: course 206 (may be taken concurrently). Laboratory procedures for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject matter sequence of course 206. Offered in alternate years.

297T. Tutoring in Pharmacology (1-3) I, II, III. The Staff (Chairperson in charge)
Tutorial—3-9 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or the equivalent; consent of instructor. Under supervision of the instructor, students assist in preparation and teaching of courses in Pharmacology. (S/U grading only.)

298. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400A. Principles of Pharmacology (2.5) I. Hance and staff
Lecture—6 hours (for 4 weeks); discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs.

400B. Principles of Pharmacology (6) II. Stark and staff
Lecture—38 hours total; discussion—28 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. The actions, uses and toxicities of the major classes of drugs. Continuation of 400A.

490. Seminar in Pharmacology for Medical Students (1) I, II, III, IV. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students.

497T. Tutoring in Pharmacology (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.)

498. Special Study for Medical Students (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Lecture, directed reading, and/or discussion groups—3-15 hours. Prerequisite: consent of instructor. Special study in pharmacology for medical students. (S/U grading only.)

499. Directed Research for Medical Students (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (S/U grading only.)

Neurology (NEU)

Upper Division Course

199. Individual Special Study and Research (1-4) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Individual special study in neurophysiology and biomedical engineering is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.)

Graduate Courses

201. Human Behavioral Neurobiology (2) I. Robertson
Lecture/discussion—2 hours. Prerequisite: Cell Biology and Human Anatomy 203; Psychology 108 or

*Course not offered this academic year.

136. Neurobiology of normal and abnormal behavior of humans, based on specific neuroanatomical, neurophysiological, and cognitive parameters. Evaluation of these parameters will be, for example, by application of clinical neurologic, neuropsychologic, and neuroimaging tests.

202. Visuomotor Neurobiology (2) III. Rafal
Seminar—2 hours. Prerequisite: course 201, Cell Biology and Human Anatomy 203. An overview of neural mechanisms of visually guided behavior in humans will examine the integration of visual attention and eye movements. Performance of normal humans and neurologic patients in reflexive orienting, visual search, reading and reaching will be considered. Offered in alternate years.

290. Seminar in Selected Topics (1) I, II, III, IV. Gorin
Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (S/U grading only.)

298. Group Study (1-5) I, II, III, IV. The Staff (Seyal in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (S/U grading only.)

299. Individual Special Study and Research (1-12) I, II, III, IV. Staff (Richman in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.)

Professional Courses

420. Clinical Neurosciences (4) II. Remler and staff
Lecture—6 hours; laboratory/discussion—5 hours (for five weeks total). Prerequisite: medical student with approval by Committee on Student Evaluation and Promotion. Lectures and case discussions of pathophysiology underlying neurological disorders including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma will be discussed.

450. Clinical Neurology Clerkship (3-6) I, II, III, IV. Richman and staff
Clinical activity—full time (2-4 weeks at UCDMC). Prerequisite: fourth-year medical student. Essentials of a detailed neurological examination and principles of differential neurological diagnosis. Emphasis on common neurological disorders encountered in practice.

451. Clinical Neurology Clerkship (3-6) I, II, III, IV. Remler and staff
Clinical activity—full time (2-4 weeks at Highland General Hospital, Oakland). Prerequisite: fourth-year medical student. Essentials of detailed neurological examination and principles of differential neurological diagnosis. Emphasis on common neurological disorders encountered in practice.

452. Advanced Clinical Neurology (6) I, II, III, IV. Richman and staff
Clinical activity—full time (4 weeks). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

453. Advanced Clinical Neurology (6) I, II, III, IV. Remler and staff
Clinical activity—full time (4 weeks at Highland General Hospital, Oakland). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of the nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

454. Electroencephalography and Evoked Potentials (3-18) I, II, III, IV. Gabor, Seyal
Clinical activity—full time (2-12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electroencephalographic diagnosis including technical basis of electroencephalography and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

455. Child Neurology (6) I, II, III, IV. Gospe
Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Internal Medicine 430, Obstetrics and Gynecology 430, Pediatrics 430 and consent of instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings, differential diagnosis, management and therapy. This course satisfies the fourth year neuroscience requirement.

456. Cortical Neurology (3-18) I, II, III, IV. Remler, Knight
Clinical neurological research—full time (12 weeks at Highland General Hospital, Oakland). Prerequisite: course 451 or the equivalent; consent of instructor. Student will pursue a small project in clinical neurologic research on higher cortical functions. The focus is on scientific analysis of behavior in disease states. Study may be arranged for from two weeks to twelve weeks, with units corresponding to length of course.

457. Special Topics in Neurology (3-18) I, II, III, IV. The Staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: course 450, 451 or consent of instructor. Students study areas of special interest in tutorial manner under supervision of member of faculty with expertise and interest in elected field. Students may elect tutorial clinical experience with member of staff.

458. Introduction to Cognitive and Communication Disorders (3) I. Dronkers
Lecture—3 hours; observations, individual projects. Prerequisite: consent of instructor. Introduction to cognitive and communication disorders. Includes a survey of disorders subsequent to brain damage; management by neurology, neuropsychology, and speech pathology; and current research on appraisal, diagnosis, and treatment. (S/U grading only.)

459. Independent Study in Neurogenic Communication Disorders (1-3) I, II, III, IV. Dronkers
Conference, observation and data collection—3-9 hours. Prerequisite: consent of instructor. Independent study of neurogenic communication disorders—aphasia, dementia, apraxia of speech, dysarthria. Designed for individual interest and includes discussion, directed reading, research design, data collection, and preparation of results. (S/U grading only.)

464. Clinical Neurology (3-18) IV, I, II, III. The Staff (Richman in charge)
Clinical activity—full time (minimum of one-half quarter). Prerequisite: fourth-year medical student or third-year medical student with completion of a medical clerkship; consent of Chairperson. Clerkship in neurology to be arranged at another institution with accredited residency programs in neurology under proper supervision.

468. Special Clinical Elective in Neurology (6-18) I, II, III, IV. The Staff
Clinical activity—full time (4 to 12 weeks). Prerequisite: fourth-year medical student or third-year medical student with clerkship in medicine and pediatrics. Emphasis will be on mastering the neurologic examination and on introduction to neurologic evaluation, diagnosis and therapy.

480. Insights in Neurology (1-3) I, II, III, IV. The Staff
Discussion—3 hours; clinical activity—3 to 9 hours. Prerequisite: student in good academic standing; consent of instructor. Attendance at neurology grand rounds and regular rounds following. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Richman in charge)
Laboratory—2-24 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. (S/U grading only for graduate and medical students.)

Neurosurgery (NSU)

Upper Division Course

199. Special Study in Neurosurgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only.)

Graduate Course

299. Neurosurgery Research (3-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.)

Professional Courses

451. Neurosurgical Critical Care Clerkship (3) I, II, III. The Staff (Chairperson in charge)
Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room.

455. Clinical Pediatric Neurosurgery (6) I, II, III, IV. Pang
Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year medical students who have satisfactorily completed course 460; consent of instructor. Admission and follow-up of pediatric patients. Neurological history, examination, and diagnostic procedures are emphasized. Students will participate in surgical procedures and are required to attend all pediatric neurosurgery conferences.

460. Clinical Neurosurgery (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (3 days per unit; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Approved for graduate degree credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars.

464. Externship (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision.

470. Advanced Clinical Neurosurgery (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic standing. Student will function as acting intern on neurosurgery service. Admission and management of patients. Neurological history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences and rounds.

480. Insights in Neurosurgery (1-3) I, II, III, IV. The Staff
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Observation of neurosurgical care in emergency room, operating room and hospital floors, including manner of treatment of a variety of chronic and acute neurological diseases. (S/U grading only.)

499. Neurosurgery Research (1-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.)

Obstetrics and Gynecology (OBG)

Upper Division Courses

190. Seminar in Early Mammalian Development (1) I, II, III. Wiley
Seminar—1 hour; short paper. Prerequisite: Zoology 100 or the equivalent. Each student will present paper from the recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

290. Current Topics in Research (1) I, II, III, IV. The Staff
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Selected topics in reproductive biology. (S/U grading only.)

291. Seminar in Early Mammalian Development (1) I, II, III, IV. Wiley
Seminar—1 hour. Each student will be asked to present a paper from the recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

298. Group Study (1-5) I, II, III, IV. Overstreet
Prerequisite: graduate standing; consent of instructor.

299. Research (1-12) I, II, III, IV. Overstreet
Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

Professional Courses

420. Human Reproduction (2) IV. Wiley
Lecture—4 hours (for 6 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Course serves as a bridge between the basic science aspects and clinical aspects of human reproduction. Provides clinically relevant extensions of material introduced in the sciences basic to medicine in anatomy, reproductive physiology and molecular biology/genetics.

430. Obstetrics and Gynecology Clerkship (12) I, II, III, IV. Birdsong
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Obstetric, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing.

433. Obstetrics and Gynecology Continuum Clerkship (6) I, II, III, IV. Birdsong
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Obstetric, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC or affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing.

465. Elective Clerkship (4-18) I, II, III, IV. Birdsong
Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical student; course 430 or the equivalent; consent of instructor. Active participation in inpatient and outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

470. Acting Internship in Obstetrics and Gynecology (6-8) I, II, III, IV. Leiserowitz
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed course 430; consent of instructor. Student will perform as intern and expect the following experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Round daily with attending.

471. Ambulatory Gynecology and Obstetrics (6-8) I, II, III, IV. The Staff
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed course 430; consent of instructor. Student to participate in following clinics each week: General Gynecology, New and Return Obstetrics, Post-Partum, High-Risk Obstetrics, Pre-Operative Clinic, other specialty clinics as assigned. Student will conduct examinations, present patients to staff and will be able to discuss treatment regimens. Night call in Labor and Delivery Suite every third night.

499. Research in Obstetrics and Gynecology (4-18) I, II, III, IV. The Staff
Prerequisite: medical student with consent of instructor. Student will pursue a research problem of her/his own choosing, selected with help of the faculty. Integration with ongoing faculty research projects recommended. (S/U grading only.)

Ophthalmology (OPT)

Upper Division Courses

192. Research Internship (1-12) I, II, III, IV. The Staff
Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Course

299. Basic Research in Visual Science (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

440. Ophthalmology Required Clerkship (3) I, II, III, IV. J. Brandt
Clinical activity—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Fundamental knowledge of ophthalmic diagnosis and principles; basic ophthalmic instruments ; understanding of treatment for eye problems manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

461. Basic Clinical Ophthalmology (4.5) I, II, III, IV. J. Brandt
Clinical activity—to be arranged (2 weeks). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Provides an acquaintance with the fundamentals of routine clinical ophthalmology.

465. Advanced Subspecialty Ophthalmology (6 or 9) I, II, III, IV. Mannis, Keltner, J. Brandt
Clinical activity—to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). Prerequisite: medical students who have completed Internal Medicine 430 (in third or fourth year); consent of instructor. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. Rotations at UCD Medical Center may be arranged in 6-week units of one service alone, or in combination, as arranged with instructors.

480. Insights in Ophthalmology (1-3) I, II, III, IV. J. Brandt and staff
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical exposure in ophthalmology including slide-tape program, patient exposure, and department conferences (i.e., grand rounds and subspecialty conference). (S/U grading only.)

498. Group Study (1-3) I, II, III, IV. The Staff (J. Brandt in charge)
Prerequisite: medical students with consent of instructor. Directed reading and discussion. (S/U grading only.)

499. Research in Ophthalmology (1-12) I, II, III, IV. The Staff
To be arranged—3-36 hours. Prerequisite: medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. (S/U grading only.)

Orthopaedic Surgery (OSU)

Lower Division Course

***99. Special Studies for Undergraduates** (1-4) I, II, III, IV. The Staff (Martin in charge)
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Course

***199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Martin in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Professional Courses

421. The Musculoskeletal System (2.5) The Staff
Lecture—5 hours (for 5 weeks); laboratory/discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. An introduction to the basic and clinical science of orthopaedic surgery and rheumatology.

428. Ambulatory Orthopaedics (3-6) I, II, III, IV. Moehring
Clinical activity—full time (2-4 weeks). Prerequisite: 4th-year medical student in good academic standing and consent of instructor. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment, including the emergency room. Student will conduct orthopaedic examinations, present patients to staff rotating through trauma, hand, pediatrics, adult and foot clinics. Orthopaedic physical examination and interpretation of x-rays. Limited enrollment.

462. Community Preceptorship (3-6) I, II, III, IV. Moehring
Clinical activity—full time (2-4 weeks). Prerequisite: fourth-year medical student in good academic standing with consent of instructor. Acquaints student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room, operating room and inpatient environment. Student must provide own transportation.

464. Acting Internship (6) I, II, III, IV. Moehring
Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing and consent of instructor. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. Limited enrollment. May be repeated for credit.

480. Insights in Orthopaedic Surgery (1-3) I, II, III, IV. Szabo
Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (S/U grading only.)

481. History of Medicine for Medical Students (1.5) I. Benson

*Course not offered this academic year.

Lecture/discussion—2.5 hours (for six weeks). Prerequisite: third- or fourth-year students in the School of Medicine or second-year students with consent of instructor. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the development of health care and to provide an expanded philosophical perspective on the ever-changing field of modern medicine. (S/U grading only.)

499. Orthopaedics Research (1-12) I, II, III, IV. The Staff (Rodrigo in charge)
Clinical activity—3 hours to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year medical student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. May be repeated for credit. (S/U grading only.)

Otolaryngology (OTO)

Lower Division Courses

***192. Internship in Otolaryngology** (1-12) I, II, III, IV. Chairperson in charge
Internship—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Otolaryngology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced undergraduate with consent of instructor. (P/NP grading only.)

Graduate Courses

290C. Research Conference in Otolaryngology (1) I, II. The Staff
Lecture/discussion—1 hour. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S/U grading only.)

291. Principles of Speech, Hearing and Equilibrium (3) II. The Staff
Lecture/discussion—3 hours. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation.

298. Group Study (1-5) I, II, III, IV. The Staff (S/U grading only.)

299. Individual Study in Otolaryngology for Advanced Graduate Students (1-12) I, II, III, IV. Chole and staff
Prerequisite: advanced graduate student with consent of instructor. (S/U grading only.)

Professional Courses

401. Clinical Examinations in Otolaryngology (1) I, II, III, IV. Chole
Lecture—1 hour; laboratory—1 hour; practical—1 hour total. Prerequisite: second-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Obtaining the history, applied anatomy of the regions, and the art of the examination. Head mirror required.

402. Otolaryngology in Family Practice (1) I, II, III, IV.
Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Approved for graduate degree credit. Planned as a refresher course for those already possessing a background of knowledge in the specialty.

403. Basic Principles of Reconstructive Surgery (1) II. Donald
Lecture—four 2-hour sessions; laboratory—one 2-hour session (5 weeks). Prerequisite: third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plasties and revision of scars. Laboratory session utilizing animal tissues.

440. Otolaryngology Required Clerkship (3) I, II, III, IV. Brodie
Clinical activity—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides fundamental knowledge of otolaryngologic diagnosis and principles, develops facility with basic Ear, Nose and Throat instruments, provides an understanding of treatment for ear, nose and throat problems manageable by a primary care physician, provides knowledge of what patients should be referred for otolaryngologic care.

460. Clinical Otolaryngology Elective (3-18) I, II, III, IV. Brodie
Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department.

480. Insights in Otolaryngology (1-3) I, II, III, IV. Brodie
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Individualized activities (depending upon time available and previous exposure to Ear, Nose and Throat) including observing patient exams, ward rounds and attendance at lectures and grand rounds. (S/U grading only.)

***490. Journal Seminar** (1) I, II, III, IV. Donald, Chole
Lecture/discussion—10 hours total (course given three times per quarter). Prerequisite: fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances.

498. Individual or Group Study (1-5) I, II, III. The Staff
Lecture/discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: consent of instructor. Introduction to basic research in Otolaryngology. Lectures, discussion and laboratory study of sensory and motor systems. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. (S/U grading only.)

Pathology (PMD)

Upper Division Courses

192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Internship—3-36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (P/NP grading only.)

199. Special Study in Pathology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced undergraduates and consent of instructor. (P/NP grading only.)

Graduate Courses

210. Introduction to Human Pathology (4.5) III. C. Miller
Lecture/discussion—8 hours; laboratory—4 hours (5 weeks). Prerequisite: graduate or upper division students with background in gross and microscopic anatomy, physiology and biochemistry. Lectures, laboratory, and computer-assisted learning. Introduces basic human disease processes. Stresses mastery of pathophysiology and vocabulary. Examining gross and microscopic tissue sections is taught. (Course given second five weeks of spring and taken with first-year medical students enrolled in course 410A.) Course not intended for veterinary or medical students.

298. Advanced Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

404. Forensic Pathology (2) I, II, III, IV . Ellis
Laboratory—3-10 hours. Prerequisite: medical student or consent of instructor. Systematic study of current forensic cases with emphasis on differential diagnosis, preservation of evidence, and medical-legal procedures. Introduction to histopathologic diagnosis, ballistics, and toxicology. (S/U grading only.)

***405. Brain Cutting Conference** (1-4) I, II, III, IV. Ellis
Seminar—1-4 hours. Prerequisite: third- and fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed.

***407. Diseases of the Nervous System** (1-3) I, II, III, IV. Ellis
Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: third- and fourth-year medical students or special training in pathology or neurological sciences; consent of instructor. Study of human nervous system reactions to disease including infection, neoplasia and maldevelopment; application of experimental models to human disease; and clinical correlations. Seminars emphasize microscopic findings in current cases; discussions include individualized experience in neuropathologic techniques. Given jointly with the Departments of Neurology and Neurosurgery.

408. Basic Diagnostic Anatomic Pathology (1-12) I, II, III, IV. Howell
Discussion—1-4 hours; laboratory—3-24 hours. Prerequisite: third- or fourth-year medical student and consent of instructor. Rotation through autopsy, surgical pathology, and cytology services with participation in diagnostic activities under supervision. Additional correlative discussions of case studies with clinical material, gross, microscopic, and laboratory findings. (S/U grading only.)

410A-410B. General/Systemic Pathology (4.5, 7.5) III-IV. Miller, Jensen
Lecture—30, 30 hours total; laboratory/discussion—25, 90 hours total; autotutorial—0, 5 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. In-depth study of disease and its causes related to the general mechanisms of disease and each of the specific human organ systems. Concepts of pathophysiology applicable and required for clinical diagnosis. (Deferred grading only, pending completion of sequence.)

464. Advanced Surgical Pathology (6-12) I, II, III, IV. Gandour-Edwards
Clinical activity—full time (4-8 weeks). Prerequisite: third- or fourth-year medical student and consent of instructor. Designed to provide an intensive experience in surgical pathology with emphasis on applications to clinical practice. Students will participate in grossing specimens, frozen sections, microscopic sign-out, conferences, and clinico-pathologic correlations. (S/U grading only.)

465. Applied Clinical Laboratory Medicine (6-9) II, III, IV. Kost
Clinical activity—full time (4-6 weeks). Prerequisite: consent of instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management and quality control.

497T. Tutoring in Pathology (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the

required curriculum of the School of Medicine. (S/U grading only.)

498. Advanced Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (S/U grading only.)

499. Research (1-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical student with consent of instructor. Research in experimental, molecular, comparative, and applied pathology. Limited enrollment. (S/U grading only.)

Pediatrics (PED)

Upper Division Course

199. Special Study in Pediatric Research (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.)

Graduate Course

299. Pediatric Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate students who are candidates for a degree in some area of biology or behavioral sciences; consent of instructor. (S/U grading only.)

Professional Courses

401. Preceptorship in Pediatrics (2) I, II, III, IV. Chairperson in charge
Preceptorship—half time. Prerequisite: second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatrician's office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on student's experience. Evaluation by student.

402. Clinical Experience in Private Practice (1-18) I, II, III, IV. Chairperson in charge
Clinical activity—full time (2 to 12 weeks). Prerequisite: third-or fourth-year medical student; course 430; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor, performing such tasks as history taking, physical examination, and patient management.

430. Pediatric Clerkship (12) I, II, III, IV. Hansen
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Eight-week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing.

***433. Pediatric Continuum Clerkship** (6) I, II, III, IV. Hansen
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Four-week clinical clerkship providing opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery/ambulatory or inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing.

460A. Acting Internship: General Inpatient Pediatric Clerkship (6-18) I, II, III, IV. Connors
Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call. The Acting Intern can expect to manage between six and ten patients at a time. Limited enrollment.

460B. Acting Internship: Outpatient Pediatrics (3-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Supervised experience in pediatric care on outpatient service at UCDMC. Student functions as "Acting Intern" with appropriate supervision by residents and attending faculty. Limited enrollment.

461. Elective in Hematology/Oncology (3-18) I, II, III, IV. Ducore
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and management of hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

462. Elective in Pediatric Endocrinology (3-18) I, II, III, IV. Connors and staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of second-year study or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

464. Acting Internship in Neonatology (6-18) I, II, III, IV. Merritt
Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. Limited enrollment.

465. Pediatric Specialty Clinic Elective (3-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment.

466. Elective in Pediatric Cardiology (3-18) I, II, III, IV. Parrish
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged.

467. Elective in Pulmonary Medicine (3-18) I, II, III, IV. McDonald, Joad
Clinical activity—full time (2 to 12 weeks); daily rounds, two weekly half-day clinics. Prerequisite: pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities.

468. Elective in Pediatric Nephrology (3-18) I, II, III, IV. Makker
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

469. Elective in Pediatric Infectious Disease (3-18) I, II, III, IV. Wenman
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment.

470. Elective in Pediatric Neurology (3-18) I, II, III, IV. Gospe
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430, Internal Medicine 430 and Pediatrics 430 and consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment.

471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

476. Acting Internship in Pediatric Intensive Care (6-18) I, II, III, IV. Dimand
Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of A or consent of instructor of record; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. Limited enrollment.

***499. Research Topics in Pediatrics** (1-18) I, II, III, IV. The Staff (Styne in charge)
Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. (S/U grading only.)

Physical Medicine and Rehabilitation (PMR)

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

Graduate Course

***299. Research** (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

440. Rehabilitation Medicine Clerkship (3) I, II, III, IV. McDonald
Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student; approval by Committee on Student Evaluation and Promotion. Rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and musculoskeletal disorders. Physiological effects, indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

461. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kilmer
Clinical activity—full time. Prerequisite: completion of third year in Medical School; Internal Medicine 430, Surgery 430. Intended for non-UC medical students. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Fourth-year student may function as acting intern on Physical Medicine and Rehabilitation service.

462. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kilmer
Clinical activity—full time. Prerequisite: Internal Medicine 430, Surgery 430; completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson.

*Course not offered this academic year.

498. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (S/U grading only.)

499. Research for Medical Students (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (S/U grading only.)

Plastic Surgery (PSU)

Professional Courses

460. Clinical Plastic Surgery Elective (1-18) I, II, III, IV. Stevenson
Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Surgery 430; consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation.

***461. Dentistry for Future Physicians and Surgeons** (6-8) I, II, III, IV. Thaller
Discussion/seminar—3 hours; laboratory—2 hours; clinical activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry; recognize potential dental problems; provide emergency care; have knowledge of where to refer these problems. (S/U grading only.)

Psychiatry (PSY)

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Servis in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Servis in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

Graduate Courses

***226. Psychiatric Implications of Legal Intervention** (2) I, III. Yarvis
Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on youth and juvenile court procedure. Moot court demonstrations.

298. Directed Group Study For Graduate Students (1-5) I, II, III, IV. The Staff (Servis in charge)
Prerequisite: graduate standing and consent of instructor.

299. Special Study for Graduate Students (1-12) I, II, III, IV. The Staff (Servis in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

401. Medicine and the Mind: An Introduction to Psychiatry (2) I. Keasey
Lecture/discussion—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to concepts and clinical applications of psychiatry throughout the human life cycle. Includes tutorials tailored to individual student interests which will explore the biological, psychological, social, and cultural factors influencing health and illness. Includes lecture and video presentations as well as group discussion.

402. Human Sexuality (1) VI. Keasey
Lecture—2 hours; discussion—2 hours (4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Normal and variant human sexuality. The focus will be on understanding human sexual function in health and illness. (S/U grading only.)

403. Fundamentals of Clinical Psychiatry (3.5) II. Leamon
Lecture—5 hours; discussion—2 hours. Prerequisite: courses 401 and 402. Teaches principles and techniques of psychiatric interviewing, Mental Status Exam and diagnosis. Covers major child and adult disorders, including substance abuse and dependence. Lectures, patient presentations, AV materials, along with weekly student interviews of psychiatric patients in small group format.

412. Psychiatry Grand Rounds (1) II, III, IV. Cox and staff
Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCDMC for presentation of selected clinical cases, presentation of lecture and research reports.

413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV. Cox and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of coordinator. Experience in clinical management/treatment of adult outpatients with psychiatric and substance abuse disorders; crisis management/intervention, evaluation/development of diagnosis and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/residents.

414. Consultation-Liaison Clerkship (6-12) I, II, III, IV. Sevis and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents.

415. Substance Abuse: Diagnosis and Treatment (3) I, II, III, IV. Leyba
Clinical activity—20 hours; independent study—15 hours; lecture/discussion—5 hours. Prerequisite: medical student with consent of instructor. Two-week selective offering supervised contact with patients addicted to alcohol, opioids, cannabis, or psychostimulants. Sites: Travis Air Force Base and regional Methadone and Alcohol Treatment Programs. Pharmacological, psychosocial, "12-step" and behavioral treatments will be demonstrated.

416. Child Psychiatry Clerkship (6-12) I, II, III, IV. Harris and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis.

417. Jail Psychiatric Clerkship (6 or 12) I, II, III, IV. Yarvis and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of course coordinator. Students gain experience, under close faculty supervision, assessing acute and chronic mentally ill inmates in both inpatient and clinic settings.

418. Off-Campus Clinical Experience (6 or 12) I, II, III, IV. Cox and staff
Clinical activity—full time (4 or 8 weeks). Prerequisite: fourth-year medical students; consent of instructor. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advance approval of instructor and individual in charge of off-campus setting.

420. Acting Internship in Psychiatry (6-12) I, II, III, IV. Cox and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management.

422. Readings in Psychiatry (1-3) I, II, III, IV. Cox and staff
Readings/discussion—3-9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (S/U grading only.)

430. Psychiatry Clinical Clerkship (12) I, II, III, IV. Cox
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Students are assigned to clinical settings; building upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Focus on patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment and intervention.

433. Psychiatry Continuum Clerkship (6) I, II, III, IV. The Staff
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Practice in clinical settings, building upon the skills gained in preclinical years, with an emphasis on diagnostic, therapeutic, and interpersonal skills. Areas of focus: patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, and intervention.

480. Insights in Psychiatry (1-3) I, II, III, IV. Cox
Clinical activity—3–9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. On individual basis, student provided with an opportunity for gaining insight into various clinical activities in the practice of psychiatry. (S/U grading only.)

498. Directed Group Study (1-5) I, II, III, IV. Servis and staff
Prerequisite: consent of instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (S/U grading only for graduate or medical students.)

499. Research (1-12) I, II, III, IV. Maddock and staff
Prerequisite: consent of instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. (S/U grading only for graduate or medical students.)

Radiation Oncology (RON)

Graduate Course

299. Independent Study and Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: enrollment with Biophysics Group for Ph.D. candidacy, and consent of group adviser and sponsor. (S/U grading only.)

Professional Courses

463. Radiation Oncology Clerkship (3-9) I, II, III, IV. Castro, Ryu, Wilder
Clinical activity—full time (2-6 weeks). Prerequisite: completion of Medical Sciences 430, 431; third-year clinical clerkship, consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics.

498. Group Study in Therapeutic Radiology (1-12) I, II, III, IV. The Staff.
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

499. Research in Therapeutic Radiology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

Radiology—Diagnostic (RDI)

Professional Courses

413. Radiological Diagnosis II (Physics of Diagnostic Radiology) (5) I. Seibert, Boone
Lecture—49 hours total; laboratory—6 hours total. Prerequisite: consent of instructor. Physics of diagnostic imaging; x-ray production and interaction; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereoscopy; xeroradiography; computerized and geometrical tomography; magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (S/U grading only.)

414. Medical Radiation Biology (3) III. Bushberg
Lecture—27 hours total. Prerequisite: consent of instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. Offered in even numbered years only. (S/U grading only.)

***415. Radiopharmacy** (3) III. Vera
Lecture—3 hours. Prerequisite: consent of instructor. Fundamentals of radiopharmaceutical science including radiochemistry; radiopharmaceutical production; theory; applications; mechanisms of localization, radionuclide and radiopharmaceutical drug applications and related regulatory aspects. Offered in alternate years. (S/U grading only.)

461. Clinical Clerkship in Diagnostic Radiology (1-18) I, II, III, IV. Greenspan
Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of Medical School; consent of instructor. Student works with radiologists at UCD Medical Center in film reading sessions and radiological procedures; includes fluoroscopy, vascular radiology and special investigations. Includes daily individual teaching sessions with faculty radiologists, radiology learning laboratory, and all radiology conferences and seminars. Limited enrollment.

462. Diagnostic Imaging of Acquired and Congenital Heart Disease (2) II. Bogren
Lecture/discussion—5 hours (for 3 weeks). Prerequisite: fourth-year medical student in good academic standing and course 461 (may be taken concurrently). Main emphasis on radiology of acquired and congenital heart disease, but also on magnetic resonance, nuclear medicine, and echocardiography of heart diseases. (S/U grading only.)

498. Group Study in Diagnostic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

499. Research in Diagnostic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

Radiology—Nuclear Medicine (RNU)

Upper Division Courses

101. Biomedical Radiochemistry (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmaco-dynamics and radioimmunoassay. (Same course as 401.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (S. DeNardo in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Stadalnik in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Course

299. Research: Special Study for Graduate Students (1-12) I, II, III, IV. The Staff (Director in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

401. Biomedical Radiochemistry (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate and medical students; consent of instructor. Approved for graduate degree credit. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radioimmunoassay. (Same course as 101.)

411. Radiological Physics I (Physics of Nuclear Medicine) (5) I. Bushberg, Vera
Lecture—43 hours total; laboratory—12 hours total. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimeters; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at UC Davis Medical Center. Offered in alternate years. (S/U grading only.)

463. Clinical Clerkship in Nuclear Medicine (9 or 18) I, II, III, IV. Shelton
Clinical activity—full time (3 days per unit). Prerequisite: satisfactory completion of second year of Medical School or the equivalent; consent of instructor. Clerkship correlates radioisotopic methods with clinical, pathophysiologic, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. Limited enrollment with preference to students enrolling for 18 units.

498. Group Study in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

499. Research in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

Surgery (SUR)

Upper Division Courses

192. Internship in General Surgery (1-12) I, II, III, IV. The Staff
Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only.)

199. Special Study in General Surgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

Graduate Course

299. Research (1-12) I, II, III, IV. Wolfe in charge
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

419. Introduction to Clinical Surgery (1-6) I, II, III, IV. Ward
Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the most common surgical diseases. Course will afford opportunity to review surgical patients and discuss them with members of staff.

430. Surgery Clerkship (12) I, II, III, IV. Holcroft
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Eight-week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, Consult, Transplant and Trauma. Clerkship assignments are at UCDMC and Highland. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients.

433. Surgery Continuum Clerkship (6) I, II, III, IV. The Staff
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Four-week general surgery clerkship which may include GI, Burn, Oncology, Plastics, Vascular, Cardiothoracic, Consult, Transplant and Trauma. Clerkship assignments are at UCDMC and Highland. Daily core material presentations and reading assignments. Student involvement includes workup and care of surgical patients.

460A. Clinical Surgical Elective (6-18) I, II, III, IV. Benfield
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430. Rotation through Surgery Specialty Clinics: Vascular, GI, GU, Thoracic, Plastic, Radiotherapy. Student works up one new and two return visit patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussions.

461. Surgery Burn Unit Clerkship (6 or 9) I, II, III, IV. The Staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student functions as an extern in the eight-bed Burn Unit; learns principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

462. Surgery Trauma Service Clerkship (6 or 9) I, II, III, IV. Blaisdell and staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student works as an extern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off.

463. Surgery Intensive Care Unit (6 or 9) I, II, III, IV. Holcroft and staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgery ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients.

464. General Surgery Clerkship: Kaiser Hospital (6 or 9) I, II, III, IV. The Staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student participates with University residents on the teaching services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical, general surgical problems and participate in their care.

*Course not offered this academic year.

466. General Surgery Clerkship: Travis AF Base Hospital (6 or 9) I, II, III, IV. Kline, Holcroft
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Opportunity to participate on the surgical service of our affiliated Air Force Hospital. The program has a large number of general surgery problems and provides a broad clinical experience in surgery.

467. Surgical Oncology (3-9) I, II, III, IV. Goodnight and staff.
Clinical activity—full time (2 to 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Students actively participate in management of patients requiring surgery for cancer, endocrine disease and selected general surgical problems. Cases include malignant melanoma, sarcomas, gastrointestinal cancer, head and neck pathology, and metastatic malignancies. Attending rounds daily. Four teaching conferences weekly.

468. Cardiothoracic Surgery Clerkship (6-9) I, II, III, IV. Benfield
Clinical activity—full time (4 to 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student works as an extern on the Cardiothoracic Surgical Service, participating in perioperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted.

469. Trauma Service: East Bay (6-9) I, II, III, IV. Organ and staff
Clinical activity—full time. Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430 and Internal Medicine 430. Student works as an extern on the Trauma Service at Highland General Hospital (Oakland) participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on and 24 hours off.

470. General Surgery: East Bay (6-9) I, II, III, IV. Organ
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430. Student will work as an extern on one of the two general surgery services and participate in the pre-operative evaluation, intra-operative management, and post-operative care of surgical patients.

471. Gastrointestinal Surgery (3-9) I, II, III, IV. Wolfe
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430, Internal Medicine 430 and Pediatrics 430. Student participates on the GI Surgery Service, working under the immediate supervision of the faculty and surgical housestaff, involving the full spectrum of gastrointestinal diseases performed by the medical student.

472. Vascular Surgery (3-9) I, II, III, 8IV. Holcroft
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430, Internal Medicine 430 and Pediatrics 430. Student participates on the vascular surgery service and in the management and operations of arterial and venous system, exclusive of diseases that require cardiopulmonary bypass for treatment. Includes patient care responsibilities with appropriate supervision.

473. Surgery Intensive Care Unit (6-9) I, II, III, IV. Organ
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430 and Internal Medicine 430. Student functions as an extern on the surgical ICU service, participating in the clinical management of critically ill patients in the SICU and participating in ICU procedures with appropriate supervision.

478. Surgical Preceptorship: Off Campus (6-18) I, II, III, IV. Holcroft
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preoperative, operative and post-operative care of surgical patients under the supervision of attending staff.

480. Insights in Surgery (1-3) I, II, III, IV. The Staff
Clinical activity—3 to 9 hours. Prerequisite: medical student in good academic standing and consent of instructor. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (S/U grading only.)

494H. Fourth-Year Surgical Honors Program (18) I, II, III, IV. Holcroft
Prerequisite: completion of third year of medical school with superior performance on course 430; consent of instructor. To provide intensive and comprehensive training in surgery to students interested in a postgraduate surgical career, that would enable them to succeed during the internship and residency training. (S/U grading only.)

498. Group Study (1-5) I, II, III, IV.
Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (S/U grading only.)

499. Laboratory Research (1-12) I, II, III, IV. Holcroft and staff
Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (S/U grading only.)

Urology (URO)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. deVere White
Prerequisite: consent of instructor. (P/NP grading only.)

Professional Courses

400. Office Urology (1) I, II, III, IV. deVere White
Clinical activity—4 hours in afternoons (6 weeks). Prerequisite: fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized.

460. Urology Clinical Clerkship (5-18) IV, I, II, III. deVere White
Clinical activity—full time. Prerequisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. Limited enrollment.

461. Externship in Urology (5-18) I, II, III, IV. deVere White
Clinical activity—full time. Prerequisite: fourth-year medical students with consent of instructor. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit.

499. Research in Urology (1-12) I, II, III, IV. deVere White
Research—3-36 hours. Prerequisite: medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics.

Medicine and Epidemiology

(School of Veterinary Medicine)

Anthony A. Stannard, D.V.M., Ph.D., Chairperson of the Department

Department Office, 2102 Tupper Hall (916-752-1363)

Faculty

Alexander A. Ardans, D.V.M., M.S., Professor
Dale L. Brooks, D.V.M., Ph.D., Lecturer
Gary P. Carlson, D.V.M., Ph.D., Professor
Tim Carpenter, Ph.D., Professor
Jim Case, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Medicine
Larry D. Cowgill, D.V.M., Ph.D., Associate Professor
Nancy E. East, M.S., D.V.M., M.P.V.M., Professor
Pamela H. Eisele, D.V.M., Associate Clinical Professor
Laurence R. Enos, Pharm.D., Lecturer
Edward Feldman, D.V.M., Professor
Ian Gardner, D.V.M., M.P.V.M., Ph.D., Associate Professor
Lisle W. George, D.V.M., Ph.D., Professor
Ronald P. Hedrick, Ph.D., Professor
David Hird, D.V.M., M.P.V.M., Ph.D., Professor
Peter J. Ihrke, V.M.D., Professor
Mark D. Kittleson, D.V.M., M.S., Ph.D., Professor
Gerald V. Ling, D.V.M., Professor
John Madigan, M.S., D.V.M., Professor
Stanley L. Marks, B.V.Sc., Ph.D., Assistant Professor
Richard W. Nelson, D.V.M., Professor
Niels C. Pedersen, D.V.M., Ph.D., Professor
Lyndsay G. Phillips, D.V.M., Associate Professor
Jeffrey A. Roberts, D.V.M., Associate Clinical Professor
Bradford P. Smith, D.V.M., Professor
Sharon J. Spier, D.V.M., Ph.D., Associate Professor
Anthony A. Stannard, D.V.M., Ph.D., Professor
Lisa A. Tell, D.V.M., Assistant Professor
William P. Thomas, D.V.M., Professor
Mark Thurmond, D.V.M., M.P.V.M., Ph.D., Professor
James F. Wilson, D.V.M., J.D., Lecturer
W. David Wilson, B.V.M.S., M.R.C.V.S., Professor

Emeriti Faculty

Murray E. Fowler, D.V.M., Professor Emeritus
Donald G. Low, D.V.M., Ph.D., Professor Emeritus
William R. Pritchard, D.V.M., Ph.D., J.D., Professor Emeritus
Livio G. Raggi, D.V.M., Ph.D., Professor Emeritus
Edward A. Rhode, D.V.M., Professor Emeritus
Donald R. Strombeck, D.V.M., Ph.D., Professor Emeritus

Affiliated Faculty

Patricia C. Blanchard, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology
Autumn P. Davidson, D.V.M., Associate Clinical Professor
Judith Daviau, D.V.M., Lecturer
Richard W. Ermel. D.V.M., M.P.V.M., Ph.D., Associate Clinical Professor
Carolyn S. Friedman, Ph.D., Assistant Adjunct Professor
Sharon K. Hietala Ph.D., Associate Professor of CInical Diagnostic Pathology
Douglas R. Mader, M.S., D.V.M., Associate Clinical Professor
Ellen Sparger, D.V.M., Ph.D., Assistant Adjunct Professor
Celia R. Valverde, D.V.M., Associate Clinical Professor
Johanna Watson, D.V.M., Ph.D., Assistant Clinical Professor

Courses in Medicine and Epidemiology (VME)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

217. Evaluation of Diagnostic Tests (2) III. Gardner
Lecture/discussion—1.7 hours; laboratory—1 hour. Prerequisite: consent of instructor. Topics include sensitivity, specificity, predictive values, Bayes' Theorem, RDC curves, measuring agreement between tests, series and parallel testing strategies. Emphasis on rational interpretation and presentation of test results for individuals and aggregates. Offered in alternate years.

255. Animal Health Economics (3) III. Carpenter
Lecture—3 hours. Prerequisite: consent of instructor. Basic concepts of microeconomics (production and cost functions, firm decision making, and the market place) as they relate to animal health are considered. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

294B. Conservation Biology and Veterinary Medicine (1) II. Boyce
Seminar—1 hour. Discussion of current topics in conservation biology as they relate to veterinary medicine; the emphasis is on wildlife. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

397T. Tutoring in Veterinary Medicine and Epidemiology (1-5) I, II, III. The Staff
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

Professional Courses

401. Small Animal Clinics (1.5 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Resident responsible for diagnoses, medical and surgical treatment of animals in the wards and outpatient clinic, including history taking, physical examinations, laboratory tests, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (S/U grading only.)

402. Large Animal Medicine (1.5 per week) I, II, III. The Staff (Smith in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the VM Teaching Hospital and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (S/U grading only.)

403. Small Animal Medicine (1.5 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of animals in the wards and outpatient clinic including physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (S/U grading only.)

410. Management of Captive Wild Animals (2) II. Brooks
Lecture—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to management and husbandry dynamics as a prerequisite for preventive health programs in zoos, aquaria, vivaria, and other environments for exotic pets and wild animals.

411. Laboratory Animal Medicine (2) II. Brooks
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnostic, therapeutic and preventive methods for diseases of rabbits, guinea pigs, hamsters and certain related laboratory rodents will be presented to serve the needs of clinical and research veterinarians. Lecture demonstrations with subject species will be provided.

412. Laboratory Animal Medicine (2) III. Brooks
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats and other laboratory species. Emphasis will be placed on animal colony health management technique, and concepts of preventive disease needed by veterinarians in charge of research facilities.

413. Medical Primatology (2) III. Roberts
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Major diseases, medical management and husbandry of captive non-human primates. (S/U grading only.)

414. Applications of Epidemiologic Methods to Herd Health (3) III. Gardner
Lecture/discussion—2 hours; fieldwork—2 hours. Prerequisite: Epidemiology and Preventive Medicine 405 and 406 or the equivalents or consent of instructor. Epidemiologic applications to health and production problems in animal populations. Topics include test enterpretation, decision-tree analysis, time trend analysis, disease reporting, investigation of chronic diseases, microcomputer programs for herd health.

415. Management and Diseases of Captive Wildlife (2) II. Phillips
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Defining the role of the veterinarian in the health care and management of captive wildlife species in both private and zoological collections. Lectures concentrate on nondomestic mammalian species, stressing a preventive medical approach, including management of captive environment, infectious and non-infectious disease, anesthesiology, diagnostic techniques/approaches.

416. Aquatic Animal Medicine (2) III. Hedrick
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish and of some aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

417. Companion Avian Medicine (2) II. Tell
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Diseases, diagnostics, medical management and surgery of psittacine species. Avian nutrition, husbandry, and management.

421. Veterinary Dermatology (0.75 per week) I, II, III. Stannard
Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents are responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff dermatologist. (S/U grading only.)

***423. Pulmonary Diseases** (0.75 per week) I, II, III. Laboratory—25 hours. Prerequisite: professional standing intern in Veterinary Medical Teaching Hospital, or consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and clinical signs. (S/U grading only.)

425. Zoo and Wildlife Medicine (0.75 per week) I, II, III. Phillips
Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for assisting in handling and treatment of clinic cases and for learning the techniques of manual and chemical restraint of a wide variety of mammals, birds, reptiles, and fish. Medication problems, anesthetic techniques, and surgical procedures will be discussed and practiced. (S/U grading only.)

428. Food Animal Surgery (1.6) III. Smith
Lecture—16 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Selected topics in surgical diseases of food animals covered in detail. (S/U grading only.)

428L. Food Animal Surgery Laboratory (0.7) III. Smith
Laboratory—7 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 428 (concurrently). Representative surgeries of food animals performed by groups of students. Limited enrollment. (S/U grading only.)

429A. Herd Health Management of Beef, Cattle, Swine, Sheep, and Goats (4) II. East
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary service to feedlot, cow-calf, stocker, swine, sheep, and goat production units are considered, with emphasis on prevention and control of disease.

430. Raptor Medicine and Rehabilitation (2) III. Brooks
Lecture—2 hours. Biology, behavior, parasites, diseases, toxins, iatropenic conditions, diagnostics, treatments, nursing, housing, nutrition, rehabilitation and release techniques for eggs, orphans and adult native California raptors.

432A-432B-432C. Raptor Clinics (1-1-1) I-II-III. Brooks
Laboratory—3 hours. Prerequisite: students in the School of Veterinary Medicine or consent of instructor. Serves as student treatment crew for the Raptor Center, providing hands-on experience with handling, restraint and treatment for ill and injured birds of prey with the goal of rehabilitation and release back into their native habitat. (S/U grading only.)

446. Small Animal Reproduction (1) III. Feldman
Lecture—7 hours; discussion—1 hour; laboratory—2 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides a complete description (history, physical examination, laboratory abnormalities, etc.) of the common abnormalities associated with the genital tract of male and female dogs and cats.

448A. Small Animal Medicine–Level I (6) I. Nelson
Lecture—5 hours (for 12 weeks). Prerequisite: Veterinary Medicine 447. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of dogs and cats. Course is a core option for the professional veterinary curriculum and preparatory for advanced courses in small animal medical diagnoses and therapeutics.

448B. Small Animal Medicine—Level II (5.3) II. Ihrke, Cowgill
Lecture—29 sessions; discussion—19 sessions; laboratory—5 sessions. Prerequisite: Veterinary Medicine 447 and course 448A. Medical diseases of the dog and cat. Differential diagnosis of common "signs and symptoms" in small animal veterinary practice. Emphasis on integration of the systemic organ systems approach to medical diagnosis.

449A. Large Animal Medicine–Level 1 (6.1) I. Wilson
Lecture—5 hours (for 12 weeks); laboratory—3 hours (for 2 weeks). Prerequisite: Veterinary Medicine 447. Instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation,

*Course not offered this academic year.

treatment, prevention, and control of important infectious and non-infectious diseases of food animals and horses. A problem-based approach to differential diagnosis will be emphasized.

449B. Level II Advanced Equine Medicine (4.9) II. Madigan
Lecture—49 hours total. Prerequisite: course 449A. Instruction in the medical aspects of equine practice including large and small farm management practices, sports medicine principles and applications, perinatology and neonatology, and the etiology, epidemiology and control of various infectious and noninfectious conditions of the equine.

449L. Level II Advanced Equine Medicine Laboratory (0.6) II. Madigan
Laboratory—6 sessions. Prerequisite: course 449A, course 449B concurrently. Clinical presentation and instruction in treatment of the medical aspects of equine practice. (S/U grading only.)

450. Small Animal Clinical Immunology (2.2) III. Pedersen
Lecture—16 hours; laboratory—6 sessions. Prerequisite: basic immunology. Comprehensive discussion of the basic mechanisms of immunologic diseases in animals and description of common immunologic diseases, including clinical presentation, diagnosis and treatment. Emphasis on small animals and analogous disorders of humans. (S/U grading only.)

457. Veterinary Business Management (2) II. Wilson
Lecture—10 two-hour sessions. Prerequisite: third- or fourth-year standing in School of Veterinary Medicine or consent of instructor. Course presents a groundwork of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, medical record-keeping, money management, business and personal insurance, client relations and tax law. (S/U grading only.)

481A-481B-481C. Clinic Rounds (1-1-1) I-II-III. Ling, Smith
Discussion—1 hour. Prerequisite: first- or second-year standing in the School of Veterinary Medicine. Discussion of selected small and large animal cases from the Veterinary Medicine Teaching Hospital. May be repeated once for credit. (S/U grading only.)

485. Advanced Clinical Nutrition (2) II. Marks
Lecture—14 sessions; laboratory—2 three-hour sessions; discussion—2 two-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or graduate student with consent of instructor. Advanced training in the principles and practice of small animal clinical nutrition. (S/U grading only.)

486A. Equine Clinical Neonatology (1) II. Madigan
Discussion—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. (S/U grading only.)

486B. Equine Clinical Neonatology (1) III. Madigan
Discussion—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. (S/U grading only.)

487. Comparative Bio-Medical: Form and Function (2) III. Roberts
Lecture—1 hour; discussion—2 hours. Prerequisite: first- or second-year standing in the School of Veterinary Medicine or consent of instructor. Introduction and basic prerequisite for Zoological Medicine courses, involving comparative biology recommended concepts for nontraditional animal species or alternative pets, zoos, rehabilitation centers, aquaculture, laboratory animals, and non-human primates. (S/U grading only.)

488. Nondomestic Pet Animal Medicine (2) III. Phillips
Discussion—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Discussion of practical medical and surgical management of common spontaneous and infectious diseases of nondomestic pets.

489. Personal, Financial, and Professional Development (1) I. Wilson
Lecture—1 hour. Prerequisite: third-year standing in the School of Veterinary Medicine. Focus on skills essential for successful careers in veterinary medicine. Includes personal finance and investment strategies; understanding personal taxation; bookkeeping and accounting; insurance needs; and stress management. (S/U grading only.)

491. Small Animal Grand Rounds (0.5) I, II, III. The Staff (Ling in charge)
Discussion—1 hour. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (S/U grading only.)

492. Large Animal Grand Rounds (0.5) I, II, III. The Staff (Carlson in charge)
Discussion—1 hour. Prerequisite: professional standing resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. May be repeated for credit. (S/U grading only.)

493. Seminar In Veterinary Medicine (1) I, II, III. The Staff (Cowgill and Spier in charge)
Seminar—2 hours. Prerequisite: professional standing; resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (S/U grading only.)

Medieval Studies

(College of Letters and Science)

Winfreid Schleiner, Ph.D., Program Director

Program Office, 522 Sproul Hall (916-752-1219)

Committee in Charge

Samuel G. Armistead, Ph.D. *(Spanish)*
Dennis Dutschke, Ph.D. *(Italian)*
Ingeborg Henderson, Ph.D. *(German)*
Phyllis Jestice, Ph.D. *(History)*
Winder McConnell, Ph.D. *(German)*
Marijane Osborn, Ph.D. *(English)*
Larry Peterman, Ph.D. *(Political Science)*
Kevin Roddy, Ph.D. *(Medieval Studies)*
Peter Schaeffer, Ph.D. *(German)*
Brenda Schildgen, Ph.D. *(Comparative Literature)*
Raymond Waddington, Ph.D. *(English)*

Affiliated Faculty

Patricia McKinnon, Ph.D. *(Comparative Literature)*
Kevin Roddy, Ph.D., *Academic Federation Excellence in Teaching Award*
Brenda Schildgen, Ph.D. *(Comparative Literature)*

The Major Program

The major in medieval studies introduces students to the main features of European civilization during the period from the fall of Rome to the beginnings of the Renaissance. The program involves studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

The Program. The major gives students a broad view of the period and to allow for the flexibility necessary to accommodate their individual interests. The program offers a series of medieval studies courses providing an excellent introduction to the major, and preparation for advanced work within the individual disciplines. On the upper division level, each student completes course work in specific areas of history (the fall of Rome to the Renaissance), literature (Old and Middle English, including English, French, German, Italian, Russian, Latin), philosophy and religion, arts and language, and political thought. In addition, each student may complete a senior thesis on some selected aspect of medieval culture.

Career Alternatives. The major in medieval studies is a liberal arts degree providing excellent preparation for the rigors of the professional schools as well as careers in law, library science, museology, journalism, and teaching.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter
Recommended: Art 1B, History 4A, Philosophy 21, Medieval Studies 20A, 20B, 20C, Religious Studies 10.
Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval field.

Depth Subject Matter 52
History, at least 12 units from History 102B, 121A, 121B, 121C, 201B 12
Literature: at least 16 units, including two courses from each of two of the following 16
(a) English 111, 113A, 113B, 150A, 188, 189; *(b)* French 115, 141; *(c)* German 120, 122; *(d)* Italian 113, 115A, 115B, 139B, 140; *(e)* Latin 101, 102, 103, 104, 105, 106, 108, 109, 111A, 111B, 111C, 112, 114, 115, 116.
Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190; Religious Studies 102, 110 8
Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B; Dramatic Art 156, German 106; Music 121 (note prerequisite), 199; Rhetoric and Communication 110, 111 8
Political thought, at least one course from Political Science 115, 116, 118A 4
Senior thesis, Medieval Studies 190 4
Total Units for the Major 52

Major Advisers. W. McConnell *(German)*, P. Jestice *(History)*, K. Roddy *(Medieval Studies)*.

Minor Program Requirements:

UNITS

Medieval Studies 24
The minor in Medieval Studies is a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, drama, history, literature, music, national languages, philosophy, political theory, religious studies and rhetoric. Courses must be upper division and chosen from at least two of these subject areas, and they must be within the three periods of Early Medieval Culture, culture of the High Middle Ages, and Medieval transformations. Students may also select a minor with a thematic emphasis.

There is no foreign language requirement for the minor, although knowledge of Latin or a European language is recommended.

The minor must be designed in consultation with a Department Adviser.

Minor Advisers. D.J. Dutschke *(Italian)*, W. McConnell *(German)*, M. Osborn *(English)*, Kevin Roddy *(Medieval Studies)*.

Courses in Medieval Studies (MST)

Lower Division Courses

20A. Early Medieval Culture (4) I. Roddy
Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the Codes of Justinian, the *Confessions* of Saint Augustine, *The Consolation of Philosophy* of Boethius, *Beowulf,* the *Nibelungenlied,* and the *Song of Roland.* GE credit: ArtHum, Wrt.

***20B. The Culture of the High Middle Ages** (4) II. Roddy
Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the *Summa Theologica* of Thomas Aquinas, the *Chronicles* of Froissart, *The Canterbury Tales* of Chaucer, and the *Divine Comedy* of Dante. GE credit: ArtHum, Wrt.

20C. Medieval Transformations (4) III. Roddy
Lecture—3 hours; discussion—1 hour. The great medieval transformations that took place before the Renaissance. Topics will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields. GE credit: ArtHum, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

120A-F. The Medieval World (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours: discussion—1 hour; term paper. Course deals with selected themes from the Middle Ages: the Fall of Rome to the beginning of the Renaissance. Subjects will vary from year to year and cover such topics as

- **(A)** The Monastic Orders;
- *** (B)** Origins of Universities;
- *** (C)** The Seven Liberal Arts, and their Significance in the Middle Ages;
- *** (D)** Family and Society;
- **(E)** Chivalry; and
- *** (F)** Church and State.

GE credit for 120A or 120D or 120E: ArtHum, Wrt.

130A. Special Themes in Medieval Cultures (4) III. McConnell
Lecture—3 hours; discussion—1 hour. Each offering concentrates on an interdisciplinary aspect of medieval culture in the Middle East and Europe: the idea of the hero, mysticism, urban development. Extensive readings focused on medieval source material. May be repeated for credit. GE credit: ArtHum, Wrt.

130B. Special Themes in Renaissance Culture (4) II. Schleiner
Lecture—3 hours; discussion—1 hour. Each theme illuminates an interdisciplinary aspect of Renaissance culture in the eastern and western hemispheres: exploration, medical pathology, daily life, baroque culture. Immersion in source material from 1500-1650. May be repeated for credit. GE credit: ArtHum, Wrt.

190. Senior Thesis (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge.

197T. Tutoring in Medieval Studies (1-4) II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Mexican-American (Chicano) Studies

See Chicana/Chicano Studies

Microbiology

See Biological Sciences—Microbiology; Medical Microbiology (Medicine, School of); Microbiology (A Graduate Group); and Pathology, Microbiology and Immunology (Veterinary Medicine)

Microbiology (A Graduate Group)

Douglas C. Nelson, Ph.D., Chairperson of the Group

Group Office, 156 Hutchison Hall (Microbiology Section), (916-752-0262)

Faculty. Participating faculty are in the Colleges of Letters and Science and Agricultural and Environmental Sciences, and the Schools of Veterinary Medicine and Medicine.

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to doctoral applicants. The group offers study in general microbiology, microbial physiology, microbial genetics, molecular mechanisms of microbial regulation, molecular mechanisms of microbial pathogenesis, immunology, virology, and recombinant DNA technology. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the group.

Graduate Advisers. S. Dandekar *(Infectious and Immunologic Diseases),* R.B. LeFebvre *(Pathology, Microbiology and Immunology),* D.M. Ogrydziak *(Food Science and Technology),* C.W. Price *(Food Science and Technology),* K.M. Scow *(Land, Air and Water Resources).*

Courses in Microbiology (MIB)

Graduate Courses

290C. Advanced Research Conference (1) I, II, III. The Staff
Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff
Research under the guidance of dissertation committee. (S/U grading only.)

Military Science

(College of Letters and Science)

Reserve Officers' Training Corps (ROTC), Army

Ronald R. Porter, Lt. Col., Chairperson of the Department

Department Office, 125 Hickey Gymnasium (916-752-0541)

Faculty

Captain James M. Desjardin, Assistant Professor
Captain Bret T. Ninomiya, Assistant Professor
Lieutenant Colonel Ronald R. Porter, Professor
Major Victor B. Scott, Associate Professor

Program of Study

The Military Science Department offers hands-on training in management and leadership. The program stresses the following leadership dimensions: oral and written communications, oral presentations (formal briefings), initiative, sensitivity, influence, planning and organizing, delegation, administrative control, problem analysis, judgement, decisiveness, physical stamina, mission accomplishment, and followership. Also stressed are current events, national and international politics, military affairs, ethics training, and human relations with emphasis on eliminating racial and gender discrimination. Management and leadership are taught using the U.S. Army as a model. Military skills (such as drill and ceremonies, map reading, and squad tactics) are taught to the extent necessary to create an environment where students can enter leadership positions and apply theories taught in the classroom. Students learn by doing. The program assists students in all academic fields to prepare for positions of leadership in military or civilian careers.

The department offers two program tracks: *(1)* a purely academic track, and *(2)* a precommissioning track for those desiring a commission in the U.S. Army. The academic track entails no obligation to the military and is open to all students. Students pursuing the academic track do not wear a uniform or otherwise participate in extra-curricular activities designed as part of the precommissioning process. Activities for all students include the Ranger Club (a club designed for adventure activites such as rappelling, white-water rafting, orienteering, and patrolling) and intramural sports teams.

Students who desire a commission in the U.S. Army participate in both the academic portion of the program and in the leadership laboratories and extra-curricular activities designed to enhance their leadership and technical skills. They wear uniforms to leadership laboratories and selected classes and become ROTC cadets. Students may be cadets in the lower division courses without incurring a military obligation. Students participating in the upper division precommissioning program incur a military obligation. See below for details. Extra-curricular activites for cadets include an intercollegiate sports team (Ranger Challenge), the university color guard, a military honor society, a rifle/pistol team, and opportunities to participate in field training exercises.

Department Programs

Students are enrolled in military science under one of two programs.

Four-Year Program

Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. **There is no military obligation associated with attendance in lower division courses.** Admission to the advanced course (upper division) is by application from second-year lower division students who meet the academic, physical, and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service

experience, upon approval by the Department Chairperson.

Upper division students receive $150 subsistence per month after executing a contract agreeing to complete the course and **accept a commission if offered.** During the course all military science text books, uniforms and equipment are provided without cost. Students are given leadership development experience at summer camp (advanced camp) between their third and fourth years of the course. Emphasis is on individual participation, leadership development and the capability to function effectively in positions of significant responsibility.

Two-Year Program

This program is designed for students who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp (basic camp) which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during the winter and spring terms of the year preceding enrollment in the two-year program. All other provisions explained above for the upper division course apply to the two-year program.

Scholarship Program

The U.S. Army offers four- and two-year Active Duty and two-year Reserve Forces Duty scholarships to students planning to attend or attending UC Davis. The U.S. Army ROTC scholarship package pays tuition and educational fees and is awarded in three different levels of annual payment, $12,000 (Tier I), $9,000 (Tier II), and $5,000 (Tier III). All applicants will be considered for each level. Also included in all scholarships is a flat rate of $450 per year for textbooks, up to $400 per year for miscellaneous fees such as laboratory, student activity, transcript, and graduation fees, and a subsistence allowance of $150 a month for 10 months for each year that the scholarship is in effect.

The Army Reserve Officers' Training Corps four-year Active Duty merit scholarships are awarded to qualified high school seniors in a national competition each year. There are two cycles available for submission of the four-year scholarship application. High school juniors can compete for an Early Cycles scholarship by submitting their application complete and postmarked by July 15 between their junior and senior years. Applicants will receive notification of their final status by November 1. As high school seniors, students compete for the Regular Cycle scholarship by submitting their application complete and postmarked by December 1. Those applicants not selected in the Early Cycle are considered in the Regular Cycle competition. Applicants will receive notification of their final status by March 1 of their senior year in high school. Interested applicants should see their high school counselor for an application or contact UC Davis, Department of Military Science at 916-752-7682.

The three-year Active Duty and two-year Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from a junior college to UC Davis, and have three or two years remaining before graduating with a baccalaureate. Students interested in competing for these scholarships can submit their application beginning in November of each school year. The deadline for submission of an application is January 15 for the two-year scholarship and February 15 for the three-year scholarship. Additionally, students may win a two-year scholarship at the six-week summer camp (basic camp) in the Two-Year Program mentioned above. Students apply for these Army scholarships through the Military Science Department.

Leadership Laboratory

During the course of the school year, several weekends and two hours per week are spent in the conduct of practical exercises. Classes emphasize adventure activities including offense, defense and patrolling techniques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and land navigation. All cadets are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at the Army ROTC Advanced Camp, held at Fort Lewis, Washington.

Military Qualifications Standards (MQS) System

During the program of study, students will become familiar with the MQS System, which is designed to articulate skills and knowledge that are required of ROTC commissionees to begin military service. The components of the MQS System include: military skills, professional knowledge, and a professional military education.

The military skills component consists of 73 military skills which are categorized into 12 subject areas. They are basic soldiering tasks fundamental to the military professional and serve as the basis for future branch-directed specialty training.

The 24 professional knowledge subjects familiarize cadets with the history, customs and traditions, leadership and ethics, administration, organization, and training of the U.S. Army.

The professional military education component consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of five designated fields of study. Cadets must take a course in written communication, military history, human behavior, math reasoning, and computer literacy.

Academic Credit

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unrestricted elective units available in the curriculum being followed.

School of Veterinary Medicine. The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

Courses in Military Science (MSC)

Lower Division Courses

11. Roles and Organization of the U.S. Army (1) I.
Lecture—1 hour. Prerequisite: lower division standing. Constitutional and legal basis of the Army, organization and strategic roles in times of war and peace, and "total Army" concept. Impact of civil-military relations and Soviet military power on role of Army studied in context of current problems.

12. Introduction to Military Leadership (2) I.
Lecture—2 hours. Prerequisite: lower division standing, and consent of instructor. Introduction to leadership theories used in military organizations. Course surveys the duties and rsponsibilities of junior Army officers, the general environment in which they work, and leadership roles performed. Introduces military map reading skills.

13. Introduction to Basic Military Operations (1) III.
Lecture—1 hour. Prerequisite: lower division standing. Basic military tactical theories and their application at the individual and squad level. Course introduces military tactical operations, and covers military first aid. Principles of war as introduced in course 11 are applied to offensive and defensive tactics.

14A. Introduction to Military Leadership Skills (0.5) I.
Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervised leadership experiences conducted in a military environment. Basic military skills necessary to function in a leadership role are also covered. (P/NP grading only.)

14B. Introduction to Military Leadership Skills (0.5) II.
Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Development of leadership and military skills introduced in course 14A is continued with emphasis on the individual's role in the squad, the basic organizational element of the Army. As students gain capabilities, supervisory controls are reduced. (P/NP grading only.)

14C. Introduction to Military Leadership Skills (0.5) III.
Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Students demonstrate skill levels required for promotion to non-commissioned officer level. Use of chain of command from company through individual levels emphasized. Interrelationship of squad and platoon organizations is explored. (P/NP grading only.)

21. Military History (2) III.
Lecture—2 hours. Prerequisite: lower division standing; course 11 or consent of instructor. Survey of military history from 1900 to present, focusing on World War I, World War II, the Korean War, and the Vietnam War.

22A. Intermediate Military Leadership and Operations I (2) II.
Lecture—2 hours. Prerequisite: lower division standing; course 12 or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers.

22B. Intermediate Military Leadership and Operations II (2) I.
Lecture—2 hours. Prerequisite: lower division standing; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits identified in course 22A are studied in more depth enabling each student to improve on targeted weaknesses. Instruction is presented in intermediate defensive tactics at the squad level.

24A. Individual Military Leadership Skills (0.5) I.
Laboratory—2 hours. Prerequisite: lower division standing; courses 14A, 14B, 14C and 21, or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers. (P/NP grading only.)

24B. Individual Military Leadership Skills (0.5) II.
Laboratory—2 hours. Prerequisite: lower division standing; courses 14A, 14B, 14C and 21, or consent of instructor. Personal supervisory and leadership styles are developed in a supervised laboratory environment. Students are rotated through squad and team-level supervisory positions, given responsibility concomitant with positions. (P/NP grading only.)

24C. Individual Military Leadership Skills (0.5) III.
Laboratory—2 hours. Prerequisite: lower division standing; courses 14A, 14B, 14C and 21, or consent of instructor. Students are prepared for transition from junior leader to senior non-commissioned officer. Chain of command and hierarchical responsibilities and reporting requirements are demonstrated in a laboratory setting. (P/NP grading only.)

Upper Division Courses

131. Advanced Military Leadership and Management (2) III.
Lecture—2 hours. Prerequisite: upper division standing; course 22A or consent of instructor. Course addresses different types of power and influence a military leader may use, reviews counseling techniques, and introduces basic management skills. Instruction provided on the various branches in which a commissioned officer may serve.

132A. Advanced Military Operations (2) I.
Lecture—2 hours. Prerequisite: upper division standing; course 22B or consent of instructor. First phase of advanced military tactical operations. Advanced work on topographical maps, navigation, and orienteering techniques. Instruction is also provided on resource planning techniques and military intelligence.

132B. Advanced Military Operations (2) II.
Lecture—2 hours. Prerequisite: upper division standing; course 132A or consent of instructor. Continuation of course 132A. Military tactical theories and their application in offense and defense are presented at the platoon and company level. Course covers in-depth analysis of the principles of war related to offensive and defensive operations.

134A. Military Organizational Leadership Skills (0.5) I.
Laboratory—2 hours. Prerequisite: upper division standing; courses 24A-24B-24C or consent of instructor. Students develop interpersonal and management skills by practical application of leadership of military organizations in a supervised leadership laboratory. Advanced-level military skills presented. Students fulfill the roles of senior non-commissioned officers. (P/NP grading only.)

134B. Military Organizational Leadership Skills (0.5) II.
Laboratory—2 hours. Prerequisite: upper division standing; courses 24A-24B-24C or consent of instructor. As more complex material is presented in classroom, the laboratory environment becomes more challenging. Students serve as senior non-commissioned officers in squad, platoon and company levels, given appropriate authority and responsibility. (P/NP grading only.)

134C. Military Organizational Leadership Skills (0.5) III.
Laboratory—2 hours. Prerequisite: upper division standing; courses 24A-24B-24C or consent of instructor. Students prepared for advanced summer training experience by extensive requirements to plan, organize and conduct military operations in field environments; individual leadership potential is closely assessed in the laboratory environment. (P/NP grading only.)

141. U.S. Army Management Systems (2) III.
Lecture—2 hours. Prerequisite: upper division standing and course 131. Army decision making, personnel and equipment management. Includes command and staff functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

142. Military Law (2) II.
Lecture—2 hours. Prerequisite: upper division standing and course 141. Analysis of the American Military Justice System, the Uniform Code of Military Justice, the Hague and Geneva Conventions, and customary law of war. Includes detailed study of selected procedures of military justice system.

143. Military Ethics and Professionalism (2) I.
Lecture—2 hours. Prerequisite: upper division standing and course 142. Profession of arms, its characteristics, uniqueness, roles, and responsibilities. Discussion topics include the professional soldier's responsibilities to the Army and the Nation, and the need for ethical conduct. Case studies are used to develop ethical decision making skills.

144A. Military Training Leadership Skills (0.5) I.
Laboratory—2 hours. Prerequisite: upper division standing; courses 134A, 134B, 134C, and 141. Develops and exercises the leadership skills necessary to plan, coordinate and conduct a training program through practical application under supervision. Emphasis on analysis of objectives, instructor planning, media utilization and evaluation of learning. Students perform as cadet officers. (P/NP grading only.)

144B. Military Training Leadership Skills (0.5) II.
Laboratory—2 hours. Prerequisite: upper division standing; courses 134A, 134B, 134C, and 141. Requirements for training of all other levels of the cadet corps are given to students for conduct in laboratory environment (under supervision). Students placed in realistic role of junior officer with appropriate level of responsibility. Students perform as cadet staff officers. (P/NP grading only.)

144C. Military Training Leadership Skills (0.5) III.
Laboratory—2 hours. Prerequisite: upper division standing; courses 134A, 134B, 134C, 141. Final laboratory in military science sequence; students are prepared for final testing and certification prior to commissioning as officers. Students will demonstrate all leadership skills necessary to commissioned officers. Students perform leadership tasks at platoon, company, and battalion levels. (P/NP grading only.)

191. Special Studies in Military Science (2)
Tucker
Independent study—6 hours. Prerequisite: consent of department chair, and courses 131, 132A, 132B, 141, 142, 143. Intensive examination of one or more special problems in military science. Possible areas of study include leadership dimensions, principles of war, air-land battle imperatives, military strategy, the operational art and professional ethics, May be repeated twice for credit when topic differs. (P/NP grading only.)

Aerospace Studies (Air Force)

Berkely program:
AFROTC Detachment 85
Hearst Gym, Berkeley, CA, 94720-3610
(1-800-852-5747 or 510-642-3572);
e-mail: hillhouse@uclink4.berkeley.edu
World Wide Web: http://violet.berkeley.edu

Sacramento Program:
California State University Sacramento
Public Service Building, Room 208
6000 J. Street, Sacramento, CA 95819-6094
(916-278-7315)

The Air Force Reserve Officer's Training Corps (AFROTC) is an educational program providing training in leadership, management, communications and military proficiency on college and university campuses. It also provides an opportunity to obtain a commission as a second lieutenant in the Air Force and enter the active duty forces after you complete a bachelor's or a graduate degree. The skills you acquire will become valuable assets for any subsequent career you choose.

The program is normally four years long, but a flexible design allows students to complete the curriculum in as little as two years. Undergraduate scholarships are available, but are not necessary for participation. Until you accept a scholarship or enter your junior year of the program, you have no obligation to join the Air Force. There are no costs for AFROTC uniforms, books, or classes. Davis students have the option of taking the Air Force program on the Berkeley or Sacramento campuses.

To receive hands-on leadership and management practice, freshmen and sophomores take a one-hour academic course and a two-hour Leadership Laboratory each week; juniors and seniors take a three-hour course plus the lab. All units can be used as elective credit towards graduation. See the Military Sciences course listings in the UC Berkeley or CSU Sacramento catalogs. Classes are held during the fall and spring semesters and the curriculum includes the history of airpower, leadership and management topics, communication skills, and national security issues.

Between the sophomore and junior years, cadets compete to attend a four- or six-week field training program at a designated Air Force base. This competitive program consists of physical conditioning, outdoor survival training, career and aircraft orientations and an evaluation of leadership potential. Additional optional training opportunities are available during the summer months and include the Royal Air Force Exchange Program, Pentagon Internships, Jump School and Glider Training at the Air Force Academy, and summer job shadowing. Students are also encouraged to participate in optional orientation flights, base visits, and community service projects throughout the school year.

Qualifications

Freshmen/Sophomore applicants must:

- be full-time college students in good academic standing
- have good moral character
- be in strong physical condition
- be at least 14 years old

Additionally, Juniors/Seniors/Scholarship recipients must:

- be United States citizens or in the process of applying for citizenship
- be 18 years old (or 17 years old with consent of parent or guardian)
- pass the Air Force Officer Qualifying Test
- pass a medical examination
- be under the age of 30 at time of graduation (may be waived)

Scholarships

Opportunities for four-year and three-year undergraduate scholarships are better than ever. Scholarships cover the full cost of tuition, books and required fees at the University of California and are available for eligible high school seniors. It also include $150 monthly stipend during the school year. If you are a junior or senior in high school and plan on attending a college or university in Northern California, you can write, call or visit the local AFROTC detachments for a scholarship application. Applications are also available from local Air Force recruiters or your high school guidance counselors.

All scholarships are merit-based and consider a variety of factors: cumulative GPA, class standing, SAT/ACT scores, academic awards/achievements, leadership ability, athletic involvement, extracurricular activities, community service and letters of recommendation. All scholarship recipents must graduate and be commissioned before their 27th birthday (may be waived for prior military personnel). A personal interview with an Air Force officer is also part of the application process. Prior to activating a scholarship, students must meet AFROTC medical and physical fitness standards. All scholarships must be used at an accredited college or university that offers AFROTC on campus or through cross-registration. The program is available at more than 700 universities and colleges nationwide.

If you are already in college, contact our office directly and apply for enrollment into AFROTC as a cadet. Three- and two-year full tuition scholarships are available for all academic majors, especially scientific and technical majors such as engineering, atmospheric science, math, computer science, and physics. GPA Scholarship requirements for nontechnical majors are slightly higher. Applicants are primarily evaluated on their leadership ability and academic performance. Scholarship boards meet throughout the year for scientific and technical majors and in July for all academic majors. Scholarships also include a $150. monthly stipend throughout the school year, required books and fees. Other loans and grants may be used towards room and board costs.

Challenging Careers

All commissioned officers enter the Air Force as second lieutenants for a 4-year active duty service commitment. Pilots and navigators serve longer commitments, based on training requirements. Once active duty, you'll be given instant responsibility in one of 32 primary career fields. Opportunities to fly are better than ever. Whether you are piloting the F-22 fighter, supervising 150 aircraft maintainers on the flightline, or caring for sick personnel in the emergency room, you will be rewarded knowing that you are making a difference.

*Course not offered this academic year.

Molecular Biosciences

(School of Veterinary Medicine)

Shri N. Giri, B.V.Sc., Ph.D., Chairperson of the Department

Department Office, 1311 Haring Hall (916-752-1059)

Faculty

Alan R. Buckpitt, Ph.D, Professor
Gino A. Cortopassi, Ph.D., Associate Professor
Francis D. Galey, D.V.M., Ph.D., Associate Professor *(Molecular Biosciences, California Veterinary Diagnostic Laboratory)*
Shri N. Giri, B.V.Sc., Ph.D., Professor
Robert J. Hansen, Ph.D., Professor
Arthur D. Jones, Ph.D., Assistant Adjunct Professor
Cynthia Kollias-Baker, D.V.M., Ph.D., Assistant Professor *(Molecular Biosciences, California Veterinary Diagnostic Laboratory)*
Michael E. Mount, D.V.M., Ph.D., Associate Professor
Isaac N. Pessah, Ph.D., Associate Professor
Quinton R. Rogers, Ph.D., Professor
Henry J. Segall, Ph.D., Professor
Scott D. Stanley, Ph.D., Assistant Professor *(Molecular Biosciences, California Veterinary Diagnostic Laboratory)*
Philip R. Vulliet, D.V.M., Ph.D., Professor
Hanspeter Witschi, M.D., Professor

Emeriti Faculty

Arthur L. Black, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Victor W. Burns, Ph.D., Professor Emeritus
Gaylord M. Conzelman, Jr., Ph.D., Professor Emeritus
Richard A. Freedland, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
James G. Morris, Ph.D., Professor Emeritus
Otto G. Raabe, Ph.D., Professor Emeritus

Courses in Molecular Biosciences (VMB)

Lower Division Course

92. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

192. Internship (1-12) I, II, III, summer. The Staff
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***205A. Intermediary Metabolism of Animals** (4) I. The Staff
Lecture—4 hours. Prerequisite: a course in biochemistry or physiological chemistry or consent of instructor; a course in physiology recommended. Biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetics effects. Dynamics of animal metabolism including pools and turnover rates. Offered in alternate years.

***205B. Intermediary Metabolism of Animals** (3) II. Rogers, Hansen, Hershey (Biological Chemistry), Rucker (Nutrition)
Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids,proteins, nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in alternate years.

***223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine** (2) I. Vulliet
Lecture—1 hour; discussion—1 hour. Prerequisite: comparative or veterinary physiology and general pharmacology. Concepts of pharmacokinetics. Absorption and disposition of various drugs, which are used as therapeutic agents, will be compared in different species (man and domestic animals). Course will provide background for research in clinical pharmacology.

***243. Heavy Metal Toxicity and Metabolism** (2) II. The Staff
Lecture—2 hours. Prerequisite: Biological Sciences 102, 103, 104, and Neurobiology, Physiology and Behavior 100B. Toxicity and metabolism of inorganic compounds with emphasis on heavy metals. Examines the relationship between chemical properties and biologic activity of various metals. Includes discussions on metal-protein interactions, genetic disorders in metabolism, chelation therapy, and inorganic carcinogenesis. Offered in alternate years.

247. Natural Toxicants (2) III. Segall
Lecture—2 hours. Prerequisite: organic chemistry, Biological Sciences 102 and 103, or consent of instructor. Toxicity and metabolism of natural toxicants with emphasis on the toxic plants present in the western United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxicants are discussed. Offered in alternate years.

***253. Metabolism of Toxicants and Drugs** (2) II. Buckpitt
Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201, 202, 203, general biochemistry or consent of instructor. Significance/chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases, hydrolases and phase 2 transferases and experimental approaches for metabolism studies. Offered in alternate years.

***258. Receptor-Mediated Mechanisms** (2) III. Pessah
Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201 or the equivalent. Survey of modern methods for studying physiological receptors including radioligand binding analysis, ion transport/flux measurements, receptor solubilization and purification strategies, and molecular cloning. Theoretical concepts of receptor-mediated signal transduction, information processing, and mechanisms of drug/toxicant interactions. Offered in alternate years.

***258L. Laboratory in Receptor Methods** (1) III. Pessah
Laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 120L, course 258 (may be taken concurrently). Design and practical application of receptor binding techniques including subcellular fractionation, equilibrium and kinetic radioligand binding studies, receptor activation/inhibition studies, isotopic ion flux measurements, and analysis of data. Limited to 12 students. Offered in alternate years.

***260. Toxicologic Pathology** (3) II. Witschi, Wilson
Lecture—3 hours. Prerequisite: Pharmacology and Toxicology 201, 202, and 203. Provide introduction to organ system pathology; provide understanding of pathogenesis and significance of chemically induced tissue injury in the various organs of the body. Offered in alternate years.

265. Mass Spectrometric Methods in Pharmacology and Toxicology (3) II. Jones
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 102, and Chemistry 128A or 128B or 128C. Intended to enable students in pharmacology, toxicology, and biological chemistry to evaluate and interpret mass spectrometric techniques and results. Emphasis on identification of metabolites and biological macromolecules and quantitative stable isotope methods.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (S/U grading only.)

297T. Tutoring in Veterinary Pharmacology and Toxicology (1-5) I, II, III. The Staff (Chairperson in Charge)
Students assist in preparation and teaching of courses in Veterinary Pharmacology and Toxicology or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience. May be repeated for credit up to 5 units. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in Charge)
Prerequisite: consent of instructor. Group study in selected areas of Pharmacology and Toxicology. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

397T. Tutoring in Molecular Biosciences (1-5) I, II, III. The Staff
Prerequisite: graduate or professional student standing and consent of instructor. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

Professional Courses

405. Veterinary Clinical Pharmacology (2) II. Vulliet
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Pharmacological basis of therapeutic use of drugs in domestic animals. Emphasis on selection of most appropriate drug, its dosage form, route of administration and dose for treatment of certain disease conditions. (S/U grading only.)

475. Diagnosis and Treatment of Food Animal and Equine Poisoning (2) III. Mount
Lecture—20 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in livestock, horses and other ungulate stock emphasizing diagnosis and treatment. Poisonous plants are covered in this course.

480. Diagnosis and Treatment of Small Animal Poisoning (2) II. Mount
Lecture—20 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in dogs, cats, and pet birds, emphasizing diagnosis and treatment.

Music

(College of Letters and Science)

Christopher Reynolds, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Arts Building (916-752-5537; Fax: 752-8818)

Faculty

Ross Bauer, Ph.D., Professor
Robert S. Bloch, M.A., Professor
Anna Maria Busse Berger, Ph.D., Professor
Jonathan Elkus, M.A., Lecturer
Andrew D. Frank, M.A., Professor
D. Kern Holoman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

Zoila Mendoza, Ph.D., Assistant Professor
Maria Niederberger, Ph.D., Lecturer
David A. Nutter, Ph.D., Professor
Pable Ortiz, D.M.A., Associate Professor
Christopher A. Reynolds, Ph.D., Professor
Wayne Slawson, Ph.D., Professor

Emeriti Faculty

Sydney R. Charles, Ph.D., Professor Emeritus
Albert J. McNeil, M.S., Professor Emeritus
Jerome W. Rosen, M.A., Professor Emeritus
Richard G. Swift, M.A., Professor Emeritus,
Academic Senate Distinguished Teaching Award

Faculty Affiliates in Applied Music

Dona Lee Brandon, M.S.M., Lecturer *(organ)*
Lois Brandwynne, M.A., Lecturer *(piano)*
Tod Brody, B.A., Lecturer *(flute)*
Phebe Craig, M.M., Lecturer *(harpsichord)*
Thomas Derthick, B.M., Lecturer *(string bass)*
Joel Elias, M.M., Lecturer *(trombone)*
Elizabeth Field, M.M.A., Lecturer *(violin)*
Stephanie Friedman, M.A., Lecturer *(voice)*
David Granger, M.M., Lecturer *(bassoon)*
Susan Lamb Cook, M.A., Lecturer *(cello)*
Stanley Lunetta, M.A., Lecturer *(percussion)*
Calvin Lymos, B.A. *(Gospel Choir)*
Michael McMullen *(Jazz Band)*
Craig Morris, M.M. *(trumpet)*
Peter Nowlen, B.M., Lecturer *(French horn)*
Deborah Pittman, M.A., Lecturer *(clarinet)*
Robert Neal Rogers, B.M. *(voice)*
Deborah Shidler, B.M.E., Lecturer *(oboe)*
John Tchicai *(Jazz Improvisation)*
Mark Tulga, M.A. *(Jazz Band)*

The Empyrean Ensemble

Ross Bauer, Director
Tod Brody, flute
Deborah Shidler, oboe
Peter Josheff, clarinet
Carla Wilson, bassoon
Peter Nowlen, French horn
Daniel Kennedy, percussion
Karen Rosenak, piano
Eric Zivian, piano
Terrie Baune, violin
Rudy Kremer, violin
Uri Wassertzug, viola
Jennifer Culp, cello
Thomas Derthick, bass

The UCD Wind Quintet

Deborah Shidler, oboe
David Granger, bassoon
Deborah Pittman, clarinet
Tod Brody, flute
Peter Nowlen, French horn

The Major Program

The Bachelor of Arts degree in music provides both a broad liberal arts education and the skills necessary to explore music through its history, theory and performance. A fundamental grounding in music theory, music history, and performance during the first two years of study leads to more specialized study of composition, history, criticism, or performance during the last two years of undergraduate work.

Student Performing Activities. The Department of Music presents over 100 concerts each year, offering performance opportunities for both majors and nonmajors in the UCD Symphony Orchestra, University Chorus, Concert Band, Early Music Ensemble, Baroque Chamber Orchestra, Chamber Singers, Gospel Choir, and numerous chamber ensembles. Also affiliated with the department are the UC Davis Jazz Band, and the Cal Aggie Marching Band.

The large groups regularly present three concerts each year, while chamber ensembles perform frequently in the weekly Thursday Noon Concerts. Performance groups have collaborated with the Department of Dramatic Art in productions of musical theater and opera. Study of instruments and voice with professional performers and teachers is required of all majors. Similar opportunities exist for talented nonmajors.

Faculty and Facilities. The faculty is noted for its achievements in a variety of areas. The musicologists are active in research, writing, and performance; the music of the composers is performed and recorded nationally and internationally. Two music journals are edited by members of the department, *19th Century Music* and *Beethoven Forum.*

The regular faculty is joined during one quarter each year by a visiting Artist-in-Residence, a distinguished performer who gives public concerts and lectures and who works with students informally. Professional performance groups in residence at UC Davis include the UC Davis Wind Quintet, the Empyrean Ensemble (formerly the UC Davis Contemporary Players).

The department's facilities include a large collection of Renaissance, Baroque, and modern instruments, the Computer and Electronic Music Studio, practice and rehearsal rooms, and an excellent music library with some 20,000 recordings, CDs, laser discs and videos. In addition, the library houses the Jan Popper collection of opera scores, books, and memorabilia.

Career Alternatives. Many students who graduate with a degree in music continue on to careers in medicine, law, or business. According the the American Medical Association, the undergraduate major with the highest rate of acceptance into medical school is not chemistry or physics, but music. Students who graduate with a B.A. in music from UC Davis have gone on to graduate programs in music at major universities and conservatories in the country. Some have become professors at distinguished universities or have received teaching credentials to teach at primary or secondary schools; others have become editors or found employment in music advertising or record companies.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**39-42**
Music 2A, 2B, 2C, 4A, 4B, 4C, 5A, 5B, 5C, 24A, 24B, 24C	36-39
Music 30, 31 (or the equivalent as determined in consultation with major adviser), one year	3
Depth Subject Matter	**44**
Music 104A, 104B, 104C	12
Music 124A, 124B	8
At least 16 units selected from Music 107A, 107B, 107C (Note: only 3 units of 107, electronic music, may be counted toward the major), 108A, 108B, 111, 112, 121, 122, 190, 198, 199	16
At least 8 units in performance courses. Select from Music 130 or 131, 141, 142, 143, 144, 145, 146.	8
Total Units for the Major	**83-86**

Beginning and transfer students must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with *The Little Preludes* of Bach is prerequisite to upper division courses in the major. Students with deficiencies will be required to pass Music 2A, 2B, 2C. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisers before enrolling in any music course.

Foreign Language Requirement. Attention is called to the requirements in foreign languages for higher degrees in music.

Major Advisers. D.A. Nutter, P.V. Ortiz.

Minor Program Requirements:

	UNITS
Music	**22**
A minimum of 16 units of upper division Music courses. Courses chosen with adviser's consent from: Music 105, 107, 110, 129	16
A minimum of six units in upper division music performance courses (Music 141, 142, 143, 144, 145, 146) may count toward the minor. Lower division preparatory work to be determined in consultation with minor advisers.	6

Teaching Credential Subject Representative. See also the section on the Teacher Education Program.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. degree in composition/theory, musicology/criticism, and conducting, and the Ph.D. degree in composition/theory and musicology/criticism. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. R. Bauer.

Courses in Music (MUS)

Lower Division Courses

***1. Basic Musicianship** (3)
Lecture—3 hours. Fundamentals of music, singing, ear-training and conducting for beginners in music. Designed for students with career plans where musical literacy is important, for example, primary level classroom teachers, actors, theatre directors, designers, and stage managers. Not open to students who have successfully completed 3A, 4A, or the equivalent.

2A-2B-2C. Keyboard Competence (1-1-1) I-II-III.
The Staff
Laboratory—1 hour. Prerequisite: concurrent enrollment in course 4A-4B-4C; keyboard diagnostic examination (not open for credit to students who have passed the exam). Designed to train students to meet the minimal piano requirements for the major in music. All music majors will be expected to perform scales, modulations, to realize figured basses, and to harmonize a given melody at sight.

3A. Introduction to Music Theory (4) I. Bloch; II. Niederberger; III. Elkus
Lecture—3 hours; laboratory—1 hour. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student.

3B. Introduction to Music Theory (4) II, III.
Bloch
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 3A. Continuation of course 3A. Intended for the general student.

4A-4B-4C. Elementary Theory (4-4-4) I-II-III.
Niederberger
Lecture/discussion—3 hours; practice—2 hours. Prerequisite: keyboard competence; keyboard diagnostic examination; students must pass the exam or take course 2A-2B-2C concurrently. Development of music writing and listening skills through the study of music fundamentals, tonal species counterpoint, harmony, score reading, analysis of repertoire. Intended primarily for music majors.

5A-5B-5C. Intermediate Theory (4-4-4) I, II.
Frank; III. Ortiz
Lecture/discussion—3 hours; practicum—2 hours. Prerequisite: course 4C. Study of imitative tonal counterpoint and of harmony; keyboard harmony; analysis of repertoire.

10. Introduction to Musical Literature (4) I.
Nutter; II. Holoman; III. The Staff
Lecture—3 hours; listening section—1 hour. An introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.

24A. Introduction to the History of Music, I (4) I. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4A or 3A (concurrently). Intended primarily for majors in music. History of music from the late Baroque to the Classical Period. GE credit: Wrt.

24B. Introduction to the History of Music, II (4) II. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 24A; course 4B or 3B (concurrently). Intended primarily for majors in music. History of music from the Classical Period to the nineteenth century. GE credit: Wrt.

24C. Introduction to the History of Music, III (4) III. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4B or 3B; course 4C (concurrently). Intended primarily for majors in music. History of music from the nineteenth century to the present. GE credit: Wrt.

28. Introduction to Afro-American Music (4) II. The Staff
Lecture—3 hours; listening and discussion—1 hour. A study of the Afro-American rhythm, field hollers, work songs, spirituals, blues, gospel, and jazz; the contrast between West African, Afro-Caribbean, and Afro-Cubanic musical traditions. GE credit: Div, Wrt.

30A-U. Applied Study of Music: Intermediate (1) I, II, III. The Staff
Performance instruction—1 hour. Prerequisite: open to Music majors with ability to perform scales and short compositions from standard repertory; admission by audition and consent of instructor. Class instruction, arranged by section: **(A)** Voice (prerequisite of course 1 or the equivalent); **(B)** Piano; **(C)** Harpsichord; **(D)** Organ; **(E)** Violin; **(F)** Viola; **(G)** Cello; **(H)** Double Bass; **(I)** Flute; **(J)** Oboe; **(K)** Clarinet; **(L)** Bassoon; **(M)** French Horn; **(N)** Trumpet; **(O)** Trombone; **(P)** Tuba; **(Q)** Percussion; **(R)** Classical Guitar; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit. Offered as demand indicates.

31A-U. Applied Study of Music: Intermediate (Individual) Performance Instruction (2) I, II, III. The Staff
Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in **(A)** Voice (prerequisite of course 1 or the equivalent); **(B)** Piano; **(C)** Harpsichord; **(D)** Organ; **(E)** Violin; **(F)** Viola; **(G)** Cello; **(H)** Double Bass; **(I)** Flute; **(J)** Oboe; **(K)** Clarinet; **(L)** Bassoon; **(M)** French Horn; **(N)** Trumpet; **(O)** Trombone; **(P)** Tuba; **(Q)** Percussion; **(R)** Classical Guitar; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit.

41. University Symphony (2) I, II, III. Holoman
Rehearsal—4 hours. Prerequisite: admission subject to audition before the first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance of music from the orchestral literature. May be repeated for credit. (P/NP grading only.)

42. University Chamber Singers (2) I, II, III. The Staff
Rehearsal—3 hours, plus sectionals—at least 1 hour. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of works for small choral group. May be repeated for credit. (P/NP grading only.)

43. University Concert Band (2) II, III. Elkus
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. (P/NP grading only.)

44. University Chorus (2) I, II, III. The Staff
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. (P/NP grading only.)

45. Early Music Ensemble (2) I, II, III. Nutter
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)

46. Chamber Music Ensemble (1) I, II, III. The Staff (Granger in charge)
Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)

54. University Gospel Choir (2) I, II, III. Lymus, Stewart
Rehearsal—4 hours. Prerequisite: consent of instructor; open to any student in the university. Rehearsal, study, and performance of Gospel music. May be repeated for credit. (Same course as African American and African Studies 54.) (P/NP grading only.)

98. Directed Group Study (1-5) The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

103. Workshop in Composition (3) I. Niederberger; II. Bauer; III. Niederberger
Workshop—3 hours. Prerequisite: course 4C. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies. Course will allow students to explore the techniques and materials of musical composition. May be repeated for credit. (P/NP grading only.)

104A-104B-104C. Advanced Theory (4-4-4) I-II-III. Bauer
Lecture—4 hours. Prerequisite: course 5C. Twentieth-century compositional procedures: analyses and projects in composition.

105. History and Analysis of Jazz (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3A or 10 or the equivalent. Jazz will be studied in its historical and cultural contexts; the evolution of jazz styles will be analyzed. Lectures, discussion/guided listening sections, and selected readings. Designed for non-majors. GE credit: ArtHum, Div, Wrt.

107A. Computer and Electronic Music (3) I. Ortiz
Lecture—3 hours; laboratory—1 hour. Prerequisite: consent of instructor. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. Limited enrollment.

107B. Computer and Electronic Music (3) II. Ortiz
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107A and consent of instructor. Continuation of course 107A. Limited enrollment.

107C. Computer and Electronic Music (3) III. Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107B and consent of instructor. Continuation of course 107B. Limited enrollment.

***108A-108B. Orchestration** (2-2) II, III. Bloch
Lecture—2 hours. Prerequisite: course 5C. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations.

***109. Masterworks in Performance** (2) I. Holoman
Lecture—2 hours. Prerequisite: course 10 recommended. Thorough score study of a single masterwork to be performed on campus during the quarter. Guided listening, selected readings, analysis and study of composer's milieu. Recommended especially for members of the performing ensembles scheduled to present the work.

110A. The Music of a Major Composer: Beethoven (4) II. Slawson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.

***110B. The Music of a Major Composer: Stravinsky** (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Stravinsky will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.

110C. The Music of a Major Composer: Bach (4) III. Elkus
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Bach will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.

110D. The Music of a Major Composer: Mozart (4) I. Frank
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Mozart will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.

***110E. The Music of a Major Composer: Haydn** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Haydn in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt.

111. Choral Conducting (2) II. The Staff
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting choral ensembles.

112. Instrumental Conducting (2) I. Holoman
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting instrumental ensembles. Offered in alternate years.

121. Topics in Music History and Criticism (4) III. Nutter
Seminar—4 hours (includes selected listening). Prerequisite: courses 4A-4B-4C, 24A-24B-24C, and consent of instructor. Sources and problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit. GE credit: Wrt.

122. Topics in Analysis and Theory (4) I. Ortiz; II. Frank
Seminar—4 hours (includes selected listening). Prerequisite: courses 5C and 25C. Analysis of works of a composer or musical style selected by the instructor and announced in advance. Consideration of theoretical issues. May be repeated for credit. GE credit: Wrt.

124A. History of Western Music: Middle Ages to 1600 (4) I. The Staff
Lecture—3 hours; listening—1 hour. Prerequisite: course 24C and 4C. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 17th century. GE credit: Wrt.

124B. History of Western Music: 1600 to 1750 (4) II. The Staff
Lecture—3 hours; listening—1 hour. Prerequisite: course 124A. Historical survey of composers and musical styles from the late 1500s to the mid-18th century. GE credit: Wrt.

125. Performance and Culture (4) III. Mendoza
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3A or 10. Introduction to the interdisciplinary study of public expressive forms. Comparative analysis of music, dances, rituals, and dramas from around

the world in their social and cultural contexts. Offered in alternate years.

126. American Music (4) II. Elkus
Lecture—3 hours; listening—1 hour. Prerequisite: course 10 or 3A-3B or consent of instructor. Introductory survey of American musics, including Native American music, Hispanic polyphony, New England psalmody, and selected 20th-century composers and styles. Offered in alternate years. GE credit: Div, Wrt.

127. Music from Latin America (4) I. Ortiz
Lecture—3 hours; discussion—1 hour. Prerequisite: Spanish 24 or 33. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica nortena, musica andina) as well as its implications in other musical genres. Taught in Spanish. For non-majors. Offered in alternate years. (Former course 27.) (Same course as Spanish 171.)

129. World Music (4) II. Mendoza
Lecture—3 hours; listening—1 hour; selected readings. Prerequisite: course 3A-3B or 10 recommended. Intended for non-majors. Studies in selected areas of non-western music, including appropriate instrumental and performing techniques, analysis of tonal systems, melody, rhythm and musical structures. Emphasis placed on cultural context of the music. GE credit: Div, Wrt.

130A-U. Applied Study of Music: Advanced (1) I, II, III. The Staff
Performance instruction—1 hour. Prerequisite: open to Music majors with ability to perform scales and short compositions from standard repertoire; admission by audition and consent of instructor. Class instruction, arranged by section: **(A)** Voice (prerequisite of course 1 or the equivalent); **(B)** Piano; **(C)** Harpsichord; **(D)** Organ; **(E)** Violin; **(F)** Viola; **(G)** Cello; **(H)** Double Bass; **(I)** Flute; **(J)** Oboe; **(K)** Clarinet; **(L)** Bassoon; **(M)** French Horn; **(N)** Trumpet; **(O)** Trombone; **(P)** Tuba; **(Q)** Percussion; **(R)** Classical Guitar; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit. Offered as demand indicates.

131A-U. Applied Study of Music: Advanced (Individual) (2) I, II, III. The Staff
Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in **(A)** Voice (prerequisite of course 1 or the equivalent); **(B)** Piano; **(C)** Harpsichord; **(D)** Organ; **(E)** Violin; **(F)** Viola; **(G)** Cello; **(H)** Double Bass; **(I)** Flute; **(J)** Oboe; **(K)** Clarinet; **(L)** Bassoon; **(M)** French Horn; **(N)** Trumpet; **(O)** Trombone; **(P)** Tuba; **(Q)** Percussion; **(R)** Classical Guitar; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit.

141. University Symphony (2) I, II, III. Holoman
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestral literature. May be repeated for credit. (P/NP grading only.)

142. University Chamber Singers (2) I, II, III. The Staff
Rehearsal—3 hours, plus sectionals—at least 1 hour. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of works for small choral group. May be repeated for credit. (P/NP grading only.)

143. University Concert Band (2) II. III. Elkus
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. (P/NP grading only.)

144. University Chorus (2) I, II, III. The Staff
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. (P/NP grading only.)

145. Early Music Ensemble (2) I, II, III. Nutter
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)

146. Chamber Music Ensemble (1) I, II, III. The Staff (Granger in charge)
Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)

154. University Gospel Choir (2) I, II, III. Lymus, Stewart
Rehearsal—4 hours. Prerequisite: consent of instructor; open to any student in the university. Rehearsal, study, and performance of Gospel music. May be repeated for credit. (Same course as African American and African Studies 154.) (P/NP grading only.)

***190. Senior Seminar in Music** (4) I. The Staff (Chairperson in charge)
Lecture—4 hours. Prerequisite: courses 5C and 25C, and consent of instructor; course 104C recommended. Intended primarily for majors in music intending to apply for graduate programs in music history, composition, or theory. Review of musical skills, issues in theory and analysis, and the history and literature of music.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***200. Music Research** (4)
Seminar—3 hours; term paper. Introduction to problems and techniques of research; practical application of music bibliography to questions about significant issues in musicology, music theory, and performance practice.

***201. Advanced Music Research and Criticism** (4) II. Swift
Seminar—3 hours; term paper. Study and practice of expository writing about music. Application of advanced research techniques in writing for different purposes, ranging from essays for the general public to thesis proposals and articles for scholarly journals.

***202. Notation** (4)
Seminar—3 hours; term paper. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music.

203. Music Composition (4) I, II, III. Bauer
Seminar—3 hours; term paper. Technical projects that explore compositional problems, the skill and techniques with which to solve them, and free composition. May be repeated for credit.

***204. Advanced Conducting** (3) I, II, III. The Staff (Holoman in charge)
Tutorial—2 hours; practicum—2 hours. Prerequisite: courses 111, 112, or the equivalent; keyboard skills appropriate to graduate standing. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance.

207. Advanced Electronic and Computer Music (4) III. Slawson
Seminar—2 hours; plus individual student/instructor meeting—2 hours. Prerequisite: courses 107A-107B-107C. Advanced composition of computer and electronic music with the Sun 3-based computer-music system and associated facilities.

210A. Proseminar in Music (Theory and Analysis) (4) I. Slawson
Seminar—3 hours; term paper. Voice-leading analysis of tonal music derived from Schenker and pitch-class set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically oriented music theory, and theories of durational structure and timbre.

***210B. Proseminar in Music (Musicology and Criticism)** (4)
Seminar—3 hours; term paper. Issues and concepts of music history, including performance practice questions for specific repertoires and periods; principles, aims, and methods of archival study; historical theory; evolution of musical styles; philosophical debates about goals and aims of the discipline in general.

210C. Proseminar in Music (Ethnomusicology) (4) III. Mendoza
Seminar—3 hours; term paper. Intensive examination of major trends in ethnomusicology as exemplified by scholars working in several non-Western cultures. Ethnomusicological theory, ranging from ethnographic description to metamusicological study (Seegar) to analysis of individual genres to sociological study.

221. Topics in Music History (4) I. Reynolds; II. Nutter; III. Holoman
Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.

222. Techniques of Analysis (4) II. Ortiz; III. Bauer
Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit.

***223. Ethnomusicology (Pacific Cultures)** (4)
Seminar—3 hours; term paper. Court music, religious music, and popular forms of China, Japan, Korea, Melanesia, and Indochina. Issues concerning history, theoretical constructs, performance practice, and cultural settings of the music will be stressed. May be repeated for credit.

***224. Performance in the Americas** (4)
Seminar—3 hours; term paper. Ethnomusicological and anthropological approaches to the study of public performance in the Americas. It proposes new ways of looking at music, dance, rituals and other forms of public expressive forms normally called "folklore" or "popular culture." Offered in alternate years.

299. Individual Study (1-12) I, II, III. The Staff (Holoman in charge)
(S/U grading only.)

Teaching Methods Courses

***300. The Teaching of Music** (3)
Lecture—3 hours. Prerequisite: course 1 or the equivalent. Methods of teaching music in grades K-6.

***301. The Teaching of Music** (3)
Lecture—3 hours. Prerequisite: course 5C or the equivalent. Methods of teaching music in grades 7-12.

Instrumental Methods. The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools.

***321A-321B. Stringed Instruments** (1-1)
Discussion—2 hours. Prerequisite: course 4C.

***322. Brass Instruments** (1)
Laboratory—2 hours. Prerequisite: course 4C. Offered in alternate years.

***323A-323B. Woodwind Instruments** (1-1)
Discussion—2 hours. Prerequisite: course 4C.

***324. Percussion Instruments** (1)
Laboratory—2 hours. Prerequisite: course 4C. Considers teaching of percussion instruments. Survey course. Offered in alternate years.

Native American Studies

(College of Letters and Science)

Inés Hernández-Ávila, Ph.D., Chairperson of the Department
Department Office, 2401 Hart Hall (916-752-3237)

Faculty

Steven J. Crum, Ph.D., Associate Professor
Inés Hernández-Ávila, Ph.D., Associate Professor
George C. Longfish, M.F.A., Professor
Martha J. Macri, Ph.D., Associate Professor
Victor D. Montejo, Ph.D., Assistant Professor
Luana K. Ross, Ph.D., Assistant Professor
Stefano Varese, Ph.D., Professor

Emeriti Faculty

Jack D. Forbes, Ph.D., Professor Emeritus
Carl N. Gorman, M.F.A., Lecturer Emeritus
Sarah Hutchison, M.A., Lecturer Emeritus
David Risling, M.A., Senior Lecturer Emeritus

Affiliated Faculty

Anne Dannenberg, Ph.D., Lecturer

The Major Program

Native American studies focuses upon the indigenous peoples of both North and South America. The program is interdisciplinary in its approach to the world of the American Indian and offers a comprehensive and comparative perspective.

The Program. Students electing a major in Native American studies may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly upon the Native experience in North America (north of Mexico). Plan II encourages interested students to focus upon Meso-America with, however, some course work integrating Meso-America with North America and South America. Plan III focuses upon South America, with some course work integrating that region with areas to the north.

Career Alternatives. Native American studies is excellent preparation for a scholarly career or professional career such as teaching, law, human services, health, tribal administration, social work, and interethnic relations. Graduate schools and agencies in these and related areas are looking for students with broad interdisciplinary preparation and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20
Native American Studies 1, 10.....8
One or two courses from Native American Studies 32, 33, 46, 55 4-8
One or two courses from African American and African Studies 12, 52, Anthropology 2, 3, Asian American Studies 1, Chicana/o Studies 10, History 17A 4-8

Depth Subject Matter 16
Native American Studies 130A, 157, 180...12
One course from Native American Studies 107, 115, 130B, 130C, 133, 156 4
Note: If a course is counted for either Plans I, II, or III (below), it cannot also be counted as part of the 16 units of Depth Subject Matter.

Areas of Specialization (complete one plan)

Plan I—North American Emphasis 28
Two courses from Native American Studies 107, 115, 116, 117, 118, 122, 130C, 156 8
Two courses from Native American Studies 101, 181A, 181B, 181C.....8
Two courses from Anthropology 113, 136, 161A, 161B, 165, 166, 172, 173, 174, 175, 176, African American and African Studies 100, 101, 107, 120, 123, 133, 153, 160, American Studies 120, Asian American Studies 100, 101, 110, 111, 112, Chicana/o Studies 100, 110, 111, 154, 156, Geography 120, 121, Sociology 128, Women's Studies 102 8
One other upper division Native American Studies course, selected in consultation with adviser 4

Plan II—Mexico-Central America Emphasis ...28
Native American Studies 107, 133.....8
Three courses from History 161A, 166A, 166B, Geography 122A, Anthropology 134, 145, 146, 174, 175, Chicana/o Studies 130, Native American Studies 122 12
Two courses from Spanish 155, 172, Art History 151, Native American Studies 101, 156, 181A, 181B, 181C, or, if student's work is specifically focused upon a Meso-American language or topic, from Native American Studies 188, 191 8

Plan III—South American Emphasis 28
Native American Studies 107, 120.....8
Two courses from History 161A, 161B, 162, 163A, 163B, 165, Geography 122B.....8
Three courses from Anthropology 134, 144, 174, 175, Native American Studies 101, 122, 156, 181A, 181B, 181C, or, if student's work is specifically focused upon a South American language or topic, from Native American Studies 188, 191.....12

Total Units for the Major 64

Study Off Campus. Majors have the option of spending one to three quarters elsewhere in the Americas or on or near a reservation as part of the fulfillment of the Area of Specialization. Each student's plan must be approved by the student's adviser and by the chairperson and may fulfill from 12 to 20 of the 28 units required for the emphasis. The courses or field internship taken elsewhere must be focused upon indigenous peoples or indigenous languages and the institution of study shall be located in an area with substantial indigeous population. Students must have upper division standing and, for Plan I, course 107 or the equivalent should have been completed; for Plan II, courses 107 and 133 should have been completed; and for Plan III, courses 107 and 120 should have been completed prior to departure. Several options may be used for receiving academic credit, including course 195 and the Education Abroad Program.

Minor Program Requirements:

The Native American Studies minor provides an introduction to the Native experience in the Americas by means of exposure to course work dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

UNITS

Native American Studies 24
Native American Studies 1 or 10.....4
Five upper division courses, at least one of which is chosen from each of the following groups 20
Ethno-History:
Native American Studies 130A, 130B, 130C, or 133
Philosophy and values:
Native American Studies 156, 157, or 180
Politics and current affairs:
Native American Studies 115, 116, 117, 118, 120, 122
Art and literature:
Native American Studies 101, 181A, 181B, or 181C
One other upper division course selected in consultation with adviser.

Courses in Native American Studies (NAS)

Lower Division Courses

1. Introduction to Native American Studies (4) I. Montejo; II. Crum; III. Ross
Lecture—3 hours; discussion—1 hour. Introduction to Native American Studies with emphasis upon basic concepts relating to Native American historical and political development. GE credit: SocSci, Div.

5. Introduction to Native American Literature (4) I, II, III. Dannenberg
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Study of selected Native American texts. Intensive focus on analysis of these texts, with frequent writing assignments to develop critical thinking and composition skills. GE credit: ArtHum, Div, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

10. Native American Experience (4) I. Longfish; II. Varese; III. Macri
Lecture—3 hours; discussion—1 hour. Introduction to the diverse cultures of Native American peoples from North, Central, and South America. Emphasis on Native American voices in the expression of cultural views and in the experience of conflicting values. GE credit: ArtHum or SocSci, Div, Wrt.

***32. Native American Music and Dance** (4) I. The Staff
Lecture/discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes. GE credit: Div.

33. Native American Art in the U.S. (4) I. Longfish
Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon design, media, and function. Intent is to familiarize the student with a wide range of styles and techniques. GE credit: ArtHum, Div.

34. Native American Art Workshop (4) II, III. Longfish
Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native American art, design, and crafts. (P/NP grading only.)

***46. Orientation to Research in Native American Studies** (4) II. Ross
Lecture/discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Limited enrollment. GE credit: SocSci, Div, Wrt.

***55. Americanisms: Native American Contributions to World Civilization** (4) I. Varese
Lecture/discussion—4 hours. Prerequisite: course 1 or 10 recommended. American indigenous people's contributions to the contemporary world, with attention to forced participation of Indian societies in the development of Western dominance and resulting appropriation of cultural creations. Responses and initiatives of indigenous peoples will be analyzed. GE credit: SocSci, Div, Wrt.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Contemporary Indian Art (4) II. Longfish
Lecture—4 hours. Prerequisite: course 33. Historical review of contemporary Indian art from 1900 to the present by looking at the two art centers of Oklahoma and Santa Fe. Social pressures that have influenced the imagery that exists today will be examined. GE credit: ArtHum, Div.

107. Special Topics in Native American Languages (4) III. Macri
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different topic is studied. GE credit: Div.

***112. History and Culture of the "Five Civilized Tribes"** (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American people, found in southeastern part of the U.S., called the "Five Civilized Tribes." Offered in alternate years.

115. Native Americans in the Contemporary World (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 1, 10, or 55. The sociocultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present day conditions. Not open for credit to students who have completed Anthropology 141B. (Former course Anthropology 141B.) GE credit: SocSci, Div, Wrt.

***116. Native American Traditional Governments** (4) II. The Staff
Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Offered in alternate years. GE credit: SocSci, Div.

***117. Native American Governmental Decision Making** (4) II. The Staff
Lecture—4 hours. Prerequisite: course 116, Political Science 2; Anthropology 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Offered in alternate years. GE credit: SocSci, Div.

***118. Native American Politics** (4) III. The Staff
Lecture—4 hours. Prerequisite: course 117. Examination of the various interest groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with relevant theory relating to underdevelopment. Offered in alternate years. GE credit: SocSci, Div.

120. Ethnopolitics of South American Indians (4) II. Varese
Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed through interactions between Indians, Euroamericans. Socioethnographic analysis of main indigenous areas and the development of national societies. GE credit: SocSci, Div, Wrt.

122. Native American Community Development (4) I. Varese
Lecture—4 hours. Prerequisite: course 1, Community and Regional Development 151. Application of community development theory and techniques to the development problems of Native American communities. Offered in alternate years. (Former course 161.) GE credit: SocSci, Div, Wrt.

130A. Native American Ethno-Historical Development (4) I. Crum
Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-history in North America before 1770s. GE credit: SocSci, Div, Wrt.

130B. Native American Ethno-Historical Development (4) II. Crum
Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethnohistory in North America, 1770-1890. GE credit: SocSci, Div, Wrt.

130C. Native American Ethno-Historical Development (4) III. Crum
Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethnohistory in North America after 1890. GE credit: SocSci, Div, Wrt.

133. Ethnohistory of Native People of Mexico and Central America (4) I. Varese
Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous people; the impact of economic and political factors on the process of cultural adaptation. Attention is given to the questions of nation-building, forced assimilation, indigenous resistance, organized political responses. GE credit: SocSci, Div.

134. Race and Sex: Race Mixture and Mixed Peoples (4) II. Forbes
Lecture—4 hours. Prerequisite: one course chosen from Anthropology 1 or 2, Native American Studies 10, Chicana/o Studies 110, African American and African Studies 100 or Asian American Studies 110. The phenomena of racial, ethnic and interreligious intermixture and marriage, and of multi-ethnic peoples. Emphases on the Americas and upon the sociocultural effects of intermixture and on the lives of bicultural and multi-ethnic persons. (Same course as Anthropology 134.) GE credit: SocSci, Div, Wrt.

***156. Native American Ethics and Value Systems** (4) II. Forbes
Lecture—4 hours. Prerequisite: upper division standing; course 1. Analysis of Native American systems of values and how these values translate into actual behavior; attention to the problem of implementing traditional values in the twentieth century and the possible impact of native values in modern societies. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

157. Native American Religion and Philosophy (4) I. Hernández-Ávila
Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philosophical thinking of Native American people with emphasis upon North America. Offered in alternate years. GE credit: Div.

180. Native American Women (4) II. Ross
Lecture/discussion—4 hours. Prerequisite: course 1 or 10 or Women's Studies 50. Social and cultural foundations of the Native American women's personality, including the development of the Indian girl and the life phases of mature womanhood. Autobiographical and biographical text will be utilized. GE credit: SocSci, Div, Wrt.

181A-181B-181C. Native American Literature (4-4-4) I. Dannenberg; II. Montejo; III. The Staff
Lecture—4 hours. Prerequisite: English 3, Comparative Literature 1, 2, 3, or any course from the General Education Literature Preparation List. Analysis of works by or about Native Americans including novels and autobiographies, analysis of Native American poetry, oral literature, songs, and tales. (A), the novel and fiction; (B), nonfiction works by native authors; (C), traditional literature and poetry. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

188. Special Topics in Native American Literary Studies (4) I. The Staff; II. Hernández-Ávila; III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Special topics drawn from Native American literature. May be repeated for credit when a different topic is studied. GE credit: Div, Wrt.

***190. Seminar in Native American Studies** (2) III. The Staff
Discussion—2 hours. Prerequisite: senior standing. Seminar of critical issues faced by Native American people. (P/NP grading only.)

191. Topics in Native American Studies (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American ethno-history, development, culture, and thought. May be repeated for credit when a different topic is studied. GE credit: ArtHum, Div.

194HA-194HB. Special Studies for Honors Students (4-4) I-II. The Staff (Montejo in charge)
Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

195. Field Experience in Native American Studies (12) I, II, III. The Staff
Field work—36 hours. Prerequisite: senior standing and major in Native American Studies, completion of lower division major requirements, and course 161. Field work with governmental and community groups, under supervision of faculty adviser and sponsor. Knowledge acquired in other courses to be applied in field work. (P/NP grading only.)

196. Senior Project in Native American Studies (4) I, II, III. The Staff
Discussion—1 hour; independent study—3 hours. Prerequisite: senior standing and major in Native American Studies, course 195 (may be taken concurrently), and consent of instructor. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis. (P/NP grading only.)

197TC. Community Tutoring in Native American Studies (1-5) I, II, III. The Staff
Tutorial—3-15 hours. Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Basic Concepts in Native American Studies (4) III. Hernández-Ávila
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Analysis of the characteristics of the discipline of Native American Studies. Concentration is on both traditional and contemporary native scholarship and thought as well as the theoretical and methodological consequences derived from application of these ideas. Offered in alternate years.

202. Advanced Topics in Native American Studies (4) II. Montejo
Seminar—4 hours. Prerequisite: graduate standing. Advanced study of selected topics or themes relevant to the field of Native American studies. Topics will be announced at the time of offering. May be repeated for credit when topic differs.

212. Community Development for Sovereignty and Autonomy (4) III. Varese
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examines a sample of contemporary indigenous communities from south, central and north America with the goal of understanding and evaluating the strategies adopted by Native American communities to develop and implement forms of sovereignty or autonomous self-management. Offered in alternate years.

***220. Colonialism/Racism and Self-Determination** (4) III. Varese
Seminar—3 hours; term paper. Prerequisite: graduate standing. Study of imperial/colonial systems and their psychosocial impacts upon oppressors and oppressed, of racism as the outgrowth of colonialism, and of nationalism, ethnic conflict and self-determination. Focus on indigenous peoples, but other groups will also be considered. Offered in alternate years.

*Course not offered this academic year.

280. Ethnohistorical Theory and Method (4) III. Crum
Seminar—3 hours; term paper. Discussion of the ethnohistorical method; the utilization of diverse types of data, especially documentary sources, to reconstruct socio-cultural history. Particular attention to the applied area of ethnohistory in the solution of contemporary social problems. Offered in alternate years.

298. Group Study for Graduate Students (1-5) I, II, III. The Staff (Varese in Charge)
Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

299. Special Study for Graduate Students (1-12) I, II, III. The Staff (Varese in Charge)
Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

Nature and Culture

(College of Letters and Science)

Lenora Timm, Ph.D., Program Director

Program Office, 522 Sproul Hall (916-752-1219)

Committee in Charge

Francisco X. Alarcón *(Spanish and Classics)*
Michael Barbour, Ph.D. *(Environmental Horticulture)*
Scott McLean, Ph.D. *(Comparative Literature)*
Eldridge Moores, Ph.D. *(Geology)*
Peter Moyle, Ph.D. *(Wildlife, Fish, and Conservation Biology)*
Ben Orlove, Ph.D. *(Environmental Studies)*
David Robertson Ph.D. *(English)*
Art Shapiro, Ph.D. *(Evolution and Ecology)*
Heath Schenker, M.A. *(Environmental Desgn)*
Michael Smith, Ph.D. *(History)*
Gary Snyder, Hon. Ph.D. *(English)*
Lenora Timm, Ph.D. *(Linguistics)*
Robert Torrance, Ph.D. *(Comparative Literature)*
Mark Wheelis, Ph.D. *(Microbiology)*

Faculty

Scott McLean, Ph.D., Lecturer *(Comparative Literature)*
Eldridge Moores, Ph.D., Professor *(Geology)*
Peter Moyle, Ph.D., Professor *(Wildlife, Fish and Conservation Biology)*
David Robertson, Ph.D., Professor *(English)*
Mark Wheelis, Ph.D., Senior Lecturer *(Microbiology)*

The Program. The Nature and Culture major is a coherent interdisciplinary set of studies that offers exploration of the complex relationships existing between human cultures and the natural world. This program is the first of its kind in the country, providing a rigorous curriculum that interweaves courses in the natural sciences, the humanities, and the social sciences, supplemented by elective course work in these and other fields of study. There are at present three required core courses in Nature and Culture itself, a principal function of which is to tie together knowledge and experience gained in the various disciplines that students will work in as they progress through their studies.

Career Alternatives. Students completing an A.B. in Nature and Culture will be qualified to enter most professional schools, such as medicine and law, and many graduate programs in science and the humanities, especially those with an emphasis on interdisciplinary study. Students expecting to apply for highly specialized fields will need to plan their elective work carefully. The degree program provides excellent preparation for careers in business and government, as well as for the credential program for K-12 teaching. When combined with courses in non-fiction writing, the Nature and Culture curriculum will prepare students for the burgeoning fields of environmental writing and environmental journalism.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**40-41**
Nature and Culture 1	4
Chemistry 2A-2B	10
Biological Sciences 1A-1B-1C	15
Environmental Studies 30 or Anthropology 2	3-4
Comparative Literature 1, 2, or 3, or English 3	4
Comparative Literature 20	4
Recommended: Statistics 13, 32, 102, or 103.	
Depth Subject Matter	**44**
Nature and Culture 100 and 180	8
Environmental Studies 100, or Evolution and Ecology 101 or 121	4
Anthropology/Environmental Studies 101	4
Anthropology/Environmental Studies 133	4
English 184 or Native American Studies 181A, 181B, or 181C, or Comparative Literature 120	4
History and Philosophy of Science 130A	4
Electives, a minimum of 16 units selected in consultation with an adviser from one or two thematic clusters. Possible clusters include Human Evolution and Ecology, Human Culture and Society, Indigenous Peoples, California and the Southwest, Art and Literature, Earth and Environment, The Impact of Humans on the Environment, Environmental Law, Policy and Planning. A complete list of clusters and courses is available from advisers and from the Program Office	16
Total units for the major	**84-85**

Major advisers: S. McLean, D. Robertson, L. Timm, M. Wheelis.

Minor Program Requirements:

	UNITS
Nature and Culture	**24**
Nature and Culture 1	4
Nature and Culture 100	4
Environmental Studies 100, Evolution and Ecology 100 or 121	4
Anthropology/Environmental Studies 101	4
Anthropology/Environmental Studies 133	4
English 184 or Native American Studies 181A, 181B, or 181C	4

Courses in Nature and Culture (NAC)

Lower Division Courses

1. Intersections of Nature and Culture (4) I. Moores, McLean
Lecture/discussion—3 hours; term paper. Prerequisite: satisfaction of Subject A requirement; Comparative Literature 1, 2 or 3, or English 3 recommended. Nature and culture as human constructs, conditioned by both time and place; importance of nature in human thought, both scientific and spiritual; scientific and literary view of the relation between nature and culture, including forms of observation and methods of analysis. GE credit: ArtHum or SciEng, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

99. Individual Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

***100 The Culture of Nature: Theoretical Frameworks and Case Studies** (4) II. McLean, Wheelis
Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Problems in nature and culture, with particular attention to integrative theoretical frameworks available for the investigation of specific issues. Case studies will vary with instructor. May be repeated once for credit when topic and instructor differ. GE credit: SocSci, Div, Wrt.

120. Environmental Ethics (4) III. Timm, McLean
Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Ethical issues underlying environmental/ecological controversies, including anthropocentrism vs. ecocentrism, wilderness and species preservation, human population growth, animal rights, deep ecology, and ecofeminism. Emphasis is on critical examination of issues from cross-cultural, theoretical, and applied perspectives. GE credit: ArtHum, Wrt.

180. Fieldwork in Nature and Culture (4) I. Moyle, Robertson
Discussion—1 hour; fieldwork—70 hours/quarter; term paper. Prerequisite: course 100 and consent of instructor. Fieldwork: one week prior to the beginning of the quarter, plus two weekends. Natural scientific, social scientific, and literary/artistic approaches to the study of nature and culture in one place, which will vary with instructor.

192. Internship in Nature and Culture (1-12) I, II, III. The Staff (Director in charge)
Internship—3-36 hours. Prerequisite: course 1. Internship in natural sciences, social sciences, or humanities on or off campus in which students use and improve their interdisciplinary skills and perspectives gained through the Nature and Culture curriculum. Supervised by a faculty member. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Nature and Culture (1-5) I, II, III. The Staff
Tutoring—3-15 hours. Prerequisite: consent of instructor. Assist in field trips, lead study sessions with groups and individual students. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

199. Individual Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Nematology

(College of Agricultural and Environmental Sciences)

Harry K. Kaya, Ph.D., Chairperson of the Department

Department Office, 354 Hutchison Hall (916-752-7567 or 916-752-6905)

Faculty

Edward P. Caswell-Chen, Ph.D., Associate Professor
Howard Ferris, Ph.D., Professor
Bruce A. Jaffee, Ph.D., Professor
Harry K. Kaya, Ph.D., Professor *(Entomology)*
Steven Nadler, Ph.D., Associate Professor
Valerie M. Williamson, Ph.D., Associate Professor

Emeriti Faculty

Benjamin F. Lownsbery, Ph.D., Professor Emeritus
Armand R. Maggenti, Ph.D., Professor Emeritus
Dewey J. Raski, Ph.D., Professor Emeritus

Affiliated Faculty

Becky B. Westerdahl, Ph.D., Acting Associate Professor

Minor Program Requirements:

	UNITS
Nematology	**18-20**
Nematology 100, 110, and Soil Science 100	10
Two or three courses from one of the following areas	8-10
(a) Plant Science: Microbiology 102, Entomology 100, 135, 153, 156, 156L, Evolution and Ecology	

112, Plant Pathology 120, Plant Biology 121, Soil Science 111, 112.

(b) Entomology:
one upper division Entomology course, Evolution and Ecology 112, Microbiology 102, Plant Biology 121, Plant Pathology 120, Soil Science 102, 111, 112.

Minor Adviser. H.K. Kaya.

Graduate Study. Graduate degrees specializing in Nematology are offered through the Departments of Entomology and Plant Pathology, and through various Graduate Groups (Biochemistry, Ecology, Genetics, Plant Protection and Pest Management). Refer to the Graduate Studies section in this catalog for details.

Courses in Nematology (NEM)

Upper Division Courses

100. General Plant Nematology (4) I. Ferris
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

110. Introduction to Nematology (2) II. Caswell-Chen
Lecture—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to human environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals. GE credit: SciEng.

199. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Molecular and Physiological Plant Nematology (2) II. Williamson
Lecture—1 hour; discussion—1 hour. Prerequisite: Biological Sciences 101; Plant Pathology 120, course 100 or 110. Molecular biology and physiology of nematodes using *Caenorhabditis elegans* as a model, but with emphasis on plant-parasitic species. Plant responses to nematodes. Discussion of current literature emphasized. Offered in alternate years.

***202. Nematodes and the Soil Environment** (2) II. Jaffee
Lecture—1 hour; discussion—1 hour. Prerequisite: course 100 or 110, Plant Pathology 120, Soil Science 100 or 111. Consideration of how soilborne nematodes (parasites of plants and insects and microbivores) are affected by abiotic factors (especially soil porosity and water potential) and biotic factors (especially fungi and bacteria that parasitize nematodes). Offered in alternate years.

***203. Ecology of Parasitic Nematodes** (2) III. Caswell-Chen
Lecture—1 hour; discussion—1 hour. Prerequisite: course 100 or 110 or Entomology 156; Evolution and Ecology 101 or Plant Biology 117. Major concepts in population and community ecology of animal- and plant-parasitic nematodes. Current advances in techniques, theory, and basic information about nematode-host dynamics, and application to management of nematode diseases. Offered in alternate years.

204. Management of Plant-Parasitic Nematodes (2) III. Westerdahl
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or 110. Theory, foundation, principles and practices of nematode management. Techniques and equipment used to manage nematodes and methods used to analyze their effectiveness. Offered in alternate years.

205. Insect Nematology and Biological Control (2) I. Kaya
Lecture—1 hour; discussion—1 hour. Prerequisite: courses 100 and 110, Entomology 100 or 110. The biology of insect-parasitic nematodes, their effect on the host, and their potential as biological control agents of insect and other invertebrate pests. Application of ecological theory in classical and augmentative biological control. Offered in alternate years.

***225. Nematode Taxonomy and Comparative Morphology** (5) II. The Staff
Lecture—2 hours; laboratory—6 hours; 3 hours of laboratory to be announced. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes as well as select plant and animal parasites. Offered in alternate years.

245. Field Nematology (1) I. The Staff
Fieldwork—6 days. Prerequisite: course 100. Six-day demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (S/U grading only.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (S/U grading only.)

290C. Advanced Research Conference (1) (Research Faculty)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Neuroscience (A Graduate Group)

Lynn Robertson, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9091)
World Wide Web:
http://neuroscience.ucdavis.edu/ngg/

Faculty. The group includes 34 faculty members from 14 departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, the Division of Biological Sciences, and the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Neuroscience offers programs of study leading to the Ph.D. degree. Neuroscience is a broad, interdepartmental program with faculty interests ranging from molecular biophysics of channels to cortical organization and cognition. A major goal of the program is to prepare students for careers as research scientists. Details of the program may be obtained from the Group office.

Graduate Advisers. D. Amaral *(Center for Neurscience),* E. Carstens *(Neurobiology, Physiology and Behavior),* K. Sigvardt *(Center for Neurscience),* I. Pessah *(Molecular Biosciences).*

Courses in Neuroscience (NSC)

Graduate Courses

200LA. Laboratory Methods in Neurobiology (6) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated three times for credit. (S/U grading only.)

200LB. Laboratory Methods in Neurobiology (3) I, II, III. The Staff
Laboratory—9 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated for credit. (S/U grading only.)

221. Cellular and Molecular Neuroscience (4) I. Wilson
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced course dealing with the cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning will be covered. (Same course as Neurobiology, Physiology and Behavior 221.)

222. Systems Neuroscience (4) II. Britten
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced course covering the integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neurobiology, Physiology and Behavior 222.)

223. Cognitive Neuroscience (4) III. Mangun
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Same course as Psychology 261.)

243. Topics in Cellular and Behavioral Neurobiology (2) III. Wilson
Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. An advanced examination of several currrent problems in neurobiology. Topics will vary in different years; may be repeated for credit. (S/U grading only.)

***250. Biology of Neuroglia** (2) III. Kumari
Lecture/discussion—1.5 hours. Prerequisite: consent of instructor. The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response. Offered in alternate years. (Same course as Cell Biology and Human Anatomy 250.) (S/U grading only.)

283. Neurobiological Literature (1) I, II, III. Mulloney, Wilson
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. May be repeated for credit. (S/U grading only.)

290C. Research Conference in Neurobiology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Neuroscience or consent of instructor; course 299 (concurrently). Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Neurology

See Medicine, School of

Neurosurgery

See Medicine, School of

Nutrition

See Community Nutrition; Dietetics; Nutrition (below); Nutrition (A Graduate Group); Nutrition Science; and Clinical Nutrition and Metabolism (under Internal Medicine in Medicine, School of)

Nutrition

(College of Agricultural and Environmental Sciences)

Carl L. Keen, Ph.D., Chairperson of the Department

Department Office, 3135 Meyer Hall (916-752-4630)

Faculty

Lindsay H. Allen, Ph.D., Professor
Kenneth H. Brown, M.D., Professor
Andrew J. Clifford, Ph.D., Professor
Kathryn G. Dewey, Ph.D., Professor
M.R.C. Greenwood, Ph.D., Professor
Louis E. Grivetti, Ph.D., Professor *(Nutrition, Geography)*
Carl L. Keen, Ph.D., Professor *(Nutrition, Internal Medicine)*
Bo L. Lonnerdal, Ph.D., Professor *(Nutrition, Internal Medicine)*
Roger McDonald, Ph.D., Associate Professor
Robert B. Rucker, Ph.D., Professor *(Nutrition, Biological Chemistry)*
Michael A. Satre, Ph.D., Assistant Professor
Barbara O. Schneeman, Ph.D., Professor *(Nutrition, Food Science and Technology, Internal Medicine)*
Judith S. Stern, Sc.D., Professor *(Nutrition, Internal Medicine)*

Emeriti Faculty

Fredric W. Hill, Ph.D., Professor Emeritus
William C. Weir, Ph.D., Professor Emeritus
Frances J. Zeman, Ph.D., Professor Emeritus

Affiliated Faculty

Elizabeth A. Applegate, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Patricia Johnson, Adjunct Professor
Jo Ann Prophet, M.S., Lecturer
Janet Uriu-Hare, Assistant Research Nutritionist
Sheri Zidenbert-Cherr, Ph.D., Nutrition Science Specialist

Major Program

See the majors in Community Nutrition, Dietetics, and Nutrition Science.

Minor Program Requirements:

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

UNITS

Community Nutrition 24
Preparation: plan in advance to include the required course prerequisites.
Nutrition 101 or 110, plus 111 9
Nutrition 118, 192 (2).....6
Nutrition 120 4
Neurobiology, Physiology and Behavior 101 5
Replacement courses (see note above): Nutrition 114, 116A-116B, 116AL-116BL.

UNITS

Food Service Management 24-25
Preparation: plan in advance to include the required course prerequisites.
Food Science and Technology 100A-100B, 101A-101B 10
Food Service Management 120, 120L, 121, 122 11
Food Service Management 123 or Agricultural and Resource Economics 112...3-4
Replacement courses (see note above): Nutrition 10, 101, 110, 111, 114, 116A-116B, Economics 1A-1B.

UNITS

Nutrition and Food 24
Preparation: plan in advance to include the required course prerequisites.
Nutrition 101, 111 9
Nutrition 120 4
Food Science and Technology 100A, 100B...6
Neurobiology, Physiology and Behavior 101 5
Replacement courses (see note above): Nutrition 114, 116A-116B, 116AL-116BL.

UNITS

Nutrition Science.....20
Preparation: plan in advance to include the required course prerequisites.
Biological Sciences 102 and 103.....6
Neurobiology, Physiology and Behavior 101 5
Nutrition 110, 111 9
Replacement courses (see note above): Nutrition 114, 115, 116A-116B, 117, 120, 122, 122L, 123, 124, 201, 204.

Minor Adviser. R.B. Rucker.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the graduate adviser.

Courses in Nutrition (NUT)

Lower Division Courses

10. Discoveries and Concepts in Nutrition (3) I, II, III. Applegate
Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. GE credit: SciEng.

11. Current Topics and Controversies in Nutrition (2) I, II, III. Applegate
Discussion—1.5 hours; oral reports, written reports, term paper. Prerequisite: course 10 (may be taken concurrently). Assigned readings and discussion of topics of current concern and broad interest in contemporary nutrition. Coordinated with course 10. Not open for credit to students who have taken an upper division course in nutrition. GE credit: SciEng, Wrt.

20. Food and Culture: An Introduction to Culture, Diet, and Cuisine (4) II. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2, and course 10 recommended. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habit research; minority food habits; origins and development of dietary practices. GE credit: SciEng or SocSci.

***93. Public Issues in Nutrition and Food Science** (1) II. Schneeman
Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to Nutrition and Food Science for students new to the campus. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Introduction to Nutrition and Metabolism (4) I. Lonnerdal
Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 2 or 110. Introduction to the metabolism of protein, fat, and carbohydrate; the role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 110 or 111.

110. Principles of Nutrition (5) II. Calvert (Animal Science) and Rucker (Nutrition)
Lecture—5 hours. Prerequisite: Biological Sciences 103; a course in physiology or zoology. Fundamental principles of the nutrition of man and other animals. Physiological basis of nutrient requirements for growth, maintenance and production. Physiological basis of nutritional disorders. GE credit: Div.

111. Human Nutrition (4) III. McDonald
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 110. Nutrition of humans; critical study of nutrient requirements at various phases of life cycle.

112. Nutritional Assessment: Dietary, Anthropometric, and Clinical Measures (2) III. Brown
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 101 or 111 (may be taken concurrently). Methods of nutritional assessment in humans to evaluate dietary intake (dietary records and recalls, food frequency lists), body composition (anthropometry, physiological methods), and clinical signs of malnutrition. Principles of validity and reliability and interpretation of results.

113. Nutritional Assessment: Biochemical Measures (2) I. The Staff (McDonald in charge)
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 111. Variety of biologic markers of human nutritional status including hematological, urine, and hair analyses of clinical importance will be demonstrated and evaluated. Emphasizes the precision, accuracy, reliability, and interpretation of the values.

114. Developmental Nutrition (4) II. Keen, Satre
Lecture—4 hours. Prerequisite: course 110 or 101; course 111. Role of nutritional factors in embryonic and postnatal development. GE credit: SciEng, Wrt.

115. Animal Feeds and Nutrition (4) II. DePeters (Animal Science)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, Animal Science 41. Analyses and evaluation of feeds, influences of production, processing and storage methods on nutritive value of feeds. Animal nutrition. Diet formulation. GE credit: SciEng, Wrt.

116A-116B. Diet Therapy (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: course 111; Physiology 110 (or the equivalent). Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.

116AL. Practicum in Diet Therapy (2) I. Allen
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 116A (may be taken concurrently). Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A.

116BL. Practicum in Diet Therapy (1) II. The Staff
Lecture—0.5 hours; laboratory—1.5 hours. Prerequisite: courses 116B (may be taken concurrently) and 116AL. Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL.

117. Experimental Nutrition (5) I. Clifford
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 111; Biological Sciences 103; a laboratory course in nutrition or biochemistry. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition.

118. Community Nutrition (4) II. Dewey
Lecture—4 hours. Prerequisite: course 101 or 111, and 116A. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education.

120. Food Habits and Their Nutritional Implications (4) I. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biological Sciences 103; course 20 recommended. Advanced themes exploring food habits and their nutritional implications; pica; toxicants naturally occurring in food; ethnic diet; food systems; dietary codes; overview and case histories. GE credit: SciEng.

122. Ruminant Nutrition and Digestive Physiology (3) III. Fadel (Animal Science)
Lecture—3 hours. Prerequisite: Physiology 110; Biological Sciences 102, 103; Microbiology 2 recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

***122L. Ruminant Nutrition Laboratory** (2) III. Macy (Animal Science)
Laboratory—6 hours. Prerequisite: course 122 (concurrently). Students will conduct experiments in small groups and attend demonstrations on topics peculiar to ruminant digestive physiology and nutrition. The laboratory will deal with topics developed in lectures.

123. Companion and Captive Animal Nutrition (4) III. Klasing
Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: course 110; Biological Sciences 102 and 103. Comparative nutrition of non-ruminant vertebrate animals; including laboratory and companion animals, primates and wildlife. Relation of nutrition to metabolic adaptations and physiological state. Discussion/laboratory exercises leading to written group reports on establishment of nutritional requirements and formulating complete diets. GE credit: SciEng, Wrt.

124. Nutrition and Feeding of Finfishes (3) III. Hung (Animal Science)
Lecture—3 hours. Prerequisite: Biological Sciences 103 and Wildlife, Fish and Conservation Biology 121. Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species.

129. Journalistic Practicum in Nutrition (2) III. Stern
Discussion—2 hours. Prerequisite: course 111; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition; the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated once for credit. GE credit: Wrt.

130. Experiments in Nutrition: Design and Execution (2) I, II, III. The Staff (Keen in charge)
Laboratory—6 hours. Prerequisite: consent of instructor; course 101, 110, 111, or 114 recommended. Experiments in current nutritional problems, Discussion of experimental design. Students choose a project, and, independently or in groups of 2-3, design a protocol, do the project and report their findings. May be repeated for credit with consent of instructor.

190. Proseminar in Nutrition (1) I, II, III. Zidenberg-Cherr
Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor.

190C. Nutrition Research Conference (1) I, II, III. The Staff (Keen in charge)
Discussion—1 hour. Prerequisite: upper division standing in Nutrition or related biological science; consent of instructor. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: one upper division course in nutrition and consent of instructor. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.)

197T. Tutoring in Nutrition (1-2) I, II, III. The Staff
Discussion/laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Dietetics, Community Nutrition or related major. Completion of course 101 or 110 with a grade of B or better. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Keen in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Keen in charge)
(P/NP grading only.)

Graduate Courses

201. Vitamin Metabolism (2) II. Rucker
Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutritional aspects and the metabolism and chemistry of vitamins and vitamin-like compounds emphasized.

202. Advanced Nutritional Energetics (2) I. Baldwin
Lecture—2 hours. Prerequisite: course 110, Biological Sciences 103, Physiology 110 or the equivalent. History of nutritional energetics. Evaluation of energy transformations associated with food utilization. Energy expenditures at cellular, tissue, and animal levels as affected by diet and physiological state. Current and future feeding systems.

203. Advanced Protein and Amino Acid Nutrition (2) III. The Staff (Rogers, Molecular Biosciences, in charge)
Lecture—2 hours. Prerequisite: course 110, Biological Sciences 103, Physiology 110 or the equivalent. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, metabolism, resistance to disease, and food intake. Study of dietary requirements and interrelationships among amino acids.

204. Mineral Metabolism (2) III. Lonnerdal, Keen
Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Studies of metabolic functions and nutritional interrelationships involving minerals.

***216. Advanced Diet Therapy** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 116A-116B. Nutrition and disease interrelationships at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

***218. Advanced Field Work in Community Nutrition** (2-12) I, II, III, extra session summer. The Staff
Discussion—1 hour; fieldwork. Prerequisite: courses 118, 119; graduate standing; consent of instructor. Directed experience in community nutrition. Organization and implementation of nutrition programs.

219A. International Nutrition (3) II. Brown, Dewey, Pollitt (Pediatrics)
Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Epidemiology, etiology, and consequences of undernutrition in developing countries. Offered in alternate years.

219B. International Nutrition (3) III. Brown, Dewey, Pollitt (Pediatrics)
Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Nutrition policies and programs in developing countries. Offered in alternate years.

252. Nutrition and Development (3) II. Keen, Satre
Lecture—3 hours. Prerequisite: courses 201, 202, 203. Relationship of nutrition to prenatal and early postnatal development. Offered in alternate years.

***253. Control of Food Intake** (3) III. Stern (Nutrition), Gietzen (Anatomy, Physiology and Cell Biology) and staff
Lecture—2 hours; discussion—1 hour; 2 or 3 laboratory demonstrations per quarter. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in alternate years.

254. Applications of Systems Analysis in Nutrition (3) I. Baldwin (Animal Science)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 202, Physiological Sciences 205A-205B or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Offered in alternate years.

***255. Nutritional Toxicology** (3) I. The Staff
Lecture/discussion—3 hours. Prerequisite: course 110 or the equivalent, courses 201 and 204; Physiological Sciences 205B recommended. Examines naturally occurring toxicants in human food and animal feeds. Toxic nutrients, anti-nutrients, secondary plant compounds and mycotoxin metabolism are emphasized.

256. Nutritional and Hormonal Control of Animal Metabolic Function (3) III. Baldwin (Animal Science)
Lecture—3 hours. Prerequisite: courses 201, 202, 203; Physiological Sciences 205A-205B. Significance and interpretation of enzyme, metabolite, in vitro and in vivo isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diet-hormone interactions in carbohydrate, amino acid, and lipid metabolism will be discussed. Offered in alternate years.

***257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism** (2) I. Klasing (Avian Sciences), Calvert (Animal Science)
Lecture—2 hours. Prerequisite: courses 201 through 204; Physiological Sciences 205A-205B or the equivalent. Quantitative and qualitative aspects of nitrogen metabolism; critical evaluation of dietary intake, hormones and diet-hormone interactions which affect nitrogen metabolism, including protein synthesis-degradation, amino acid synthesis-catabolism, nitrogen transport-excretion, depending on current literature. Offered in alternate years.

***258. Field Research Methods in International Nutrition** (3) II. Brown, Dewey, Pollitt (Pediatrics)
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Offered in alternate years.

259. Nutrition and Aging (2) I. McDonald
Lecture—2 hours. Prerequisite: three of courses 201, 202, 203 and 204. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Offered in alternate years.

290. Beginning Nutrition Seminar (1) I, II. Satre
Seminar—2 hours. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field.

290C. Research Conference (1) I, II, III. The Staff (Keen in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals

*Course not offered this academic year.

presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.)

291. Advanced Nutrition Seminar (1) I, II, III. The Staff (Keen in charge)
Seminar—1 hour. Prerequisite: second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. (S/U grading only.)

297T. Supervised Teaching in Nutrition (1-3) I, II, III. The Staff (Keen in charge)
Teaching under faculty supervision—3-9 hours. Prerequisite: graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Keen in charge)

299. Research (1-12) I, II, III. The Staff (Keen in charge)
(S/U grading only.)

Professional Course

***380. Supervised Teaching in Dietetics** (2-12) I, II, III, extra-session summer. The Staff
Laboratory—6-36 hours. Prerequisite: graduate standing in M.S. program in Nutrition with emphasis in dietetics; consent of instructor. Directed teaching in approved dietetic internships or coordinated program in dietetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

Nutrition (A Graduate Group)

Q.R. Rogers, Ph.D., Chairperson of the Group

Group Office, 3135 Meyer Hall (916-752-4630)

Faculty. Faculty are drawn from the Colleges of Agricultural and Environmental Sciences, and of Letters and Science, and the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees. Research activities in nutrition include work with humans and with laboratory, domestic, and wild animals. Areas of specialization include the effect of diet on energetics and intermediary metabolism; nutrient control of gene expression, community nutrition, ruminant nutrition, amino acid requirements and utilization; nutrient balance and food intake regulation; biological antioxidants; food toxicants; mineral and vitamin nutrition; various anomalies of pre- and postnatal development; parenteral nutrition; the application of biomathematics to nutritional analyses; human and animal dietetics; and international nutrition. For detailed information regarding these programs, address the chairperson of the group.

Graduate Advisers. Consult the Nutrition Graduate Group Office.

Nutrition Science

(College of Agricultural and Environmental Sciences)

The Major Program

The study of nutrition encompasses all aspects of the collection, preparation, and consumption of food. Also important in the study of nutrition are the biochemical reactions that take place within the body's cells to utilize these nutrients. This is the level at which the nutrition science major explores the general subject of nutrition.

The Program. While students may elect to take courses concerning the social, psychological, economic, or cultural aspects of nutrition, the bulk of the course work making up the major consists of courses in the sciences. Nutrition as it is taught on the Davis campus is a biological science and requires a complete background in chemistry and biology, along with physics and calculus. These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition classes can be taken. Nutrition science students go on to study nutrition in depth during their junior and senior years.

Career Alternatives. The nutrition science major is excellent preparation for technical work in nutrition in animal, food, and pharmaceutical industries. It also provides a strong background for technical writing or health education. Students who wish to continue their studies are well prepared for professional study in nutrition, dietetics, medicine, and other health sciences.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 55-58
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A-2B-2C; and 8A-8B or 118A-118B or 128A-128B and 129A) 21-23
Computer science (Computer Science Engineering 10 or 15 or Agricultural Systems and Environment 21) 3-4
Mathematics (Mathematics 16A-16B) 6
Physics (Physics 1A-1B) 6
Statistics (Statistics 13 or Agricultural Systems and Environment 120) 4

Breadth/General Education 24
Satisfaction of General Education requirement plus additional course work in social sciences and humanities

Depth Subject Matter 26-28
Biochemistry (Biological Sciences 102, 103) 6
Nutrition 110, 111, 117 14
Nutrition courses selected from 112, 113, 114, 115, 116A, 116B, 122, 122L, 123, 130, 190, 190C, 198, and 199 6-8

Restricted Electives 42
Biochemistry laboratory (Molecular and Cellular Biology 120L) 6
Food science (upper division courses) 6
Physiology with laboratory (Neurobiology, Physiology and Behavior 101, 101L, plus an additional physiology course) 10
Additional nutrition or related biological and physical sciences 20

Unrestricted Electives 20-33

Total Units for the Degree.....180

Major Adviser. B. L. Lonnerdal.

Advising Center for the major is located in 1202E Meyer Hall (916-752-2512).

Dietetics Internship. To fulfill the academic requirements for an internship in Dietetics, choose the following courses from the categories in which they appear above: English 1 or 3, Psychology 1, Rhetoric and Communication 1, Sociology 1 or 3 or Anthropology 2, Economics 1A or 1B, Food Science and Technology 100A, 100B, 101A, 101B, Nutrition 110, 111, 113, 116A, 116B, 116AL-BL, 118, 190. The following courses must be added: Agricultural and Resource Economics 112; Community and Regional Development 173; Food Service Management 120, 120L, 121, 122, 123; or Education 110. Students intending to apply for admission to a dietetic internship should contact the Advising Office no later than the first quarter of the junior year for information on procedures.

Graduate Study. The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For information on graduate study contact the graduate adviser. See also the Graduate Studies section in this catalog.

Obstetrics and Gynecology

See Medicine, School of

Ophthalmology

See Medicine, School of

Organizational Studies

See Sociology

Orientation

(College of Agricultural and Environmental Sciences)

Course in Orientation (ORI)

Questions pertaining to the following course should be directed to the instructor or to the Biochemistry and Biophysics Department, 149 Briggs Hall.

Lower Division Course

***1. Orientation** (no credit) I, II, III. Chaykin (Biochemistry and Biophysics)
Discussion. Exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (P/NP grading only.)

Orthopaedic Surgery

See Medicine, School of

Otolaryngology

See Medicine, School of

Parks and Recreation

See Community and Regional Development; Design; Environmental Planning and Management (under Environmental Horticulture); Landscape Architecture; and Physical Education (under Exercise Science)

Pathology

See Pathology (Medicine, School of); Pathology, Microbiology and Immunology (below); and Plant Pathology

Pathology, Microbiology, and Immunology

(School of Veterinary Medicine)

N. James MacLachlan, B.V.Sc., Ph.D., Chairperson of the Department

Department Office, 1044 Haring Hall (916-752-1385)

Faculty

Mark L. Anderson, D.V.M., Ph.D., Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
Bradd C. Barr, D.V.M., Ph.D., Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
Arthur A. Bickford, V.M.D., Ph.D., Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
Walter M. Boyce, D.V.M., Ph.D., Associate Professor
Mary M. Christopher, D.V.M., Ph.D., Associate Professor
Pat A. Conrad, D.V.M., Ph.D., Professor
George Cooper, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Microbiology *(California Veterinary Diagnostic Laboratory)*
James S. Cullor, D.V.M., Ph.D., Associate Professor
Barbara Daft, D.V.M., Assistant Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
David A. Ferrick, Ph.D., Associate Professor
Laurel J. Gershwin, D.V.M., Ph.D., Professor
Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Associate Professor
Dwight C. Hirsh, D.V.M., Ph.D., Professor
Bill Johnson, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
Hailu Kinde, D.V.M., M.P.V.M., Assistant Professor of Clinical Diagnostic Microbiology *(California Veterinary Diagnostic Laboratory)*
Rance B. LeFebvre, Ph.D., Professor
Linda J. Lowenstine, D.V.M., Ph.D., Professor
N. James MacLachlan, B.V.Sc., Ph.D., Professor
F. Charles Mohr, D.V.M., Ph.D., Associate Professor
Peter F. Moore, B.V.Sc., Ph.D., Professor
Frederick A. Murphy, D.V.M., Ph.D., Professor
Bennie I. Osburn, D.V.M., Ph.D., Dean
Deryck H. Read, B.V.Sc., Ph.D., Associate Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
H.L. Shivaprasad, M.S., B.V.Sc., Ph.D., Associate Professor of Clinical Diagnostic Pathology *(California Veterinary Diagnostic Laboratory)*
Jeffrey L. Stott, Ph.D., Professor
Richard L. Walker, D.V.M., M.P.V.M., Ph.D., Associate Professor *(California Veterinary Diagnostic Laboratory)*
Dennis W. Wilson, D.V.M., M.S., Ph.D., Professor
Tilahun Yilma, D.V.M., Ph.D., Professor
Yuan Chung Zee, D.V.M., Ph.D., Professor
Joseph G. Zinkl, D.V.M., Ph.D., Professor

Emeriti Faculty

Norman F. Baker, D.V.M., Ph.D., Professor Emeritus
Ernst L. Biberstein, D.V.M., Ph.D., Professor Emeritus
Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus
Donald L. Dungworth, B.V.Sc., Ph.D., Professor Emeritus
Bernard F. Feldman, D.V.M., Ph.D., Professor Emeritus
Nemi C. Jain, M.V.Sc., Ph.D., Professor Emeritus
Donald E. Jasper, D.V.M., Ph.D., Professor Emeritus
Jiro K. Kaneko, D.V.M., Ph.D., D.V.Sc. (hc), Professor Emeritus
Peter C. Kennedy, D.V.M., Ph.D., Professor Emeritus
Jack E. Moulton, D.V.M., Ph.D., Professor Emeritus
Harvey J. Olander, D.V.M., Ph.D., Professor Emeritus
John W. Osebold, D.V.M., Ph.D., Professor Emeritus
Roy R. Pool, Jr., D.V.M., Professor Emeritus
Ming Ming Wong, Ph.D., Professor Emeritus

Affiliated Faculty

Robert M. DuFort, D.V.M., Assistant Clinical Professor
Jeanne M. George, D.V.M., Lecturer
John S. Glenn, D.V.M., Ph.D., Lecturer, Cooperative Extension Specialist
Laura D. Kramer, Ph.D., Associate Researcher *(Center for Vector-Borne Disease)*
Hugh D. Lothrop, B.S., Assistant Specialist *(Coachella Valley Mosquito Abatement District-Thermal)*
Marta Marthas, P.h.D., Assistant Adjunct Professor *(California Primate Research Center)*
Sean P. Mc Donough, D.V.M., Ph.D., Lecturer
Christopher J. Miller, D.V.M., Ph.D., Associate Adjunct Professor, Pathology *(California Primate Research Center)*
William K. Reisen, Ph.D., Research Entomologist *(Arbovirus Field Station, Bakersfield)*
Sonjia M. Shelly, D.V.M., Assistant Clinical Professor
John W. Switzer, D.V.M., Associate Clinical Professor
Bernadette C. Taylor, Ph.D., Assistant Researcher Immunology

Courses in Pathology, Microbiology, and Immunology (PMI)

Upper Division Courses

101. Comparative Hematology (2) III. Zinkl
Lecture—2 hours. Prerequisite: Biological Sciences 1A, Physiology 110, Biochemistry 101A-101B or Physiological Sciences 101A-101B or consent of instructor. Principles, interpretation, and applications of clinical hematology; comparative blood cellular morphology and function.

***101L. Comparative Hematology Laboratory** (2) III. Zinkl
Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

102. Clinical Biochemistry (3) II. Zinkl
Lecture—3 hours. Prerequisite: Physiology 112, 113; Physiological Sciences 101A-101B or Biochemistry and Biophysics 101A-101B or consent of instructor. Principles of biochemistry as related to alterations in the biochemical constituents of blood, urine and other body fluids.

126. Fundamentals of Immunology (3) I. Stott, Gershwin
Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

126L. Immunology Laboratory (2) I. Stott
Laboratory—6 hours. Prerequisite: course 126. Laboratory procedures in immunology. The immune response to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

127. Medical Bacteria and Fungi (5) III. LeFebvre
Lecture—3 hours; laboratory—5 hours. Prerequisite: general microbiology (Microbiology 102 and 102L), basic immunology (course 126 or Medical Microbiology 107). An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease.

128. Biology of Animal Viruses (3) I. Zee
Lecture—3 hours. Prerequisite: Biochemistry 101A or the equivalent. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses.

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Gershwin in charge)
(P/NP grading only.)

Graduate Courses

204. Normal and Abnormal Bone Marrow Cytology (1) III. Zinkl
Lecture-laboratory—2 hours. Prerequisite: Veterinary Medicine 435 or course 101. Normal maturation of hematopoietic cells followed by a study of the cytology of blood and bone marrow in selected diseases of domestic animals including infections, anemias, myeloproliferative disorders and leukemias.

***270. Advanced Immunology** (3) III. Stott
Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement. Biology of lymphocytes; cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenetic mechanisms in immunological diseases, immunological unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunochemistry and immunobiology. Offered in alternate years.

283. Comparative Avian Anatomy and Pathology (1-3) I. Lowenstine
Lecture—3 hours. Prerequisite: anatomy section—upper division undergraduates, graduates, and veterinary students; pathology section—third-year and fourth-year veterinary students and graduate students. Ten lectures outline gross/microscopic anatomy of a wide range of avian species as appropriate for students interested in avian biology. Twenty lectures encompass comparative aspects of avian pathobiology and disease manifestations for students interested in avian diseases. Offered in alternate years.

285. Cellular Basis of Disease (3) II. Mohr, Wu
Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B, Biological Sciences 104, and either Veterinary Medicine 452 or Medical Pathology 210. The disciplines of cell biology, biochemistry and molecular biology will be applied to the understanding of the basic nature of disease. Covers cellular injury and mechanisms of adaptation, host-defense and vascular responses, and cellular transformation. Offered in alternate years.

287. Comparative Pathology of Laboratory Animals (3) III. Lowenstine
Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary student; consent of instructor in charge. The pathology of diseases of animals commonly kept in laboratory settings including cold-blooded vertebrates as well as rodents, lagomorphs, and non-human primates. Emphases will be recognition of lesions and understanding of pathogenesis. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff
Seminar—1 hour. (S/U grading only.)

291A. Seminar in Immunology (1) I, II, III. Gershwin
Seminar—1 hour. A discussion of the current topics in immunology. May be repeated for credit. (S/U grading only.)

291B. Histopathology Conference (1) I, II, III.
The Staff (Wilson in charge)
Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor.

Discussion of selected cases based on records and slides. Defense of diagnoses. May be repeated for credit. (S/U grading only.)

292A. Seminar in Animal Virology (1) I, II, III. Marthas, Miller
Seminar—1 hour. A discussion of the current topics in animal virology. May be repeated for credit. (Same course as Microbiology 296.) (S/U grading only.)

292B. Surgical Pathology Conference (1) I, II, III. The Staff (Wilson in charge)
Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. May be repeated for credit. (S/U grading only.)

293A. Seminar in Infectious Diseases (1) I, II, III. Hirsh
Seminar—1 hour. Discussion of current topics and cases of infectious diseases. May be repeated for credit. (S/U grading only.)

293B. Necropsy and Surgical Pathology (1-4) I, II, III. The Staff (Wilson in charge)
Discussion—1 hour; laboratory—32 hours. Prerequisite: graduate standing; consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. May be repeated for credit. (S/U grading only.)

294A. Comparative Pathology Conference (1) I, II, III. Lowenstine
Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected topics in comparative pathology based on currently available case materials from fish, laboratory animals, zoo and wild animals and non-human primates. Given jointly by the Departments of Pathology in the Medical and Veterinary Schools and the California Primate Research Center. (S/U grading only.)

296. Microbiological Diagnosis (2-5) I, II, III. Gershwin, Hirsh
Discussion—1 hour; laboratory—5-14 hours. Prerequisite: laboratory course in veterinary or medical microbiology or the equivalent; course 293 (concurrently); consent of Chief of Microbiology, VM Teaching Hospital. Laboratory diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (S/U grading only).

298. Group Study (1-5) I, II, III. The Staff
Group study of advanced topics in pathology. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

Professional Course

397T. Tutoring in Veterinary Pathology, Microbiology, and Immunology (1-5) I, II, III. The Staff
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

Professional Courses

***418. Diseases of Free-Living Wildlife** (2) III. Boyce
Discussion—20 hours. Prerequisite: first-, second-, or third-year standing in School of Veterinary Medicine or consent of instructor. Ecology and epidemiology of disease in free-living wild animals, including medical management of free-living populations.

418L. Diseases of Free-Living Wildlife Laboratory (3) III. The Staff
Lecture—1 hour; laboratory—90 hours total. Prerequisite: third-year standing in School of Veterinary Medicine and course 418. Field course designed to develop problem solving skills for field and laboratory assessments of wildlife health and related environment; learn and perform technical aspects of wildlife restraint; develop skills necessary to approach field studies.

Pediatrics

See Medicine, School of

Pharmacology and Toxicology

See Medical Pharmacology and Toxicology (under Medicine, School of); Molecular Biosciences (Veterinary Medicine); and Pharmacology and Toxicology (A Graduate Group), below

Pharmacology and Toxicology (A Graduate Group)

Jerold A. Last, Ph.D., Chairperson of the Group

Group Office, 4138 Meyer Hall (Department of Environmental Toxicology, 916-752-4516)

Faculty. The 47 faculty in the graduate group are from more than 20 academic departments and organized research units within the College of Agricultural and Environmental Sciences, the School of Medicine and the School of Veterinary Medicine.

Graduate Study. The program of study and research leading to the Ph.D. degree emphasizes an interdisciplinary approach to graduate student training (students are admitted for the M.S. degree only under unusual and limited circumstances). Many specialty areas in pharmacology and toxicology are represented in the research interests of the faculty. Graduate students can study areas of pharmacology and toxicology which emphasize the effects of chemicals in the environment, on human health, and on ecosystems. Molecular and analytical approaches are used to study reproductive, genetic and developmental, respiratory and neurological systems, as well as metabolic fate and pharmacokinetics. Career opportunities include teaching in professional schools and hospitals, laboratory research in academia, government, industry, environmental control, and agricultural and drug regulatory agencies. For detailed information on the program, contact the Group Office, appropriate graduate adviser, or the group chairperson.

Graduate Advisers. C.G. Plopper *(Anatomy, Physiology and Cell Biology),* A.R. Buckpitt *(Molecular Biosciences),* J.A. Last *(Pulmonary Medicine),* M.G. Miller *(Environmental Toxicology).*

Courses in Pharmacology and Toxicology (PTX)

Graduate Courses

201. Principles of Pharmacology and Toxicology I (5) I. Buckpitt (Molecular Biosciences)
Lecture—5 hours. Prerequisite: Biological Sciences 102 and Neurobiology, Physiology and Behavior 101. First of three courses presenting fundamental principles of pharmacology and toxicology. Introductory overview of basic concepts in pharmacology/toxicology, followed by in-depth blocks on fate processes of chemical in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically.

202. Principles of Pharmacology and Toxicology II (5) II. Pessah
Lecture—5 hours. Prerequisite: course 201. The second of three courses presenting fundamental principles of pharmacology and toxicology. Covers the principles of pharmacodynamics and mechanisms of drug/toxicant actions.

203. Principles of Pharmacology and Toxicology III (3) III. Miller
Lecture—3 hours. Prerequisite: course 202. Physiologic pharmacology and toxicology, focusing on integrated physiological systems: the nervous system, cardiovascular system, immune system and reproductive system.

230. Advanced Topics in Pharmacology and Toxicology (1-3) I, II, III. The Staff
Lecture/discussion/seminar—1 hour each (course format can vary at option of instructor). Prerequisite: course 201 and consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.

290. Seminar (1) I, II, III. The Staff
Current topics in pharmacology and toxicology. (S/U grading only.)

Philosophy

(College of Letters and Science)

Jeffrey C. King, Ph.D., Chairperson of the Department

Department Office, 1238 Social Sciences and Humanities Building (916-752-0607)

Faculty

Philip M. Clark, III, Ph.D., Assistant Professor
David I. Copp, Ph.D., Professor
James R. Griesemer, Ph.D., Professor
Gerald Dworkin, Ph.D., Professor
Michael Jubien, Ph.D., Professor
Jeffrey King, Ph.D., Associate Professor
George J. Mattey II, Ph.D., Lecturer
Paul Teller, Ph.D., Professor
Michael V. Wedin, Ph.D., Professor

Emeriti Faculty

Ronald A. Arbini, Ph.D., Professor Emeritus
William H. Bossart, Ph.D., Professor Emeritus
Joel I. Friedman, Ph.D., Professor Emeritus
Neal W. Gilbert, Ph.D., Professor Emeritus
Marjorie Grene, Ph.D., Professor Emeritus
John F. Malcolm, Ph.D., Professor Emeritus

The Major Program

Philosophy addresses problems and questions that arise in all areas of human thought and experience and in all disciplines. Recurring questions about the nature of value, the good life, right conduct, knowledge, truth, language, mind, and reality are central to philosophical study. Philosophy also investigates the methodologies and assumptions of the major disciplines in the university in order to deepen our understanding of the sciences, of mathematics, art, literature, and history, and of religion and morality. It leads us to address issues about the nature of these subjects, about the methods of reasoning characteristic of them, and about the contributions they make to our understanding of ourselves and our world.

Philosophy contributes to the liberal education of its students. The department emphasizes an analytic approach to philosophical questions, which trains students to understand and evaluate arguments and to think and write precisely and clearly. These skills are of immense value in a variety of careers.

The Program. The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, ethics, and political philosophy. In addition, upper division courses are offered in moral and political philosophy, and aesthetics, and in the

philosophy of religion, of mind, of language, of mathematics, of law, and of the natural, biological, and social sciences.

The problems of philosophy have important roots in past. The history of philosophy is important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. For these reasons, the department places great emphasis on the history of philosophy, providing courses on the major figures and traditions of western philosophy.

Honors Program. The department offers an honors program, which gives qualifying majors the opportunity to work closely with faculty and graduate students.

Career Alternatives. Students of philosophy learn to understand and evaluate arguments and to think and write precisely and clearly. These analytical skills are assets in any career. Many of our majors have pursued graduate study in philosophy and have become philosophers in their own right. Others have pursued academic careers in related disciplines in the humanities and social sciences. Philosophy majors are well prepared for law, business, or other professional schools and have found careers in computer programming, government service, teaching, the ministry, and social work. Non-majors will find a number of philosophy courses listed below that will enhance their education, career and life experiences.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 16
Three of the following: Philosophy 1, 13, 14 or 24, 21, 22, 23, 31 or 32, 101, 102...12
Philosophy 12.....4

Depth Subject Matter 36
Upper division units in Philosophy selected with approval from the major adviser...36
Note: Philosophy 101 and 102 may not be counted toward both preparatory and depth subject matter units.

Total Units for the Major 52

Major Adviser. G.J. Mattey.

Minor Program Requirements:

Students wishing to minor in Philosophy may choose a general minor or a minor specializing in logic. There are no specific courses required for the general minor, so students may create a program to suit their own interests, subject to the approval of the minor adviser. The range of choice in the logic specialization is limited to the courses listed.

UNITS

Philosophy—General.....20
Twenty upper division units in philosophy, chosen in consultation with the minor adviser. At most, 4 units may be lower division if the student has taken two lower division philosophy courses, one of which is drawn from the following: Philosophy 12, 21, 22, 23.

Philosophy—Logic.....20
Philosophy 12 or Mathematics 108.....4
Philosophy 112.....4
Select units from Philosophy 113, 131, 132, 133, 134, 135 12

Minor Adviser. G.J. Mattey.

Courses for Non-Majors. The department offers both lower and upper division courses of interest and benefit to non-majors. Philosophy 1 is the introductory course for non-majors. Philosophy 5 teaches critical thinking. Students majoring in most disciplines in the university will find courses relevant to their educational or career goals. The following courses are recommended:

(i) pre-law: 12, 14, 24, 102, 104, 112, 115, 116, 118 and, especially, 119; *(ii) pre-medical:* 14, 104, 108, 114, 115, 116; *(iii) business:* 14, 102, 112, 114, 115, 116, 117, 118, 119; *(iv) social policy:* 14, 24, 101, 102, 114, 115, 116, 117, 118, 119; *(v) social sciences:* 12, 31, 32, 101, 102, 103, 104, 109, 118, 131; *(vi) physical sciences:* 12, 31, 32, 101, 102, 104, 106, 107, 112, 131; *(vii) biological sciences:* 31, 32, 101, 102, 104, 108, 110; *(viii) humanities and the arts:* 14, 21 through 24, 101, 102, 103, 105, 114, 116, 118, 123, 160 through 175; *(ix) agricultural and environmental studies:* 5, 14, 24, 31, 104, 114, 115, 116, 118.

Department Activities. The Philosophy department sponsors a lecture-seminar series of well-known philosophers who present papers in their fields of expertise. The department also operates ongoing faculty and graduate student colloquia. Undergraduate students are welcome to attend and join these discussions. Information can be obtained in the department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. In association with the Program on Economy, Justice and Society, the department also offers the Ph.D. in Philosophy with designated emphasis in Economy, Justice and Society. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. M. Jubien.

Courses in Philosophy (PHI)

Lower Division Courses

1. Introduction to Philosophy (4) I. King; II. The Staff; III. Wedin
Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. GE credit: ArtHum, Wrt.

5. Critical Reasoning (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Topics to be covered may include basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to students who have completed course 6. GE credit: Wrt.

***6. Critical Reasoning and Writing** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Topics to be covered may include criteria of good reasoning in everyday life and in science; basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Critical papers emphasized. Not open to students who have completed course 5. Offered in alternate years. GE credit: ArtHum, Wrt.

11. Philosophy East and West (4) II. Friedman
Lecture—3 hours; discussion—1 hour. Comparative treatment of select theories in Eastern and Western philosophy, e.g., of self, God, being, knowledge, enlightenment. Topics selected from the following philosophies: Eastern—Buddhist, Confucian, Hindu, Taoist; and Western—Platonist, Aristotelian, Medieval Christian, Modern Rationalist/Empiricist, Kantian, Hegelian, Existentialist. Offered in alternate years. (Former course 10E.) GE credit: ArtHum, Div, Wrt.

12. Introduction to Symbolic Logic (4) I. Teller
Lecture—3 hours; discussion—1 hour. Sentence logic syntax and semantics. Truth tables. Transcription between sentence logic and English. Logical equivalence. Validity. Proof techniques.

***13. The Person** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Examination of the concept of the person, that is, of our intuitions about what persons are, e.g., that persons are agents, that they have a distinct psychology, that they are rational, that they are language-users, that they are mortal. GE credit: ArtHum, Wrt.

14. Ethical and Social Problems in Contemporary Society (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Philosophical issues and positions involved in contemporary moral and social problems. Possible topics include civil disobedience and revolution, racial and sex discrimination, environment, population control, technology and human values, sexual morality, freedom in society. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

15. Bioethics (4) I. Dworkin
Lecture—3 hours; discussion–1 hour. Critical analysis of normative issues raised by contemporary medicine and biology. Possible topics include euthanasia, abortion, reproductive technologies, genetic engineering, practitioner/patient relationships, allocation of medical resources, experimentation on human subjects. Offered in alternate years. GE credit: ArtHum, Wrt.

21. History of Philosophy: Ancient (4) I. Wedin
Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato, and Aristotle. GE credit: ArtHum, Wrt.

22. History of Philosophy: Seventeenth Century (4) II. Mattey
Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz and seventeenth century scientific thinkers. GE credit: ArtHum, Wrt.

***23. History of Philosophy: Eighteenth Century** (4) III. Mattey
Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. GE credit: ArtHum, Wrt.

***24. Introduction to Ethics and Political Philosophy** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting central problems in ethical theory and political philosophy. Why should we be moral? What is moral behavior? What is justice, both for the individual and for society? Is there a right of rebellion? GE credit: ArtHum, Wrt.

31. Appraising Scientific Reasoning (4) I. Griesemer
Lecture—3 hours; discussion—1 hour. Introduction to scientific hypotheses and the kinds of reasoning used to justify such hypotheses. Emphasis on adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Concrete historical and contemporary cases. GE credit: ArtHum or SciEng.

***32. Understanding Scientific Change** (4) II. Griesemer
Lecture—3 hours; discussion—1 hour. Concepts of scientific change in historical and philosophical perspective. Survey of models of growth of knowledge, 17th century to present. Relationship between logic of theories and theory choice. Kuhn's revolution model. Examples from various sciences. GE credit: ArtHum or SciEng, Wrt.

***90X. Lower Division Seminar in Philosophy** (1-2) I, II, III. The Staff
Seminar—1-2 hours. Prerequisite: completion of fewer than 84 quarter units; completion of at least one course in philosophy; consent of instructor. Investigation of a selected topic in philosophy through readings, discussions, and written assignments. Emphasis upon student participation. Limited enrollment.

***98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

(Certain upper division courses may not be offered every year.)

101. Metaphysics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. GE credit: ArtHum, Wrt.

102. Theory of Knowledge (4) I. Mattey
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Analysis of the concept of

knowledge. The relation between knowledge, belief and truth. Development of foundationalist, coherentist and externalist theories of justified belief. Examination of skepticism. GE credit: ArtHum, Wrt.

***103. Philosophy of Mind** (4) III. The Staff
Lecture/discussion—3 hours; term paper. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. GE credit: ArtHum, Wrt.

104. Introduction to Philosophy of Science (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or a science background recommended. Basic problems in the philosophy of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms, the nature of theories, operationalism and behaviorism, realism, reduction. GE credit: ArtHum or SciEng, Wrt.

***105. Philosophy of Religion** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. GE credit: ArtHum, Wrt.

***106. Science and Metaphysics** (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy or consent of instructor. Intensive study of topics in metaphysics to which the results of modern science are or appear to be relevant: the nature of time, causation, determinism, physicalism, realism. GE credit: ArtHum or SciEng, Wrt.

107. Philosophy of the Physical Sciences (4) I. Teller
Lecture—3 hours; discussion—1 hour. Prerequisite: one philosophy course or a science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanations, and models. Problems of causality, determininism, induction, and probability; the structure of scientific revolutions. GE credit: ArtHum or SciEng, Wrt.

108. Philosophy of the Biological Sciences (4) I. Griesemer
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in biology or one course in philosophy. Scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. GE credit: ArtHum or SciEng, Wrt.

***109. Philosophy of the Social Sciences** (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or a social science recommended. The nature of the social sciences, their subject matter and methods. Similarities to and differences from natural and life sciences. Predicting and explaining human behavior. Behaviorism. Reduction, holism, and individualism. Related moral issues. The social sciences and philosophy. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt.

***110. An Historical Introduction to the Philosophy of Science** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Several general topics in the philosophy of science introduced and discussed in the context of actual episodes in the development of the natural sciences. Impact of these scientific developments on philosophical thought of the immediately following historical period. GE credit: ArtHum or SciEng, Wrt.

***111. Philosophy of Space and Time** (4) Teller
Lecture/discussion—3 hours; term paper. Prerequisite: one upper division philosophy course. Philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of geometry, conventionalism, absolutist versus relationist views of space and time, philosophical impact of relativity theory.

112. Intermediate Symbolic Logic (4) II. Mattey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or consent of instructor. Predicate logic syntax and semantics. Transcription between predicate logic and English. Proof techniques. Identity, functions, and definite descriptions. Introduction to concepts of metatheory.

***113. Advanced Logic** (4) III. Jubien
Lecture/discussion—4 hours. Prerequisite: course 112 or Mathematics 108 or the equivalent. Topics will vary between metalogic of First-Order logic through the Completeness and Löwenheim-Skolem theorems; and Zermelo-Fraenkel set theory typically axiomatized as a First-Order theory. May be repeated once when subject area differs.

***114. History of Ethics** (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: one philosophy course. Study of some classic texts from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. GE credit: ArtHum, Wrt.

***115. Problems in Normative Ethics** (4) Clark
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Moral philosophy studied through examination of moral problems and the moral principles and common sense intuitions that bear on them. Problems discussed may include: animal rights, fetal rights, euthanasia, justice and health care, war, nuclear deterrence, world hunger, environmental protection. GE credit: ArtHum, Wrt.

116. Ethical Theories (4) II. Copp
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy; one course in ethics recommended. Study of fundamental concepts and problems in ethical theory through an examination of classical and contemporary philosophical theories of ethics. Among the theories that may be discussed are utilitarianism, virtue theory, theories of natural rights, Kantian ethical theory, and contractarianism.

117. Foundations of Ethics (4) II. Copp
Lecture/discussion—3 hours; term paper. Prerequisite: one of courses 114, 115, 116, 101, or 137. Advanced investigation of questions about the nature and foundations of morality. Among the topics that may be discussed are moral realism and anti-realism, cognitivism and non-cognitivism, types of relativism, moral skepticism, normative language and normative belief.

***118. Political Philosophy** (4) Clark
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. (Former course 117.) Not open for credit to students who have completed former course 117. Offered in alternate years. GE credit: SocSci, Div, Wrt.

119. Philosophy of Law (4) I. Copp
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or consent of instructor. Philosophical theories of the nature of law, legal obligation, the relation of law and morals. Problems for law involving liberty and justice: freedom of expression, privacy, rights, discrimination and fairness, responsibility, and punishment. (Former course 116.) GE credit: SocSci, Div, Wrt.

***121. Topics in Metaphysics** (4) II. The Staff
Lecture/discussion—4 hours. Prerequisite: course 101. Examination of up to three topics in metaphysics, e.g., fatalism; necessity; identity; ontological categories; minds, bodies, and persons; space and time; freedom and determinism.

***122. Topics in Theory of Knowledge** (4) Mattey
Lecture/discussion—4 hours. Prerequisite: course 102. Examination of one or more topics in theory of knowledge, such as belief, skepticism, justification.

***123. Aesthetics** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. GE credit: ArtHum, Wrt.

***127. Philosophy and Economics** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one upper division course in philosophy. Study of issues at the intersection of economics and moral and political philosophy, e.g., the nature of value, the nature of justice, the nature of rationality, the measurability of human well-being. GE credit: ArtHum or SocSci, Wrt.

***131. Philosophy of Logic and Mathematics** (4) Jubien
Lecture/discussion—3 hours; term paper. Prerequisite: course 12 or one course for credit in mathematics. Nature of formal systems and mathematical theories. Selected topics include logical and semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödel's incompleteness results.

***132. History of Logic** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy or logic recommended. Overview of the chief developments in the history of logic.

***133. Topics in Mathematical Logic** (4) III. King
Lecture/discussion—4 hours. Prerequisite: course 113 or Mathematics 125 or consent of instructor. Topics to be taken typically from the following: metalogic and model theory; axiomatic set theory and independence results; Gödel's incompleteness theorems; computability and recursion theory.

134. Modal Logic (4) III. Mattey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or Mathematics 108 or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. "Possible worlds" semantics and formal proofs. Applications to epistemology, ethics, or temporality. Offered in alternate years.

***135. Alternative Logics** (4) Mattey
Lecture/discussion—4 hours. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionist logics, relevance logics, and nonmonotonic logics.

***137. Philosophy of Language** (4) King
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy or linguistics. Discussion of philosophical theories of how languages work and philosophical problems arising from thinking about language. Emphasis on modern (1879–present) philosophical views on language.

143. Hellenistic Philosophy (4) I. Mattey
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Focus on Greek and Roman philosophy after Aristotle, including Epicureanism, Stoicism, Skepticism, and neo-Platonism. GE credit: ArtHum, Wrt.

***145. Medieval Philosophy** (4) The Staff
Lecture/discussion—3 hours; written reports. Prerequisite: course 21. Study of major philosophers in the medieval period. GE credit: ArtHum, Wrt.

151. Philosophy of the Nineteenth Century (4) III. Mattey
Lecture/discussion—4 hours. Prerequisite: courses 21, 22, or 23 recommended. Idealism of Hegel, the pessimism of Schopenhauer, Marxism, the irrationalism of Kierkegaard, Nietzsche and Dostoevsky. GE credit: ArtHum, Wrt.

***155. American Philosophy** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C.I. Lewis.

156. Contemporary Analytic Philosophy (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Consideration of central issues such as meaning/reference, analytic/synthetic, reductionism, formal and ordinary language, essential properties, ontological commitment,

possible world semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen.

***158. Phenomenology and Existentialism in Germany** (4) The Staff
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century German thinkers such as Husserl, Heidegger, Jaspers.

***159. Phenomenology and Existentialism in France** (4) The Staff
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century French thinkers such as Sartre, Marcel, Merleau-Ponty.

***160. Pre-Socratics** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heracleitus, Parmenides, Empedocles, Anaxagoras, and the atomists.

***161. Plato** (4) The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Examines Plato's most important contributions in metaphysics, epistemology, psychology, cosmology, ethics and political philosophy. Dialogues will be selected from Plato's middle and later writings. Offered in alternate years.

***162. Aristotle** (4) I. Wedin
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. An overview of Aristotle's most central and influential writings. Topics selected from fields such as metaphysics, physics, ethics, logic, and psychology. Offered in alternate years.

168. Descartes (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 22. Descartes' metaphysics, theory of knowledge, and philosophy of science. Readings from *Meditations on First Philosophy* and *Principles of Philosophy.* Offered in alternate years.

***169. Spinoza** (4) The Staff
Lecture/discussion—4 hours. Prerequisite: course 22.

***170. Leibniz** (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 22. Survey of the philosophical writings of G. W. Leibniz. Topics include Leibniz's logic, the existence of God, human freedom, substance, and the relation between science and metaphysics. Offered in alternate years.

172. Locke and Berkeley (4) I. The Staff
Lecture—4 hours. Prerequisite: course 23. Examination of Locke's *Essay Concerning Human Understanding* and Berkeley's *Principles of Human Knowledge* and *Three Dialogues.* Topics include abstract ideas, existence of matter, primary and secondary qualities, the existence of God, and the nature of scientific knowledge.

***174. Hume** (4) The Staff
Lecture/discussion—4 hours. Prerequisite: course 23. Examination of David Hume's *Treatise of Human Nature* and related writings. Topics include space and time, necessity, induction, skepticism concerning the external world and concerning personal identity. Offered in alternate years.

***175. Kant** (4) Mattey
Lecture/discussion—4 hours. Prerequisite: course 23. Intensive examination of the *Critique of Pure Reason.* Topics include the extent and limitations of human cognition, space and time, substance and causality, freedom and determinism, and the existence of God. Offered in alternate years.

***177. Hegel** (4) The Staff
Lecture/discussion—4 hours. Prerequisite: courses 23 and 175 recommended.

190. Special Topics in the History of Philosophy (4) I. Wedin
Lecture—3 hours; term paper. Intensive study of special topic, problem, or authors in the history of philosophy. May be repeated for credit.

193. Research in Philosophy (2) I, II, III. The Staff (Chairperson in charge)
Term paper/discussion—2 hours. Prerequisite: consent of instructor. Individual research resulting in a paper on a specific topic in one of various fields of philosophy. May be repeated twice for credit.

194HA-194HB. Honors Research Project (4-4) I, II, III. The Staff (Chairperson in charge)
Tutoring—3 hours; term paper. Prerequisite: consent of instructor; open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major adviser for list of instructors available in a given quarter.

***198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Metaphysics (4) II. Teller
Seminar—3 hours; term paper. Topics vary from quarter to quarter. Sample topics include modality, truth, ontology, events, and causation. May be repeated for credit.

202. Theory of Knowledge (4) III. The Staff
Seminar—4 hours.

***206. Philosophical Argumentation** (4) The Staff
Seminar—3 hours; short papers. Prerequisite: graduate standing. Investigation and evaluation of philosophical arguments. Critical discussion of student papers on various aspects of philosophical disputes.

***207. Philosophy of Physics** (4) The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. An intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of spacetime theories, the interpretation of quantum mechanics, foundations of statistical mechanics. May be repeated for credit with consent of instructor.

***208. Philosophy of Biology** (4) Griesemer
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive treatment of one or more general topics in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology, and cultural evolution. May be repeated for credit with consent of instructor.

***210. Philosophy of Science** (4) II. Teller
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Treatment of one or more general topics of current interest in the philosophy of science, such as scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. Course may be repeated for credit with consent of instructor.

***212. Philosophy of Logic and Mathematics** (4) The Staff
Seminar—3 hours; term paper. Prerequisite: course 112 or 113, or Mathematics 108 or 125, or the equivalent. Philosophical issues in logic and mathematics. Topics may include nature of logical and mathematical truth or knowledge; correctness of logical systems; foundations of mathematics; metaphysical and epistemological presuppositions; applications to philosophical problems and formalization of philosophical theories.

***214. Ethics** (4) I. Copp; III. Dworkin
Seminar—3 hours; term paper.

217. Political Philosophy (4) I. Copp
Seminar—3 hours; term paper. Prerequisite: graduate student standing. Advanced study of issues in political philosophy. May be repeated for credit with consent of instructor.

237. Philosophy of Language (4) I. King
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Study of philosophical issues raised by language, such as the nature of semantic content, proper semantics for verbs of propositional attitude, feasibility and limitations of formal semantics and pragmatics for natural languages. May be repeated for credit with consent of instructor when the content is sufficiently distinct.

***261. Plato** (4) The Staff
Seminar—3 hours.

262. Aristotle (4) III. Wedin
Seminar—3 hours.

***275. Kant** (4) Mattey
Seminar—3 hours.

***290. History of Philosophy** (4) I. Mattey
Seminar—3 hours. Special topics in the history of philosophy.

***293. The Emotions** (4) The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing; open to undergraduates with consent of instructor. Considers the emotions in their full variety. Relates emotion to desire, to belief, to sensation, to behavior, and to rationality. Cultural interpretations of emotion will be reviewed. Ancient and modern writers will be read. Offered in alternate years.

298. Group Study (1-5) III. Copp

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Physical Education

See Exercise Science

Physical Medicine and Rehabilitation

See Medicine, School of

Physics

(College of Letters and Science)

Barry M. Klein, Ph.D., Chairperson of the Department

Joseph E. Kiskis, Ph.D., Vice Chairperson of the Department (Graduate Matters)

Wendell H. Potter, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)

Department Office, 225 Physics/Geology Building (916-752-1500)

Faculty

Robert H. Becker, Ph.D., Professor
Franklin P. Brady, Ph.D., Professor
Steven Carlip, Ph.D., Associate Professor
Daniel A. Cebra, Ph.D., Assistant Professor
Ling-Lie Chau, Ph.D., Professor
Shirley Chiang, Ph.D., Professor
Lawrence B. Coleman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Linton R. Corruccini, Ph.D., Professor
Daniel L. Cox, Ph.D., Professor
Charles S. Fadley, Ph.D., Professor
Ching-Yao Fong, Ph.D., Professor
John F. Gunion, Ph.D., Professor
Tao Han, Ph.D., Assistant Professor
Joseph E. Kiskis, Ph.D., Professor
Barry M. Klein, Ph.D., Professor
Winston T. Ko, Ph.D., Professor
Richard L. Lander, Ph.D., Professor
Sudhindra Mani, Ph.D., Associate Professor
Douglas W. McColm, Ph.D., Senior Lecturer
David E. Pellett, Ph.D., Professor
Warren E. Pickett, Ph.D., Professor
Wendell H. Potter, Ph.D., Senior Lecturer
Forest R. Rouse, Ph.D., Assistant Professor
Richard T. Scalettar, Ph.D., Associate Professor
Robert N. Shelton, Ph.D., Professor
Rajiv R.P. Singh, Ph.D., Associate Professor
David J. Webb, Ph.D., Associate Professor

Philip M. Yager, Ph.D., Professor
Xiangdong Zhu, Ph.D., Associate Professor
Rena J. Zieve, Ph.D., Assistant Professor
Gergely Zimanyi, Ph.D., Associate Professor

Emeriti Faculty

Thomas A. Cahill, Ph.D., Professor Emeritus
James E. Draper, Ph.D., Professor Emeritus
Glen W. Erickson, Ph.D., Professor Emeritus
Claude Garrod, Ph.D., Professor Emeritus
James P. Hurley, Ph.D., Professor Emeritus
John A. Jungerman, Ph.D., Professor Emeritus
William J. Knox, Ph.D., Professor Emeritus
Neal Peek, Ph.D., Senior Lecturer Emeritus
Roderick V. Reid, Jr., Ph.D., Professor Emeritus
William W. True, Ph.D., Professor Emeritus

The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe tick. Information learned from high-energy particle accelerators and nuclear reactors teaches us not only what holds the nucleus and the atom together but also why stars shine and how radiation therapy fights cancer.

The Program. The Department of Physics offers three degree programs: the Bachelor of Arts in Physics, and the Bachelor of Science in Physics and in Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market on completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives. Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Applied Physics

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 56
Physics 9A, 9B, 9C, 9D 16
Mathematics 21A, 21B, 21C, 21D, 22A, 22B ...22
Engineering 5 (or equivalent programming course) 3
Chemistry 2A-2B-2C or 2AH-2BH-2CH.....15
Any recommended courses for a particular concentration.

Depth Subject Matter 54
Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 112, 115A, 116A, 116B, 122 36
At least 18 units from approved courses within one of the following concentrations chosen in consultation with a major adviser 18
Materials science, quantum optics, chemical physics, atmospheric physics, geophysics, physical oceanography. (Lists of approved courses in each concentration with representative programs are available from the Physics Department.)

Total Units for the Major 110

Physics

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 41
Physics 9A, 9B, 9C, 9D 16
Mathematics 21A, 21B, 21C, 21D, 22A, 22B ...22
Engineering 5 (or equivalent programming course) 3

Depth Subject Matter 39
Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 112, 115A, 122 28
At least 7 units from Physics 105BL, 105C, 110C, 115B, 127, 129A, 129B, 130A, 130B, 140A, 140B 7
At least 4 additional upper division units in physics. 4

Total Units for the Major 80

Recommended
Chemistry 2A-2B-2C or 2AH-2BH-2CH. See also recommended elective courses following the B.S. program below.

Physics

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 56
Physics 9A, 9B, 9C, 9D 16
Mathematics 21A, 21B, 21C, 21D, 22A, 22B ...22
Engineering 5 (or equivalent programming course) 3
Chemistry 2A-2B-2C or 2AH-2BH-2CH.....15

Depth Subject Matter 54
Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 110C, 112, 115A, 115B, 122.....34
At least 10 units from Physics 105BL, 105C, 127, 129A, 129B, 130A, 130B, 140A, 140B 10
At least 10 additional upper division units from physics. (No more than 6 units in courses numbered 194H, 195, 198, and 199 may be applied in satisfaction of this requirement.) 10

Total Units for the Major 110

Recommended Electives
Astronomy: Astronomy 2.
Computer and numerical analysis: Mathematics 128A or Applied Science Engineering 115.
Statistics: Statistics 131A.
Advanced mathematics: Mathematics 108, 118A-118B, 119A-119B, 121A-121B, 127A-127B-127C, 185A, 185B.

Program Variance. Courses from other departments may be submitted for courses in the depth subject matter requirements by obtaining written permission from the Undergraduate Curriculum Committee chairperson, as approved by the Department.

Major Advisers. Contact Departmental Undergraduate Majors Office, 231 Physics/Geology Building, for adviser assignment.

Minor Program Requirements:

Three distinct minor emphases are offered, all requiring prerequisites equivalent to Mathematics 21A-21B-21C-21D and 22A-22B and Physics 9A-9B-9C-9D. Students considering the possibility of earning a Physics minor should consult with a Physics major adviser before beginning work in one of these minor programs.

UNITS

Physics 18-24

Classical Physics emphasis **23**
Physics 104A-104B, 105A, 105AL, 105C, 108, 108L, 110A-110B. 23
(If the fall quarter courses, 104A, 105A, 110A, 112, are taken in different years, 104A and 105A should be taken in the first year; course 105C does not require 105B.)

Quantum Physics emphasis **22**
Physics 104A-104B, 105A, 105AL, 105B, 112, 115A-115B 22
(Physics 104A-104B and 105A-105B must precede 115A-115B. Physics 110A recommended.)

General Physics emphasis.....**22**
Physics 104A-104B, 105A, 105AL, 105B, 110A, 112, 115A 22
(Physics 104A-104B and 105A-105B must precede 115A.)

Graduate Study. The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees and the Ph.D. degree with an Applied Physics Research Specialty. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, University of California, Davis 95616.

Astronomy. There is no major program leading to a degree in Astronomy. Introductory courses are offered in general astronomy and astrophysics. Students who wish to use the observatory or the portable telescopes may do so through the Astronomy Club. The graduate program in physics provides research opportunities in radio-astronomy or microwave astrophysics.

Courses in Astronomy (AST)

Lower Division Courses

2. Introduction to Modern Astronomy and Astrophysics (4) I. The Staff
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, the solar system, galaxies, and the Universe. Not open to students who have received credit for course 10.

10. General Astronomy (4) III. The Staff
Lecture—3 hours; laboratory/discussion—2 hours. A non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, galaxies, and the Universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extra-terrestrial communications. Not open to students who have received credit for course 2 or any physics course (except 10, 137, 160). GE credit: SciEng.

Courses in Physics (PHY)

Physics 10 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Physics 1 is a two-quarter sequence requiring some mathematics (trigonometry). Either 1A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 7 is a one-year (three-quarter) introductory physics course with laboratory intended for students majoring in the biological sciences. It has a calculus prerequisite. If you don't need a full year of introductory physics, you should take one or two quarters of Physics 1 instead. Read the following information carefully, if you are using Physics 7 to complete an introductory course you have already begun.

The sequence of material in Physics 7 is different from that in most traditionally taught introductory physics courses. Physics 7B is most like the first quarter or semester of traditionally taught courses which treat classical mechanics. Physics 7C is most like the last quarter or semester which, in traditionally taught courses, treats optics, electricity and magnetism, and modern physics. The content and sequence of

Physics 7A is unlike that of most other traditionally taught courses.

If you have completed one introductory quarter or semester of a traditionally taught physics course and want to continue with Physics 7, you should first take (and will receive full credit for) Physics 7A. Then, either skip 7B, but self-study the last three weeks of material, **or** take 7B and receive reduced credit. Next, take 7C for full credit.

If you have taken two quarters of a year-long introductory physics course and have not had extensive work in optics, electricity and magnetism, and modern physics, you should take Physics 7C. In no case should you take Physics 7B without first taking Physics 7A. All other situations should be discussed directly with a Physics 7 instructor.

Students not intending to take the entire sequence should take Physics 1.

Physics 9 is a four-quarter sequence using calculus throughout and including laboratory work as an integral part. The course is primarily for students in the physical sciences and engineering.

Note: Faculty listed for each course are well acquainted with the course, but may not teach it this year.

Lower Division Courses

1A. Principles of Physics (3) I. McColm
Lecture—3 hours. Prerequisite: trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open to students who have received credit for course 5A, 7B, or 9A.

1B. Principles of Physics (3) II. McColm
Lecture—3 hours. Prerequisite: course 1A or 9A. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open to students who have received credit for course 5B, 5C, 7A, 7B, 7C, 9B, 9C, or 9D.

7A. General Physics (4) I, II. Coleman, Potter, Webb
Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: Mathematics 16B (may be taken concurrently). Introduction to general principles and analytical methods used in physics for students majoring in a biological science. Only two units of credit allowed to students who have completed course 9B, 5B, or 1B.

7B. General Physics (4) II, III. Coleman, McColm, Potter
Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: course 7A. Continuation of course 7A. Only two units of credit allowed to students who have completed course 9A, 5A, or 1A.

7C. General Physics (4) III, I. Coleman, Potter
Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: course 7B. Continuation of course 7B. Only two units of credit allowed to students who have completed course 9C or 5C.

9A. Classical Physics (4) III. The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: Mathematics 21B. Mechanics. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Only two units of credit allowed for students who have completed course 1A. Only one unit of credit allowed for students who have completed course 5A or 7B.

9B. Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9A with consent of instructor; Mathematics 21C; Mathematics 21D (may be taken concurrently). Prerequisite: course 9A, Mathematics 21C, Mathematics 21D (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Not open for credit to students who have completed Engineering 105A. Only one unit of credit allowed for students who have completed course 5B or 7A.

9C. Classical Physics (4) II. The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9B; Mathematics 21D; Mathematics 22A (may be taken concurrently). Continuation of course 9B. Electricity and magnetism including circuits and Maxwell's equations. Only one unit of credit allowed for students who have completed course 5C or 7C.

9D. Modern Physics (4) III. The Staff
Lecture—3 hours; discussion—1.5 hours. Prerequisite: course 9C and Mathematics 22A; Mathematics 22B recommended (may be taken concurrently). Introduction to physics concepts developed since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics.

9HA. Honors Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: high school physics recommended; high school calculus or Mathematics 21A required; Mathematics 21B concurrently. Same material as in course 9A, but in greater depth. Only two units of credit allowed for students who have completed course 1A, 5A, or 7B.

9HB. Honors Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9HA (or course 9A and recommendation of course 9A instructor or academic adviser); Mathematics 21B; Mathematics 21C (may be taken concurrently). Continuation of course 9HA. Same material as in course 9B , but in greater depth. Only two units of credit allowed for students who have completed course 5B or 7A.

9HC. Honors Classical Physics (4) II. The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9HB (or course 9B and recommendation of course 9B instructor or academic adviser); Mathematics 21C; Mathematics 21D (may be taken concurrently). Continuation of course 9HB. Same material as in course 9C, but in greater depth. Only two units of credit allowed for students who have completed course 5C or 7C.

***9HD. Honors Modern Physics** (4) III. The Staff
Lecture—3 hours; discussion—1.5 hours. Prerequisite: course 9HC (or course 9C with recommendation of course 9C instructor or academic adviser); Mathematics 22A; Mathematics 22B (may be taken concurrently). Continuation of course 9HC. Same material as in course 9D but in greater depth. Only three units of credit allowed for students who have completed course 5C.

10. Topics in Physics for Nonscientists (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Emphasis varies: survey of basic principles or a deeper exploration of some particular branch. Past topics included black holes, space time, and relativity; physics of music; history and philosophy; energy and the environment; and natural phenomena. Check with the department office for the current emphasis. No units of credit allowed if taken after any other physics course. GE credit: SciEng.

90X. Lower Division Seminar (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May *not* be repeated for credit. Limited enrollment.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics (3-3) I-II. Chau
Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C– or better; or consent of department; course 104A passed with a grade C– or better or consent of department required for 104B. Applications of linear equations and matrices, vector spaces (finite and infinite dimensional), ordinary and partial differential equations, infinite series, functions of one complex variable, integration methods, integral transforms, and variational methods.

105A-105B. Analytical Mechanics (3-3) I-II. Rouse
Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C– or better; or consent of department; course 104A and 105A passed with a grade C– or better or consent of department required for 105B. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations.

105AL. Computational Laboratory in Mechanics (1) I. Rouse
Laboratory—3 hours. Prerequisite: Engineering 5 or the equivalent; course 105A concurrently. Introduction to the application of computers to solving physics problems. Introduction to numerical and graphical methods in mechanics. (P/NP grading only.)

105BL. Computational Laboratory in Mechanics (1) II. Rouse
Laboratory—3 hours. Prerequisite: course 105AL; course 105B concurrently. Computer application of numerical and graphical methods in mechanics. (P/NP grading only.)

105C. Continuum Mechanics (3) III. Yager
Lecture—3 hours. Prerequisite: courses 104B and 105A passed with a grade of C– or better, or consent of department. The continuum hypothesis and limitations. Tensor methods develop stress-strain relations for linear isotropic solids/fluids and field equations to study wave propagation in solids/fluids, heat flow, potential flow and ocean waves.

108. Optics (3) III. Zhu
Lecture—3 hours. Prerequisite: course 9 or 5 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science, and atmospheric science. Study of modern optical instrumentation. Open to non-majors.

108L. Optics Laboratory (1) III. Zhu
Laboratory—3 hours. Prerequisite: course 108 concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques.

110A-110B-110C. Electricity and Magnetism (3-3-3) I-II-III. Ko
Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C– or better, or consent of department; prerequisite for 110B is courses 110A and 104A passed with a grade of C– or better or consent of department; prerequisite for course 110C is courses 110B and 104B passed with a grade of C– or better, or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

112. Thermodynamics and Statistical Mechanics (3) I. Webb
Lecture—3 hours. Prerequisite: course 115A or the equivalent. Introduction to classical and quantum statistical mechanics and their connections with thermodynamics. The theory is developed for the ideal gas model and simple magnetic models and then extended to studies of solids, quantum fluids, and chemical equilibria.

115A. Foundations of Quantum Mechanics (3) III. Fong, Carlip
Lecture—3 hours. Prerequisite: courses 104B and 105B passed with grade C– or better, or consent of department. Failures of classical physics; particle wave duality, probability and quantum mechanical operators; the uncertainty principle; the Schrödinger equation; energy levels; tunneling.

115B. Applications of Quantum Mechanics (3) I. Fong, Carlip
Lecture—3 hours. Prerequisite: course 115A passed with a grade of C– of better, or consent of department. Angular momentum and spin; hydrogen atom and atomic spectra; perturbation theory; scattering theory.

*Course not offered this academic year.

116A. Electronic Instrumentation (4) II. Cebra
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C, Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) III. Pellett
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 9D, 116A. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics.

121. Atomic Physics (4) II. McColm
Lecture—3 hours; term paper. Prerequisite: course 9D. The phenomena of atomic physics including contemporary work: fine-and hyperfine-structure, quantum electrodynamics, laser spectroscopy, beam foil experiments and trapped atoms.

122. Advanced Physics Laboratory (3) I, II.
The Staff
Laboratory—8 hours. Prerequisite: course 9D. Experimental techniques and measurements in atomic, condensed matter, nuclear and particle physics; spectroscopy, optical pumping, magnetic resonance, superconductivity, semiconductors, ferroelectricity, gamma-ray coincidence, Mossbauer Effect, Rutherford scattering, muon lifetime. The student performs three to six experiments depending on difficulty. Individual work is stressed. May be repeated once for credit. GE credit: SciEng, Wrt.

127. Introduction to Astrophysics (3) III. Becker
Lecture—3 hours. Prerequisite: course 105A. Celestial mechanics, radiation, astrophysical measurements, electromagnetic processes, the sun, binary and variable stars, stellar structure and evolution, galaxies, cosmology. Offered in alternate years.

129A. Introduction to Nuclear Physics (3) II.
Brady
Lecture—3 hours. Prerequisite: course 115A. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics: nuclear models and forces, radioactive decay and detecting nuclear radiation and nuclear reaction products, alpha, beta and gamma decay.

129B. Nuclear Physics, Extensions and Applications (4) III. Brady
Lecture—3 hours; term paper. Prerequisite: course 129A. Continuation of course 129A. Nuclear reactions, neutrons, fission, fusion accelerators, introduction to meson and particle physics, nuclear astrophysics, and applications of nuclear physics and techniques to mass spectrometry, nuclear medicine, trace element analysis. Not offered every year.

130A-130B. Elementary Particle Physics (3-4)
II-III. Lander
Lecture—3 hours; term paper required for 130B. Prerequisite: course 115A. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. Not offered every year.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungerman, Craig (Applied Science)
Lecture—3 hours. Prerequisite: upper division standing; one course from courses 1B, 5C, 9D, 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. (Same course as Applied Science Engineering 137.) GE credit: SciEng or SocSci.

140A-140B. Introduction to Solid State Physics (3-4) II-III. Klein
Lecture—3 hours; term paper required for 140B. Prerequisite: course 115A or the equivalent. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity.

160. Environmental Physics and Society (3) I.
Jungerman
Lecture—3 hours. Prerequisite: course 9D or 5C; or course 10 or 1B and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Engineering 160.) GE credit: SciEng or SocSci.

190X. Upper Division Seminar (1-2) I, II, III.
The Staff
Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Physics. Emphasis on student participation in learning. May *not* be repeated for credit. Limited enrollment.

194HA-194HB. Special Study for Honors Students (4-4) I, II, III. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. (Deferred grading only, pending completion of sequence).

195. Senior Thesis (5) I, II, III. The Staff (Chairperson in charge)
Independent study—15 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units.

197T. Tutoring in Physics and Astronomy (1-5)
I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200A. Theory of Mechanics and Electromagnetics (4) I. Yager
Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104B, 105B, and 110C or the equivalent; course 204A concurrently. Theoretical approaches in classical mechanics including the use of generalized coordinates and virtual work; variational calculus; Lagrange equations; symmetries, conservation laws, and Noether theorem; Lagrangian density; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations.

200B-200C. Theory of Mechanics and Electromagnetics (4-4) II-III. Reid
Lecture—3 hours; independent study—1 hour. Prerequisite: course 200A, and course 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity.

204A-204B. Methods of Mathematical Physics (4-4) I-II. Singh
Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104A and 104B or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis.

215A-215B-215C. Quantum Mechanics (4-4-4) I-II-III. Erickson
Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation.

219A-219B. Statistical Mechanics (4-4) I-II.
Scalettar
Lecture—3 hours; independent study—1 hour. Prerequisite: course 215B or the equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with applications to properties of solids, real gases, nuclear matter, etc.; fluctuations about the equilibrium state; and phase transitions and critical phenomena.

221. Atomic Physics (3) III. McColm
Lecture—3 hours; seminar—1-2 hours. Prerequisite: course 215A-215B. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions. Not offered every year.

223A. Group Theoretical Methods of Physics—Condensed Matter (3) III. Fong
Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is corequisite) or consent of instructor. Theory of groups and their representations with applications in condensed matter.

223B. Group Theoretical Methods of Physics—Elementary Particles (3) III. Kiskis
Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is corequisite) or consent of instructor. Theory of groups and their representations with applications in elementary particle physics.

224A. Nuclear Physics (3) II. Cebra
Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics. Not offered every year.

224B. Nuclear Physics (3) III. Cebra
Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. Not offered every year.

224C. Nuclear Physics (3) I. Brady
Lecture—3 hours. Prerequisite: course 224B. Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Not offered every year.

229A. Advanced Nuclear Theory (3) II. Brady
Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Not offered every year.

229B. Advanced Nuclear Theory (3) III. Brady
Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Not offered every year.

230A. Quantum Theory of Fields (3) I. Gunion
Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

230B. Quantum Theory of Fields (3) II. Gunion
Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.

240A-240B. Solid State Physics (3-3) I-II.
Corruccini
Lecture—3 hours. Prerequisite: courses 215A-215B-215C; courses 140A-140B recommended. Introduction to the phenomena and theory of the solid state.

Periodic structures, lattice structures, electron states, static properties, electron-electron interaction, electron dynamics, transport properties, optical properties, the Fermi surface, magnetism, superconductivity.

240C-240D. Solid State Physics (3-3) III-I. Zimanyi
Lecture—3 hours. Prerequisite: course 240A-240B or the equivalent. General introduction to many-body techniques as applied in solid state physics.

241. Advanced Topics in Magnetism (3) II. Singh
Lecture—3 hours. Prerequisite: courses 240A-240B, 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Not offered every year.

242. Advanced Topics in Superconductivity (3) II. Scalettar
Lecture—3 hours. Prerequisite: courses 240A-240B, 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Not offered every year.

245A. High-Energy Physics (3) II. Kiskis
Lecture—3 hours. Prerequisite: course 230A. Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders.

245B. High-Energy Physics (3) III. Carlip
Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; phenomenology of the Standard Model of $SU(2)_L xU(1)$; weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations.

245C. High-Energy Physics (3) III. Han
Lecture—3 hours. Prerequisite: course 245A. Strong interaction: quantum chromodynamics phenomenology; jets and other experimental tests; quark and gluon distribution functions; quark and gluon scattering; applications of the renormalization group. Not offered every year.

250. Special Topics in Physics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Topic varies. May be repeated for credit. Not offered every quarter.

252A. Techniques of Experimental Physics (3) III. Zhu
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized. Not offered every year.

252B. Techniques of Experimental Physics (3) III. Mani
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized. Not offered every year.

290. Seminar in Physics (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (S/U grading only.)

291. Seminar in Nuclear Physics (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in nuclear physics. May be repeated for credit. (S/U grading only.)

292. Seminar in Elementary Particle Physics (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. (S/U grading only.)

293. Seminar in Condensed Matter Physics (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. (S/U grading only.)

295. Introduction to Departmental Research (1) III. The Staff (Chairperson in charge)
Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (S/U grading only.)

297. Research on the Teaching and Learning of Physics (3) III. Potter
Seminar—3 hours. Prerequisite: graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students construct understanding of physics and other science concepts and the implications of this research for instruction.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

390. Methods of Teaching Physics (1) I, II, III. The Staff
Lecture/discussion—1 hour. Prerequisite: graduate standing in Physics; consent of instructor. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. (S/U grading only.)

Physiology

See Anatomy, Physiology and Behavior; Biological Sciences—Neurobiology, Physiology and Behavior; and Human Physiology (Medicine, School of)

Physiology (A Graduate Group)

James H. Jones, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9092)

Faculty. Consists of more than 70 faculty members drawn from 23 departments in the College of Agriculture and Environmental Sciences, the College of Letters and Science, the Division of Biological Sciences, the School of Medicine, and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees and participates in joint Ph.D./M.D. and Ph.D./D.V.M. programs. The programs emphasize broad training in the fundamental principles of physiology and in-depth specialization in cardiorespiratory, cellular, comparative, endocrine, reproductive, exercise, metabolic, neuro-, systemic and domestic animal physiology. For information regarding these programs, address the Program Staff Person at the above location.

Graduate Advisers. D. Gietzen *(Anatomy, Physiology and Cell Biology),* A.M. Oberbauer *(Animal Science),* J. Roser *(Animal Science),* and W.J. Weidner *(Neurobiology, Physiology and Behavior).*

Graduate Admissions Officer. P. Berger *(Animal Science).*

Courses in Physiology (PGG)

Graduate Courses

200L. Animal Cell Culture Laboratory (4) II. B. Wilson, R. Wu
Discussion—2 hours; laboratory—6 hours. Prerequisite: courses in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro.

210A-210B-210C. Advanced Physiology (4-6-6) I-II-III. Jones
Lecture—3 hours (210A) or 5 hours (210B and 210C); discussion—1 hour. Prerequisite: graduate student in the Physiology Graduate Group Ph.D. program, or consent of instructor. Advanced course on general principles of physiology, surveying homeostasis, cellular, neurophysiology, cardiovascular, respiratory, renal, endocrine, gastrointestinal, metabolic, reproductive, exercise, comparative, environmental and integrative physiology.

***213. Principles of Electronics for Biologists** (2) III. Horowitz
Lecture—1 hour; laboratory—3 hours. Prerequisite: Physics 5A, 5B, 5C, and Mathematics 16A, 16B, 16C or the equivalent. Principles of electronics applied to biological measurements. Focuses on interconnection of laboratory instruments including filters and computers. Topics covered include: RC networks; operational amplifiers; digital gates; computer interfacing; and programming.

214. Neurophysiology (4) II. Carstens
Lecture—4 hours. Prerequisite: Neurobiology, Physiology and Behavior 111B, 112; consent of instructor. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity.

***215. Neurophysiology Laboratory** (3) III. Horowitz, Scobey
Discussion—3 hours; laboratory—9 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments based on modern concepts to illustrate in depth, surgical techniques, stimulating and recording techniques used in neurophysiology research.

216. Neurophysiology Literature (3) I. Pappone
Lecture—1 hour; discussion—2 hours. Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structure/function relationships of some of the most important channel types. Discussion of classical and current original papers.

***217. The Vertebrate Eye** (2) II. Sillman
Seminar—1 hour; lecture/discussion—1 hour. Prerequisite: graduate standing and a background in biology; Neurobiology, Physiology and Behavior 120F strongly recommended. Physiology, biochemistry, and biology of the vertebrate eye with emphasis on the retina, particularly photoreceptors. A comparative approach will be taken with adaptations in ocular function related to behavior and environment. May be repeated for credit with consent of instructor. Offered in alternate years.

***218. Topics in Circulatory Pathophysiology** (3) II. Weidner
Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Selected topic in circulatory or cardiopulmonary physiology will be addressed each offering. Topics will include pathophysiology. Lecture and discussion based on current research literature in the field. May be repeated with consent of instructor. Offered in alternate years.

219. Muscle Growth and Development (3) II. R. Carlsen (Human Physiology)
Lecture—2 hours; seminar—1 hour. Prerequisite: Biological Sciences 103, Biological Sciences 104 or Molecular and Cellular Biology 150, or consent of in-

*Course not offered this academic year.

structor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Offered in alternate years.

220. General and Comparative Physiology of Reproduction (3) I. Anderson (Animal Science), Lasley (Reproduction)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110, 110L; Biological Sciences 101, 103. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

***222. Mammalian Gametogenesis and Fertilization** (3) II. Berger
Lecture/discussion—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 121 or the equivalent. Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding will be discussed.

***230. Advanced Endocrinology** (2) II. Moberg
Lecture—2 hours. Prerequisite: Neurobiology, Physiology and Behavior 130 or the equivalent, and graduate standing. Focus on timely topic of endrocrine research. Critical review of current literature and discussion of future research strategies in the area. May be repeated for credit when topic differs.

231. Neuroendocrinology (3) II. Woolley
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent course in systemic physiology; Neurobiology, Physiology and Behavior 130 or the equivalent course in endocrinology. Neural-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain.

234. Neurophysiological Basis of Neurotoxicology (3) I. Woolley
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent; basic understanding of neurophysiology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Environmental Toxicology 234.)

242. Biological Rhythms (3) I. Fuller
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periods; shift-work, jet lag and sleep disorders. Offered in alternate years.

275. Neurohumoral Regulatory Mechanisms of Thermogenesis (3) II. Horwitz, Horowitz
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 or the equivalent; Biological Sciences 102 or the equivalent; consent of instructor. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell).

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)

290C. Research Conference in Physiology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (S/U grading only.)

291A. Selected Topics in Visual Science (2) III. Chalupa (Psychology), Johnson (Ophthalmology), Sillman (Neurobiology, Physiology and Behavior)
Seminar—2 hours. Prerequisite: graduate student standing and consent of instructor; course 217 recommended. Vision from the standpoint of physiology, biochemistry, morphology and psychophysics. Consideration of all levels of the visual system from periphery to highest brain centers. Emphasis on recent research. Topics vary each year. May be repeated for credit. (S/U grading only.)

291B. Seminar in Cellular Mechanisms of Adaptation (1) I, II, III. Horwitz
Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: Neurobiology, Physiology and Behavior 100B; Biological Sciences 103; consent of instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when topic differs. (S/U grading only.)

291D. Research Approaches in Physiology (2) I. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: graduate standing in Graduate Group in Physiology or consent of instructor. Current research in physiology. Overall design of experiments and particular research areas. (S/U grading only.)

293. Current Progress in Physiology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their current research activities. May be repeated for credit. (S/U grading only.)

297T. Tutoring in Physiology (3) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; tutorial—2 hours. Prerequisite: completion of course to be tutored (with a grade of A) and consent of instructor. Advanced study of systemic physiology through leading small discussion groups in upper division courses (students are required to attend lectures in the course which they are tutoring). May be repeated for credit by tutoring in different courses or in the continuation of a course (e.g., courses 112, 113, 114). (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

300A-300B. Pedagogical Aspects of Physiology in Higher Education (3-3) I, II, III. The Staff (Chairperson in charge)
Lecture, discussion, or laboratory, or combination. Prerequisite: meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (S/U grading only.)

390. The Teaching of Physiology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: Teaching Assistant assignment to a physiology lecture course and consent of instructor. Practical experience in methods and problems of teaching physiology lecture courses. May include analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, and formulation of topics and questions for examinations under supervision of instructor. May be repeated for credit. (S/U grading only.)

Plant Biology

See Agricultural Systems and Environment; Agronomy; Biological Sciences—Plant Biology; Crop Science and Management; Environmental Horticulture; Plant Biology (A Graduate Group); Plant Pathology; Plant Protection and Pest Management; Pomology; Vegetable Crops; and Viticulture and Enology

Plant Biology

Deborah P. Delmer, Ph.D., Chairperson of the Section

Section Office, 1002 Life Sciences Addition (916-752-0617)

Committee in Charge of the Major

Deborah Canington, Ph.D. *(Plant Biology)*
John J. Harada, Ph.D. *(Plant Biology),* Chairperson
Judy Jernstedt, Ph.D. *(Agronomy and Range Science)*
John Labavitch, Ph.D. *(Pomology)*
Alan Stemler, Ph.D. *(Plant Biology)*

Faculty

Faculty includes members of the Departments of Agronomy and Range Science; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Sections of the Division of Biological Sciences.

Primary Section Members
John L. Bowman, Ph.D., Assistant Professor
Anne Britt, Ph.D., Assistant Professor
Deborah P. Delmer, Ph.D., Professor
Richard H. Falk, Ph.D., Professor
John J. Harada, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Terence M. Murphy, Ph.D., Professor
Sharman O'Neill, Ph.D., Associate Professor
Thomas L. Rost, Ph.D., Professor
Nelima Sinha, Ph.D., Assistant Professor
Alan J. Stemler, Ph.D., Professor
Steven M. Theg, Ph.D., Associate Professor
Robert M. Thornton, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*
Larry N. Vanderhoef, Ph.D., Professor

Secondary Section Members
Judy Callis, Ph.D., Associate Professor
Richard S. Criddle, Ph.D., Professor
James A. Doyle, Ph.D., Professor *(Geology)*
Marilynn E. Etzler, Ph.D., Professor
Charles S. Gasser, Ph.D., Professor
R. Marc Learned, Ph.D., Assistant Professor
Marcel Rejmanek, Ph.D., Associate Professor
Raymond L. Rodriguez, Ph.D., Professor
Irwin H. Segel, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Donald R. Strong, Ph.D., Professor

Emeriti Faculty

Fredrick T. Addicott, Ph.D., Professor Emeritus
Floyd M. Ashton, Ph.D., Professor Emeritus
Bruce A. Bonner, Ph.D., Professor Emeritus
Herbert B. Currier, Ph.D., Professor Emeritus
Emanuel Epstein, Ph.D., Professor Emeritus
Ernst M. Gifford, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Hendrick J. Ketellapper, Ph.D., Professor Emeritus
Donald W. Kyhos, Ph.D., Professor Emeritus
Norma J. Lang, Ph.D., Professor Emeritus
C. Ralph Stocking, Ph.D., Professor Emeritus
John M. Tucker, Ph.D., Professor Emeritus

Grady Webster, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor Emeritus

Affiliated Faculty

Deborah Canington, Ph.D., Academic Coordinator/Lecturer
Ellen Dean, Ph.D., Academic Coordinator/Lecturer

The Major Program

Plant biology is the study of plants as organisms. It includes the disciplines of cellular and molecular plant biology and the traditional areas of botany, such as anatomy, morphology, systematics, physiology, mycology, phycology, ecology, and evolution.

The Program. The plant biology major consists of core courses in applied plant biology, plant anatomy, plant physiology, and plant ecology, as well as biochemistry, cell biology, and genetics. In addition, students complete a set of courses in one of the following areas: *(1)* general plant biology; *(2)* applied plant biology; *(3)* plant evolution and ecology; *(4)* plant genetics and breeding; and *(5)* plant physiology, development, and molecular biology. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization. Independent research opportunities in plant biology are available. Consult with an adviser.

Career Alternatives. A Plant Biology degree is an excellent credential for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. Plant biologists can work in the field, in the forest, in the laboratory, in botanical gardens or nurseries, in food or seed companies, or in pharmaceutical, energy or chemical industries, and pursue rewarding careers in the areas of biotechnology, environmental protection, or agribusiness. The program is also an excellent background for students wishing to enter graduate or other professional schools, including medicine, law or journalism.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 35
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B, 8A-8B 16
Agricultural Systems and Environment 120 or Statistics 13 or 100 or 102 4

Depth Subject Matter 41-42
Biological Sciences 101 4
Plant Biology 102 or 108 5
Evolution and Ecology 140 or Plant Biology 116 4
Plant Biology 105, 111, 112, 117 15
Additional upper division units in Plant Biology or related natural science courses ...13-14

Total Units for the Major 76-77

Recommended
Chemistry 2C; Evolution and Ecology 100; Plant Biology 118, 119.

For students with interests in specialized areas of plant biology (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other sections or departments, may be allowed on *prior* consultation with a Plant Biology major adviser.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-61
Biological Sciences 1A-1B-1C 15
Chemistry 2A-2B-2C 15
Chemistry 8A-8B 6
Mathematics 16A-16B-16C 9
Physics 7A-7B-7C 12
Agricultural Systems and Environment 120 or Statistics 13, 32, 100, or 102 3-4

Depth Subject Matter 45
Biological Sciences 101 or Plant Biology 152 (Students completing the Applied Plant Biology option or the Plant Genetics and Breeding option should take Plant Biology 152) 4
Biological Sciences 102, 103, 104 9
Plant Biology 105, 111 8
Completion of one Option listed below 24
Research experience through internships or special studies is recommended.

General Plant Biology option
Evolution and Ecology 100, Plant Biology 112 7
Plant Biology 117 or 142 4
One course from the Applied Plant Biology course list (Plant Biology 175 recommended) 3-5
One course from the Evolution and Diversity course list 3-5
Additional upper division course work from any of the four course lists, chosen in consultation with an adviser, to achieve a total of 24 or more units. At least one course chosen from the option course lists must include a formal laboratory or fieldwork section 3-7

Applied Plant Biology option
Plant Biology 112 3
Plant Biology 142 or 143 3-4
Plant Biology 160, 175 8
Molecular and Cellular Biology 120L; Plant Biology 111L, 153, 158, 172L, 189, or Plant Pathology 120 3-6
Additional upper division course work from the Applied Plant Biology course list to achieve a total of 24 or more units 3-7

Plant Evolution and Ecology option
Evolution and Ecology 100 4
Plant Biology 117 or 142 4
One course from the Applied Plant Biology course list (Plant Biology 175 recommended) 3-5
Additional upper division course work from the Ecology and/or Evolution and Diversity course list to achieve a total of 24 or more units. At least one course chosen must include a formal laboratory or fieldwork section 11-13

Plant Genetics and Breeding option
Plant Biology 108 or 143 3-5
Plant Biology 154 4
Plant Biology 112 or 113 or 160 3
Plant Biology 161A or 161B 4
Addtion course work from the Plant Genetics and Breeding course list to acheive a total of 24 or more units 8-10

Plant Physiology, Development and Molecular Biology option
Plant Biology 112 3
Molecular and Cellular Biology 120L, 170L; Plant Biology 111L or 153 3-6
One course from the Applied Plant Biology course list (Plant Biology 175 recommended) 3-5
One course from the Ecology course list (Plant Biology 117 recommended) 3-4
One course from the Evolution and Diversity course list 3-5
Additional upper division course work from the Plant Physiology, Development, and Molecular Biology course list to achieve a total of 24 or more units 1-9

Total Units for the Major 105-106

Course Lists

Applied Plant Biology
Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 118, 150, 170A, 170B, 195; Atmospheric Science 133; Entomology 100, 100L, 110, 119, 119L, 135; Environmental Horticulture 102, 105, 107, 120, 125, 130, 133; Environmental Toxicology 101; Hydrologic Science 124; International Agricultural Development 101; Nematology 100, 110; Plant Biology 121, 142, 143, 146, 151, 152, 153, 154, 157, 158, 160, 171, 172, 172L, 173, 174, 175, 176, 177, 178, 188, 196; Plant Pathology 120, 125, Pomology 103; Range Science 100, 105, 133, 134; Soil Science 100, 105, 109, 111; Viticulture and Enology 101A, 101B, 101C, 110, 115, 116, 118.

Ecology
Agricultural Systems and Environment 112; Environmental Studies 121, 123, 124, 128, 128L, 150C, 151, 151L, 155, 155L; Evolution and Ecology 121, 138; Hydrologic Science 122, 122L, 124; Plant Biology 117, 121, 142, 146; Range Science 133, 134.

Evolution and Diversity
Evolution and Ecology 100, 102, 140, 144, 149; Plant Biology 102, 108, 116, 118, 143, 148.

Plant Genetics and Breeding
Agricultural Systems and Environment 118, 150; Entomology 110; Evolution and Ecology 100, 144; Molecular and Cellular Biology 161, 164; Plant Biology 116, 117, 142, 151, 153, 157, 175; Plant Pathology 120, 125.

Plant Physiology, Development, and Molecular Biology
Molecular and Cellular Biology 126; Plant Biology 113, 125, 153, 157, 158, 160; Plant Pathology 130.

Master Adviser. A. Stemler, Plant Biology Section Office, 2220 Life Sciences Addition.

Minor Program Requirements:

UNITS

Plant Biology 23
Biological Sciences 1C (or equivalent introductory plant biology course) 5
Upper division units, including at least one course from each of the following four groups 18

(a) Anatomy and morphology:
Evolution and Ecology 140, Plant Biology 105, 116, 118.

(b) Physiology and development:
Plant Biology 111, 112, 125, Plant Pathology 130.

(*c) Evolution and ecology:*
Evolution and Ecology 100, Plant Biology 102, 117, 143.

(d) Applied plant biology:
Agronomy 100, Plant Biology 154, 160, 171, 172, 175.

Minor Adviser. Same as for major above.

Honors and Honors Programs. Students on the honors list may elect to substitute a maximum of 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

Teaching Credential Subject Representative. R.M. Thornton *(Section of Plant Biology),* 278 Robbins Hall. See also the Teacher Education Program.

Graduate Study. Consult the Plant Biology Graduate Group listing.

Concordance

The following courses in Plant Biology have been renumbered.

Former Course Number	Equivalent new course and number
10	Plant Biology 11 (Plants, People and the Biosphere)
119	Plant Biology 148 (Introductory Mycology)
120	Plant Biology 176 (Introduction to Weed Science)
122	Plant Biology 177 (Action of Herbicides)
135	Plant Biology 158 (Mineral Nutrition of Plants)
150	Plant Biology 178 (Biology and Management of Freshwater Macrophytes)

*Course not offered this academic year.

Courses in Plant Biology (PLB)

Lower Division Courses

1. Plants for Garden, Orchard and Landscape (2) I, III. Marrush (Vegetable Crops)
Lecture—1 hour; laboratory—3 hours. For nonmajors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagating trees and vines, growing flowers and ornamental plants, and the role of plants in human health and well-being. Not open for credit to students who have completed Agricultural Systems and Environment 2 or Plant Science 1. (Former course Plant Science 1.) (P/NP grading.)

11. Plants and the Biosphere (3) I. Falk
Lecture—3 hours; one weekend field trip (half-day); term paper. Ethnobotanical and ecological themes are emphasized in examining our dependence on plants, the ecological roles of plants, and the development of botany as a contemporary science. Intended primarily for non-science majors. Not open for credit to students who have completed former course 10 or Botany 10. (Former course 10, Botany 10.) GE credit: SciEng, Wrt.

12. Plants and People (3) I. Bradford; II. Bennett, Michelmore; III. Nevins (Vegetable Crops)
Lecture—3 hours. Prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect their utility. Not open for credit to students who have completed Plant Science 10. (Former course Plant Science 10.) GE credit: SciEng, Div, Wrt.

90X. Plant Science Seminar (1-4) I, II, III. The Staff
Prerequisite: consent of instructor. Examination of a special topic in a small group setting. Not open for credit to students who have completed course Plant Science 90X. (Former course Plant Science 90X.)

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. (Former course Botany 92.) (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (Former course Botany 98.) (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge.)
Prerequisite: consent of instructor. (Former course Botany 99.) (P/NP grading only.)

Upper Division Courses

For questions about courses numbered 102 through 125, see the Plant Biology Section Office, 143 Robbins Hall. For questions concerning courses numbered 142 through 188, see the Plant Science Advising Center, 152 Hunt Hall.

102. California Floristics (5) III. Dean
Lecture—2 hours; lecture/discussion—1 hour; laboratory—6 hours (includes three one-day, weekend field trips). Prerequisite: Biological Sciences 1A, 1B, 1C or the equivalent in plant science. Survey of the flora of California, with emphasis on field recognition and identification of important vascular plant families and genera characterizing the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographical patterns of California flora. Not open for credit to students who have completed Botany 102. (Former course Botany 102.)

105. Developmental Plant Anatomy (5) I. Rost
Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (for example, Biological Sciences 1C). Survey of vascular plant structure and development. Current ideas and experimental evidence for developmental concepts. Not open for credit to students who have completed Botany 105. (Former course Botany 105.)

108. Systematics and Evolution of Angiosperms (5) III. Doyle
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B and 1C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Evolution and Ecology 108.) GE credit: SciEng.

111. Plant Physiology (3) I. Stemler, Lucas
Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B (may be taken concurrently; Physics 7A, 7B, 7C recommended. Fundamental activities of plants; the plant cell as a functioning unit. Processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration. Not open for credit to students who have completed Botany 111. (Former course Botany 111.)

111D. Problems in Plant Physiology (1) I. Stemler, Lucas
Discussion—1 hour. Prerequisite: course 111 concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. Not open for credit to students who have completed Botany 111D. (Former course Botany 111D.) (P/NP grading only.)

111L. Introductory Plant Physiology Laboratory (5) III. Murphy
Lecture/discussion—1 hour; laboratory—9 hours; extensive writing. Prerequisite: course 111 (may be taken concurrently) or 112 or consent of instructor (both recommended). Introduction to basic experimental techniques and instruments used in the investigation of plant physiological processes, such as photosynthesis, water and solute transport, tissue cultures, and detection of hormones. Not open for credit to students who have completed Botany 111L. (Former course Botany 111L.)

112. Plant Growth and Development (3) II. Thornton
Lecture—3 hours. Prerequisite: Biological Sciences 1C, Chemistry 8B. Introduction to the mechanisms and control systems that govern plant growth and development and the responses of plants to the environment. Strong emphasis on vegetative development of flowering plants. Not open for credit to students who have completed Botany 112. (Former course Botany 112.) GE credit: SciEng.

112D. Problems in Plant Growth and Development (1) II. Thornton
Discussion—1 hour. Prerequisite: course 112 concurrently. Discussion of problems and applications relating to principles presented in course 112. Students will be assigned problems each week showing novel applications of the principles described in course 112 and will prepare answers to be delivered orally during class period. Not open for credit to students who have completed Botany 112D. (Former course Botany 112D.) (P/NP grading only.)

113. Molecular and Cellular Biology of Plants (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Biological Sciences 102 recommended. Molecular and cellular aspects of the growth and development of plants and their response to biological and environmental stresses. Primary focus on processes unique to plants. Experimental approaches will be emphasized.

113D. Problems in Molecular and Cellular Biology of Plants (1) III. The Staff
Discussion—1 hour. Prerequisite: course 113 concurrently. Discussion of topics and applications related to principles presented in course 113. Assigned topics each week show novel applications of the principles described in course 113; discussion of topics during class period. (P/NP grading only.)

116. Plant Morphology and Evolution (5) II. Jernstedt
Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 1C); plant anatomy recommended (e.g., course 105). Introduction to the form, development and evolution of vascular plants. Emphasis given to the form and development of reproductive structure in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed Botany 116. (Former course Botany 116.) GE credit: SciEng.

117. Plant Ecology (4) I. Schwartz
Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; course 112; course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for Evolution and Ecology 121. (Same course as Evolution and Ecology 117.) Not open for credit to students who have completed Botany 117. (Former course Botany 117.)

118. Introductory Phycology and Bryology (4) II. Canington
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1C. Comparative morphology, physiology, development and reproduction of cyanobacteria, the major algal groups, and the bryophytes. Focus on structure-function and evolutionary relationships. Ecological factors and commercial uses considered. Laboratory includes study of living organisms and identification exercises. Not open for credit to students who have completed Botany 118. (Former course Botany 118.)

121. Biology of Weeds (3) III. Rejmanek
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Origin and evolution, beneficial and harmful aspects, reproduction and dispersal, seed germination and dormancy, growth and development, ecology, interaction of weeds and crops, natural succession, and herbicide-induced succession. Laboratories will emphasize taxonomy of weeds and demonstrate principles discussed in lectures. Not open for credit to students who have completed Botany 121. (Former course Botany 121.)

123. Plant-Virus-Vector Interaction (3) I. Lucas, Gilbertson, Ullman
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; course 105, Plant Pathology 120, and Entomology 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Entomology 123/Plant Pathology 123.)

***125. Molecular Biology of Plant Development** (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Biological Sciences 103; Molecular and Cellular Biology 161 or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues. Not open for credit to students who have completed Botany 125. (Former course Botany 125.)

142. Ecology of Crop Systems (4) II. Denison (Agronomy and Range Science)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C; Mathematics 16A or Physics 1A, or consent of instructor. Ecological processes governing the structure and behavior of managed ecosystems. Emphasis on mechanistic and systems views of the physical environment, photosynthetic productivity, competition, adaptation, nutrient cycling, energy relations and contemporary issues such as climate change. Not open for credit to students who have completed Plant Science 101. (Former course Plant Science 101.) GE credit: SciEng.

143. Evolution of Crop Plants (3) III. Gepts (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Origins of crops and agriculture, including methodological approaches, center of origin and diversity, crop dissemination pathways, and differences between wild and cultivated plants. Group studies of individual crops are published on the Internet. Not open for credit to students who have completed Plant Science 103 (Former course Plant Science 103.) GE credit: SciEng, Wrt.

144. Trees and Forests (3) I. Barbour, Berry (Environmental Horticulture), Bledsoe (Land, Air and Water Resources), DeJong (Pomology)
Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology; photosynthesis, respiration soil processes, life histories, dormancy, forest biodiversity, and agroforestry. (Same course as Environmental and Resource Sciences 144/Environmental Horticulture 144.) Not open for credit to students who have completed Plant Science 106. (Former course Plant Science 106.)

146. Rhizosphere Ecology (2) III. Phillips (Agronomy and Range Science)
Lecture—2 hours. Prerequisite: Agricultural Sysems and Environment 2 or Biological Sciences 1A-1B-1C. Plant-microbe interactions affect plant growth, soil formation, and agricultural sustainability. Course addresses physical, chemical and biological processes which occur at the surface of plant roots. Evolution and modification of the biochemical and genetic bases of rhizosphere ecology are discussed. Not open for credit to students who have completed Plant Science 110. (Former course Plant Science 110.)

148. Introductory Mycology (5) I. MacDonald, Rizzo (Plant Pathology)
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to morphology, ontogeny, taxonomy and biology of the fungi. Not open for credit to students who have completed former course 119, Botany/Plant Pathology 119. (Former course 119, Botany/Plant Pathology 119.) (Same course as Plant Pathology 148.)

151. Plant Genetic Resources for Global Crop Production (3) I. Bliss
Lecture—3 hours. Prerequisite: Biological Sciences 1B or 10. Biological and social factors that influence availability of plant genetic resources for discovery of useful new substances and improvement of cultivated plants. Effects of ethical issues, property rights and biological systems on conservation strategies in local and global contexts. GE credit: SciEng, Wrt.

152. Plant Genetics (4) I. Wilkins (Agronomy and Range Science)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A or consent of instructor. Basic principles of transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open for credit to students who have completed Plant Science 105. (Former course Plant Science 105.)

153. Plant, Cell, Tissue and Organ Culture (4) II. Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryogenesis, anther culture, protoplast culture and transformation. Offered in alternate years. Not open for credit to students who have completed Plant Science 107. (Former course Plant Science 107.)

154. Introduction to Plant Breeding (4) II. St. Clair (Vegetable Crops)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152, Biological Sciences 101 or consent of instructor. The principles, methods and applications of plant breeding and genetics to the improvement of crop plants. Illustration of how plant breeding is a dynamic, multidisciplinary, constantly-evolving science. Laboratory emphasizes hands-on experience in the basics of breeding through experiments. (Former course Plant Science 113.)

157. Physiology of Environmental Stresses in Plants (3) II. Richards, Läuchli, Silk (Land, Air and Water Resources)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses. Not open for credit to students who have completed Plant Science 126. (Former course Plant Science 126.)

158. Mineral Nutrition of Plants (4) III. Richards (Land, Air, and Water Resources), Brown (Pomology)
Lecture—3 hours: laboratory—3 hours. Prerequisite: course 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. Not open for credit to students who have completed Plant Biology/Plant Science 135 or Botany 135. (Former course Plant Biology/Plant Science 135, Botany 135.)

160. Principles of Plant Biotechnology (3) II. Dandekar (Pomology)
Lecture—3 hours. Prerequisite: Biological Sciences 1A and 101. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement. Not open for credit to students who have completed Plant Science 140. (Former course Plant Science 140.)

161A. Plant Genetics and Biotechnology Laboratory (4) I. Wilkins, Dubcovsky (Agronomy and Range Science), Quiros (Vegetable Crops)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. Techniques of genetic analysis at the molecular and organismal levels, including segregation and linkage analysis, cytogenetics and recombinant DNA. Not open for credit to students who have completed Plant Science 141A. (Former course Plant Science 141A.)

***161B. Plant Genetics and Biotechnology Laboratory** (4) II. Wilkins, Gepts (Agronony and Range Science), Dandekar (Pomology)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. Advanced techniques of genetic analysis at the molecular and organismal levels, including transformation, gene expression, analysis of transgenic plants and QTL analysis. Not open for credit to students who have completed Plant Science 141B. (Former course Plant Science 141B.)

171. Plant Propagation (4) III. Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed Plant Science 109. (Former course Plant Science 109.)

172. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology), Reid (Environmental Horticulture), Saltveit (Vegetable Crops)
Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., Agricultural Sysems and Environment 2, course 12 or Food Science and Technology 2); concurrent enrollment in course 172L recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres. Not open for credit to students who have completed Plant Science 112. (Former course Plant Science 112.)

172L. Postharvest Physiology and Handling Laboratory (2) I. Kader (Pomology), Saltveit (Vegetable Crops)
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 172 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 172. Not open for credit to students who have completed Plant Science 112L. (Former course Plant Science 112L.)

173. Biological Applications in Fruit Tree Management (2) II. DeJong (Pomology)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2 or the equivalents. Physiology, growth, development and environmental requirements of fruit trees and cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students who have completed Plant Science 115. (Former course Plant Science 115.)

174. Biological Applications in Fruit Production (2) III. De Young, Polito (Pomology)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2; course 173 recommended. Reproductive biology of tree-crop species. Biological principles of fruit production, tree nutrition and orchard management. Laboratories emphasize hands-on work with orchard tree systems.

175. Applied Plant Biology (4) II. Brown, Labavitch, Bliss (Pomology)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111, and Biological Sciences 101 or course 152. Advanced concepts of plant biology with reference to the uses of plants for food, fiber, and environmental enhancement. Current research, applications, and issues in crop improvement, production and biotechnology will be presented and discussed. Not open for credit to students who have completed Plant Science 145. (Former course Plant Science 145.)

176. Introduction to Weed Science (3) II. Bayer
Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8A, 8B. Principles of weed science including mechanical, biological, and chemical control methods. Weed control in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Sight identification of common weeds and demonstrations to illustrate the principles. Not open for credit to students who have completed former course 120, Botany 120. (Former course 120, Botany 120.)

177. Action of Herbicides (3) III. Bayer/Falk
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 176; Soil Science 100; courses 111, 111D recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils. Not open for credit to students who have completed former course 122, Botany 122. (Former course 122, Botany 122.)

178. Biology and Management of Freshwater Macrophytes (3) I. Anderson
Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 8B; course 111 or Hydrologic Science 122 recommended. Brief survey of common fresh water macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology and management. Offered in alternate years. Not open for credit to students who have completed former course 150, Botany 150. (Former course 150, Botany 150.)

188. Undergraduate Research: Proposal (3) III. Bloom, Yoder (Vegetable Crops)
Lecture/discussion—3 hours. Prerequisite: upper division standing and consent of instructor. Through lectures, class discussion and individual mentoring, students will define a problem, identify objectives, conduct a literature survey, generate testable

*Course not offered this academic year.

hypotheses, design experiments, plan data analysis, prepare an outline, and write a scientific proposal. (Same course as Agricultural Systems and Environment 188.) Not open for credit to students who have completed Plant Science 191, Vegetable Crops 191. (Former course Plant Science 191.) (P/NP grading only.)

189. Experiments in Plant Biology: Design and Execution (3) I, II, III. The Staff.
Laboratory/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C or the equivalent courses in plant sciences, and consent of the instructor. Provides an opportunity for undergraduate students to formulate experimental approaches to current questions in plant biology and to carry out their proposed experiments. May be repeated for credit for a total of 12 units. (Former course Botany 189.)

190C. Research Conference in Botany (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in botany or related discipline; consent of instructor. Introduction to research methods in botany. Design of field or laboratory research projects, survey of appropriate literature, and discussion of research by faculty and students. May be repeated for credit. (Former course Botany 190C.) (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Section faculty. (Former course Botany 192.) (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. Not open for credit to students who have completed Botany 194H. (Former course Botany 194H.) (P/NP grading only.)

196. Postharvest Technology of Horticultural Crops (3) III. Kader (Pomology) in charge
Lecture/discussion/demonstration—5 days; field trip—5 days. Prerequisite: upper division or graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Considered a spring course for preenrollment. Not open for credit to students who have completed Plant Science 196. (Former course Plant Science 196.) (P/NP grading only.)

197T. Tutoring in Botany (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student contact will be primarily in laboratory or discussion sections. (Former course Botany 197T.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Former course Botany 198.) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge.)
Prerequisite: consent of instructor. (Former course Botany 199.) (P/NP grading only.)

Plant Biology (A Graduate Group)

John Labavitch, Ph.D., Chairperson of the Group

Group Office, 1012 Life Sciences Addition
(916-752-7094; Fax: 916-752-5410)

Faculty. Includes 100 faculty members from fifteen departments in the field of plant biology.

Graduate Study. The Graduate Group in Plant Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The program prepares students for careers in teaching and research at colleges and universities, government or industrial laboratories. The graduate curriculum involves both a broad overview of the discipline and in-depth study and research in one of four areas of specialization: cell and molecular biology; ecology, systematics, and evolution; integrative plant and crop physiology; and plant development and structure. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, cell biology, cytology, developmental biology, ecology, genetics, molecular biology, morphology, paleobotany, physiology, population biology, systematics, and weed science.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelor's degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisite to the advanced degrees in Plant Biology: inorganic chemistry, organic chemistry, introductory physics, genetics, structural botany, biochemistry, introductory plant physiology, introductory plant physiology laboratory, calculus, introductory statistics, plant ecology/systematics/evolution, genetics, and plant cell/molecular biology. Limited deficiencies can be made up after admission. The graduate adviser, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Adviser. Contact the Group office.

Courses in Plant Biology (PBI)

Graduate Courses

***201. Plant Senescence: Cellular and Molecular Aspects** (4) II. Labavitch (Pomology), Bennett (Vegetable Crops)
Lecture—4 hours. Prerequisite: Plant Biology 111, 112; Biological Sciences 102 and 103. Cellular and molecular phenomena associated with the senescence of plants and plant parts. Emphasis on principles and mechanisms. Offered in alternate years.

***202. Advanced Physiology of Cultivated Plants** (2) I. Matthews (Viticulture), DeJong (Pomology)
Lecture—1 hour; discussion—1 hour. Prerequisite: Plant Science 101 and 102; Plant Biology 111, 112. Selected physiological topics generally focusing on source-sink behavior affecting crop production and quality. Offered in alternate years. (P/NP grading only.)

***205B. Advanced Plant Physiology** (3) II. Stemler
Lecture/discussion—3 hours. Prerequisite: Plant Biology 111, 112, and Biological Sciences 103. Photosynthesis, photophosphorylation, chloroplast metabolism and biology. Offered in alternate years.

***205C. Advanced Plant Physiology** (3) I. The Staff
Lecture—3 hours. Prerequisite: Plant Biology 112, Biological Sciences 102; courses 205A, 205B and Biological Sciences 103 recommended. Internal and environmental regulation of plant growth and development.

***206B. Advanced Plant Physiology Laboratory** (3)
Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently); Molecular and Cellular Biology 120L. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

***206C. Advanced Plant Physiology Laboratory** (3) I. The Staff
Laboratory—9 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

***208. Plant Hormones and Regulators** (4) II. Labavitch (Pomology)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 112. Chemistry, biochemistry and physiological activity of major classes of natural plant growth regulators. Primary consideration given to concepts that are of current research interest. Growth regulators in agriculture. Offered in alternate years.

210. Plant Ecophysiology (3) II. Pearcy
Lecture—3 hours. Prerequisite: Plant Biology 111, 112, 117. Study of the mechanisms of physiological adaptation of plants to their environment. Offered in alternate years.

211. Ecophysiological Methods (3) III. Pearcy
Lecture—1 hour; laboratory—4 hours; individual project; one Saturday field trip to be arranged. Prerequisite: Plant Biology 111, 117, and consent of instructor. A laboratory and lecture course covering basic concepts underlying the research methods and instrumentation useful in plant ecophysiology.

***212. Physiology of Herbicidal Action** (3) III. Bayer
Lecture—3 hours. Prerequisite: Plant Biology 112, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants. Offered in alternate years.

***214. Higher Plant Cell Walls** (3) I. Labavitch (Pomology), Nevins (Vegetable Crops)
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112, and a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.

***215. Light and Plant Growth** (3) II. Bonner
Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 5B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis. Course offered in alternate years.

***216. Advanced Topics in Mineral Nutrition** (4) III. Läuchli (Land, Air and Water Resources)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 135 or consent of instructor. Cellular compartmentation of mineral elements, new methods and results; selected topics in absorption, translocation, metabolism and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments. Offered in alternate years.

***217. Membrane Biology of Plants** (3) I. Bennett, Lucas
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112 and Biological Sciences 103, or consent of instructor. Structure, biogenesis, and function of plant cell membranes. Emphasis will be placed on the molecular basis of plant membrane functions and on the role of membranes in selected physiological processes. Offered in alternate years.

218A. Advanced Concepts in Plant Cell Biology: Cell Biogenesis (3) III. Bennett, Theg
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 102, 103. Survey of molecular mechanisms underlying structural and functional differentiation of plant cell subcellular compartments. Topics include membrane and protein biosynthesis, protein targeting and turnover, and regulation of nuclear and organellar gene expression as related to the biogenesis of plant cell organelles. Offered in alternate years.

***218B. Advanced Concepts in Plant Cell Biology: Signal Transduction and Intercellular Communication** (3) III. Lucas, Lagarias
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103 or consent of instructor. Intracellular signal transduction pathways in the plant cells as well as longer term, adaptive responses which involve signals transmitted between plant cells. Weekly lectures and student-led discussions on current literature. Offered in alternate years.

219. Reproductive Biology of Flowering Plants (3) I. Wu (Environmental Horticulture), Polito
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 111 and Biological Sciences 101. Fundamental mechanisms of reproductive biology of flowering plants and their influence on genetic variation, evolution, and cultural practices. Offered in alternate years. (Former course Plant Science 270.)

***220. Plant Developmental Biology** (4) III. Rost, Jernstedt
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: plant anatomy, physiology, and biochemistry. A survey of the concepts of plant development and organization. Examines plant cells, tissues, and organs with special emphasis on experimental evidence for mechanisms regulating developmental processes. Offered in alternate years.

***221. Special Topics in Plant Physiology** (2) III. The Staff
Discussion—1 hour; seminar—1 hour; term paper. Analysis in depth of recent advances in plant physiology. Lectures and discussions by research specialists. May be repeated for credit. (S/U grading only.)

***222. Special Topics in Plant Morphology, Systematics, and Ecology** (2) II. The Staff
Seminar—2 hours; term paper. Analysis of recent advances in plant structure and evolution. Lectures and discussions by research specialists. May be repeated once for credit. Offered in alternate years. (S/U grading only.)

223. Special Topics in Scientific Method (2) I. Bradford
Discussion—2 hours. Examine the historical and philosophical background of the scientific method. Analyze the rational perceptual, causal, creative and social aspects of scientific knowledge. Clarify the roles of reason, experimentation and creativity in scientific research. (S/U grading only.)

224. Water in Physiology and Ecology of Plants (4) III. Hsiao (Land, Air and Water Resources)
Lecture—3 hours; discussion—1 hour. Prerequisite: Hydrologic Science 124, or Plant Biology 111 and 117, or consent of instructor. Evapotranspiration and energy balance; water and component potentials; water transport to, within, and from plants; dynamics and regulation of water status; drought resistance; responses to water deficits and salinity; water use efficiency; adaptation to aridity; productivity in relation to water. Offered every fourth quarter. (Former course Plant Science 224.)

***225. Methods and Instrumentation for Crop and Soil Science** (3) III. Denison, Brown, Hartz, Hsiao
Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: basic knowledge of plant physiology, soil science, chemistry and physics. Theory and practice of in situ sampling and instrumentation methods for crop science (broadly defined to include tree crops) and related aspects of soil science (e.g., moisture and fertility) and laboratory analysis. Offered in alternate years.

227. Plant Molecular Biology (4) II. Bowman, Sinha, Britt
Lecture/discussion—4 hours. Prerequisite: Molecular and Cellular Biology 121 or 161. Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli.

***228. Plant Molecular Biology Laboratory** (5) II. Harada
Lecture—2 hours; laboratory—10 hours. Prerequisite: Molecular and Cellular Biology 120L, a course in molecular genetics and consent of instructors. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structures, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Vegetable Crops 228.)

229. Molecular Biology of Plant Reproduction (3) II. O'Neill
Lecture—3 hours. Molecular genetic basis of plant reproduction. Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering. Offered in alternate years.

***231. Biological Electron Microscopy** (1) I. Falk
Lecture—1 hour. Prerequisite: consent of instructor. Introduction to biological microscopy. Areas covered are: electron optics, electron specimen interactions, and vacuum systems.

***231L. Biological Electron Microscopy Laboratory** (3) I. Falk
Laboratory—9 hours. Prerequisite: consent of instructor; course 231 (may be taken concurrently). Introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation. Limited enrollment.

***255. Principles of Plant Taxonomy** (4) I.
Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 108; Evolution and Ecology 100 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—anatomy, embryology, biochemistry, etc.—elucidate problems of taxonomic relationship, mainly of genera and higher categories.

***256A. Experimental Plant Taxonomy** (2) II.Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Biology 108; Plant Biology 117 and Evolution and Ecology 100 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Offered in alternate years.

***256B. Experimental Plant Taxonomy** (2) III. Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. Continuation of course 256A. Study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytogenetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships. Offered in alternate years.

290A. Faculty Seminar (1) I. The Staff
Seminar—1 hour. Seminars presented by members of Plant Biology faculty describing their areas of research. Required of all beginning students in the Plant Biology Graduate Group. (S/U grading only.)

290B. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.)

290C. Research Conference in Botany (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research projects in botany. May be repeated for credit. (S/U grading only.)

291. Graduate Student Seminar in Plant Biology (1) II, III. The Staff
Seminar—1 hour. Prerequisite: graduate student standing. Student-given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Topic determined by instructor in charge. May be repeated for credit. (S/U grading only.)

292. Seminars in Plant Biology (1) II. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. (S/U grading only.)

293. Seminar in Postharvest Biology (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor; open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables, and ornamentals. May be repeated for credit. (S/U grading only.)

297T. Tutoring in Plant Biology (1–5) I, II, III. The Staff
Tutorial—3–15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: graduate standing.

299. Research (1-12) I, II, III. The Staff
Prerequisite: graduate standing. (S/U grading only.)

Professional Course

390. The Teaching of Plant Biology (2) I, II, III. The Staff
Discussion—2 hours. Prerequisite: graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. (S/U grading only.)

Plant Pathology

(College of Agricultural and Environmental Sciences)

James D. MacDonald, Ph.D., Chairperson of the Department

Department Office, 354 Hutchison Hall (916-752-0300)

Faculty

Richard M. Bostock, Ph.D., Professor
George Bruening, Ph.D., Professor
John M. Duniway, Ph.D., Professor
Lynn Epstein, Ph.D., Associate Professor
Bryce W. Falk, Ph.D., Professor
Robert L. Gilbertson, Ph.D., Associate Professor
David G. Gilchrist, Ph.D., Professor
Thomas R. Gordon, Ph.D., Associate Professor
Clarence I. Kado, Ph.D., Professor
Bruce Kirkpatrick, Ph.D., Associate Professor
James D. MacDonald, Ph.D., Professor *(Plant Pathology, Environmental Horticulture)*
David Rizzo, Ph.D., Assistant Professor
Pamela C. Ronald, Ph.D., Assistant Professor
Brett M. Tyler, Ph.D., Professor
Ariena H.C. van Bruggen, Ph.D., Professor
Robert K. Webster, Ph.D., Professor

Emeriti Faculty

Edward E. Butler, Ph.D., Professor Emeritus
Robert N. Campbell, Ph.D., Professor Emeritus
James E. DeVay, Ph.D., Professor Emeritus
W. Harley English, Ph.D., Professor Emeritus
Raymond G. Grogan, Ph.D., Professor Emeritus
William B. Hewitt, Ph.D., Professor Emeritus
Bert Lear, Ph.D., Professor Emeritus
Srecko John M. Mircetich, Ph.D., Lecturer Emeritus
George Nyland, Ph.D., Professor Emeritus

Affiliated Faculty

Greg Browne, Ph.D, Research Plant Pathologist
E. Civerolo, Ph.D., Lecturer
Michael R. Davis, Ph.D., Lecturer
Deborah A. Golino, Ph.D., Lecturer
W. Douglas Gubler, Ph.D., Lecturer
Jerry K. Uyemoto, Ph.D., Lecturer

Related Major Program. See the major in Plant Biology.

Graduate Study. The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate adviser. See also the Graduate Studies section in this catalog.

Graduate Advisers. R. Gilbertson, B. Kirkpatrick, B.M. Tyler, A.H.C. van Bruggen.

Courses in Plant Pathology (PLP)

Upper Division Courses

120. Introduction to Plant Pathology (4) I. Duniway, Falk; III. Gilbertson, Bostock
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 2 recommended. The nature, cause, and control of plant diseases.

123. Plant-Virus-Vector Interaction (3) I. Lucas, Gilbertson, Ullman
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Plant Biology 105, course 120, and Entomology 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Entomology 123/Plant Biology 123.)

***125. Diagnosis and Control of Plant Diseases** (4) III. MacDonald
Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Offered in alternate years.

130. Fungal Biotechnology and Biochemistry (3) II. Gilchrist, Bostock
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and 102 (may be taken concurrently). How fundamental physiological and biochemical activities of fungi impact the destructive and beneficial roles of these organisms in nature. Utilization and manipulation of fungi for biotechnological and industrial applications.

140. Agricultural Biotechnology, Ethics and Public Policy (4) III. Bruening
Lecture—3 hours; term paper or discussion—1 hour. Examination of agricultural biotechnology within a moral/ethical framework. Public policy development and implementation. GE credit: SciEng, Wrt.

148. Introductory Mycology (5) MacDonald, Rizzo
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to morphology, ontogeny, taxonomy and biology of the fungi. (Same course as Plant Biology 148.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: course 120 and consent of instructor. Work experience off and on campus, supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

205A-205B. Diseases of Vegetable and Field Crops (4-1) III-Extra-session summer. van Bruggen
Lecture—2 hours; laboratory—3 hours; fieldwork—6 hours; research term paper. Prerequisite: course 120; Plant Biology 119 or course 125. Study of vegetable and field crops with emphasis on diagnosis, epidemiology, and control. Lectures on diagnostic techniques, seed pathology, disease assessment and crop loss, and integrated disease management. Field trips and laboratory exercises related to disease diagnosis. (Deferred grading only, pending completion of sequence.)

***206A-206B. Diseases of Fruit, Nut, and Vine Crops** (3-1) III-Extra-session summer. Kirkpatrick
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Plant Biology 119. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

***208. Ecology of Plant Pathogens and Epidemiology of Plant Diseases** (4) III. Duniway
Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Interaction between higher plants, plant pathogens, and the environment which is important in the occurrence and severity of plant disease. Emphasis is placed on the population dynamics and ecology of plant pathogens in the aerial and soil environment. Offered in alternate years.

***209. Principles of Plant Disease Control** (3) II. Webster
Lecture—3 hours. Prerequisite: course 120 or the equivalent. Discussion of the underlying principles and methods used for the control of plant diseases. Emphasis placed on application of epidemiological principles, biological (including host resistance), and chemical strategies to achieve disease control. Offered in alternate years.

***210. Biochemistry and Molecular Biology of Plant–Microbe Interaction** (4) I. Gilchrist, Bostock
Lecture/discussion—4 hours. Prerequisite: Biological Sciences 101, 102, 103, and 104, or the equivalent. Discussion of plant–microbe interactions, focused on the underlying cellular, biochemical, and molecular events that determine the diseased state. Offered in alternate years.

215X. Genetics and Molecular Biology of Plant Pathogens (4) II. Tyler
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 120 and Biological Sciences 101. Genetic analysis of pathogenicity, cultivar-specificity, and host-specificity in plant pathogens, particularly fungi; application of molecular biology to the isolation and characterization of the genes involved; and to aspects of pathogen identification; emphasis on research techniques and problem-solving. Offered in alternate years.

***217. Molecular Genetics of Fungi** (3) II. Holland, Tyler
Lecture—3 hours. Prerequisite: graduate standing in a biological science, Biological Sciences 101, 103, Molecular and Cellular Biology 161, Plant Biology 119, courses 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; plant pathogenesis; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. Offered in alternate years. (Same course as Biological Chemistry 217.)

224. Plant Pathogenic Fungi (5) III. Rizzo
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 148. Advanced topics in the systematics, morphology, and ecology of the fungi. Emphasis on plant pathogenic fungi, although other groups will be considered. Offered in alternate years.

226. Plant Virology (5) II. Bruening, Falk, Gilbertson
Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research.

228. Plant Bacteriology (5) II. Kirkpatrick
Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Microbiology 2 or the equivalent; Biological Sciences 102, 103. Study of bacteria which have a saprophytic, symbiotic, or parasitic association with higher and lower plants. Clinical and molecular methods for identification and classification of these bacteria. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced plant pathology; primarily designed for graduate students. (S/U grading only.)

291. Seminar in Molecular Plant Pathology (1) I, II. Bostock, Gilchrist, Falk, Gilbertson
Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Review and evaluation of current literature and research in biochemistry and molecular biology of plant microbe interactions. May be repeated for credit. (S/U grading only.)

292. Seminar in Plant Virology (1) III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (S/U grading only.)

293. Seminar on Soil Microbiology and Root Diseases (1) II. VanBruggen, Duniway
Seminar—1 hour. Prerequisite: course 120. One of the students or faculty members introduces a topic based on one or more papers read by the students, and then leads the discussion on this topic. (S/U grading only.)

294. Seminar on Plant Epidemiology (1) I. Duniway
Seminar—1 hour. Prerequisite: course 120. One of the students or faculty members introduces a topic, based on one more papers on plant epidemiology read by the participants, and then leads the discussion on this topic. May be repeated for credit. (S/U grading only.)

295. Seminar in Mycology (1) I. III. The Staff (Chairperson in charge)
Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.)

298. Special Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Plant Physiology

See Biological Sciences—Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)

Plant Protection and Pest Management (A Graduate Group)

James D. MacDonald, Ph.D., Acting Chairperson of the Group

Group Office, 367 Briggs Hall (916-752-0475)

Faculty. Includes faculty members from the Colleges of Agricultural and Environmental Sciences and Letters and Science.

Graduate Study. The Graduate Group in Plant Protection and Pest Management offers programs of study and research leading to the M.S. degree. Students may conduct independent research or participate in on-going projects on integrated crop management and sustainable agriculture. Weeds, insects, plant pathogens, nematodes, rodents, and other pests are treated as parts of complex ecosystems and not as isolated problems. Courses include concepts and systems of plant protection and pest management, diagnosis and control of plant pest problems, toxicology and legal ramifications, and equipment for chemical applications. Detailed information can be obtained from the Group Chairperson and the application for Graduate Admission and Fellowship.

Graduate Adviser. E.P. Caswell-Chen *(Nematology).*

Courses in Plant Protection and Pest Management (PPP)

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (4) II. Webster (Plant Pathology)
Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: Agricultural Systems and Environment 120, Entomology 110, Plant Pathology 120, Plant Biology 120 (may be taken concurrently), Nematology 100; Plant Biology 117 or Evolution and Ecology 101 recommended. Ecological perspectives of agricultural systems, the role of pests and pest management in these systems, and the monitoring and modeling of the systems.

202A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents (4-4) I. Norris (Weed Science); III. Rosenheim (Entomology)
Discussion—1 hour; fieldwork—9 hours. Prerequisite: Entomology 110, Plant Pathology 120, Plant Biology 120, Nematology 100 (may be taken concurrently). Problems and assessment of losses caused by insects, pathogens, weeds, nematodes, and other pests. Methods of determining infestation levels and establishing economic thresholds, and control of these pests with emphasis on integration of available management practices into programs.

290. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III, summer. The Staff (Chairperson in charge)
(S/U grading only.)

Plant Science

See Biological Sciences—Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)

Courses in Plant Science have been transferred to Plant Biology.

Concordance

The following courses in Plant Science have been transferred to Plant Biology.

Former Course Number	Equivalent new course and number
1	Plant Biology 1 (Plants for Garden, Orchard and Landscape
10	Plant Biology 12 (Plants and People)
90X	Plant Biology 90X (Plant Science Seminar)
101	Plant Biology 142 (Ecology of Crop Systems)
103	Plant Biology 143 (Evolution of Crop Plants)
104	Plant Biology 151 (Conservation of Plant Genetic Resources)
105	Plant Biology 152 (Plant Genetics)
106	Plant Biology 144 (Trees and Forests)
107	Plant Biology 153 (Plant Cell, Tissue, and Organ Culture)
109	Plant Biology 171 (Plant Propagation)
110	Plant Biology 146 (Rhizosphere Ecology)
112	Plant Biology 172 (Postharvest Physiology and Handling of Horticultural Commodities)
112L	Plant Biology 172L (Postharvest Physiology and Handling Lab.)
113	Plant Biology 154 (Plant Breeding)
115	Plant Biology 173 (Biological Applications in Pomology)
116	Plant Biology 174 (Principles of Fruit Production)
126	Plant Biology 157 (Physiology of Environmental Stresses in Plants)
135	Plant Biology 158 (Mineral Nutrition of Plants)
140	Plant Biology 160 (Principles of Plant Biotechnology)
141A	Plant Biology 161A (Plant Genetics and Biotechnology Laboratory)
141B	Plant Biology 161B (Plant Genetics and Biotechnology Laboratory)
145	Plant Biology 175 (Applied Plant Biology)
191	Plant Biology 188 (Undergraduate Research: Proposal)
196	Plant Biology 196 (Postharvest Technology of Horticultural Crops)

Plastic Surgery

See Medicine, School of

Political Science

(College of Letters and Science)

————, Ph.D., Chairperson of the Department

Department Office, 1246 Social Sciences and Humanities Building (916-752-0966)

Faculty

Josephine Andrews, Assistant Professor
Larry Berman, Ph.D., Professor
Scott S. Gartner, Ph.D., Associate Professor
John B. Gates, Ph.D., Associate Professor
Emily O. Goldman, Ph.D., Associate Professor
Stuart L. Hill, Ph.D., Associate Professor
Robert W. Jackman, Ph.D., Professor
Bruce W. Jentleson, Ph.D., Professor
Jeannette Money, Ph.D., Assistant Professor
Gabriella R. Montinola, Ph.D., Assistant Professor
Miroslav Nincic, Ph.D. Professor
Larry I. Peterman, Ph.D., Professor
Donald S. Rothchild, Ph.D., Professor
Randolph M. Siverson, Ph.D., Professor
James F. Spriggs II, Ph.D., Assistant Professor
Nayda R. Terkildsen, Ph.D., Assistant Professor
Larry L. Wade, Ph.D., Professor
Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor *(Political Science, Environmental Studies), Academic Senate Distinguished Teaching Award*

Emeriti Faculty

Edmond Costantini, Ph.D., Professor Emeritus
Richard W. Gable, Ph.D., Professor Emeritus
Alexander J. Groth, Ph.D., Professor Emeritus
Charles M. Hardin, Ph.D., Professor Emeritus
Clyde E. Jacobs, Ph.D., Professor Emeritus
Joyce K. Kallgren, Ph.D., Professor Emeritus
Lloyd D. Musolf, Ph.D., Professor Emeritus
John R. Owens, Ph.D., Professor Emeritus
Paul E. Zinner, Ph.D., Professor Emeritus

*Course not offered this academic year.

The Major Programs

Political science is the study of politics and political systems at the local, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political values, political change and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

The Program. The Department of Political Science offers two major programs: political science and political science–public service. The political science major aims to provide the student with a broad understanding of political concepts, political institutions, political behavior, and political processes. The political science–public service major is for students who desire opportunities for practical hands-on experience in their major. It differs in particular from the political science major in its internship requirement and its focus on the American political system.

Internships and Career Alternatives. Both the proximity of UC Davis to the state capitol and the programs offered by the UC Davis Washington Center afford exceptional internship possibilities in local, state, and national government offices, providing students with actual experience in politics and government service while still attending school. A student who majors in political science acquires research and analytic skills relevant to many professional fields. Consequently, the majors offered in political science are valuable not only in providing students with a better understanding of politics and political systems, but also as a first step toward careers in teaching, law, management, government, urban planning, journalism, politics, administration, or for graduate studies in numerous fields.

Political Science

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20
Political Science 1 4
Two courses from Political Science 2, 3, 4, 5, 7 8
(Course 7 may not be taken if course 5 is taken.)
Two courses from History 3, 4A, 4B, 4C, 10, 111A, 111B, 111C, 121A, 121B, 121C, 131A, 131B, 131C, 133, 134A, 134B, 145, 146A, 146B, 147A, 147B, 147C, 151A, 151B, 151C, 151D.....8

Depth Subject Matter 36
Select two courses in each of three fields, listed below. The fields must be chosen from at least two Groups, A, B, or C ...24

Group A
Field (1) *Political theory:* Political Science 111–119, 187

Group B
Field (2) *American government and institutions:* Political Science 100–109, 171, 173–175, 180–189, 191, 195
Field (3) *Parties and political behavior:* Political Science 160–170
Field (4) *Public law:* Political Science 150–156

Group C
Field (5) *Comparative government:* Political Science 126, 140–149, 177–179
Field (6) *International relations:* Political Science 120–139

Additional upper division units in political science to achieve a total of 36.....12
Only 5 units of Political Science 192 (internship) may be counted towards the 36-unit requirement; and Political Science 192A, 192B, or 192W *may not be counted toward a field requirement.*

Total Units for the Major 56

Political Science—Public Service

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 12
One course from Political Science 1, 5, or 7...4
Two courses from Political Science 2, 3, or 4 8
Recommended: Economics 1A-1B.

Depth Subject Matter 48
Core program 12
Two courses chosen from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 108, 109, 111, 114.
Internship, Political Science 192A, 192B, or 192W 10
Research paper, Political Science 193 2
Fields of concentration 24
Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science. (Core Program courses may not be counted toward this requirement.)

Fields of Concentration
Field (1) *Policy formulation:* Political Science 103, 105, 106, 108, 109, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 173, 174, 175, 195; Economics 130.
Field (2) *Policy implementation and evaluation:* Political Science 156, 180, 181, 182, 183, 187, 188, 189; Economics 131
Field (3) *Policy interpretation—Substance and procedures (public/pre-law):* Political Science 150, 151, 152, 153, 155, 156.
Field (4) *Policy areas:*
a) Urban policy and implementation: Political Science 100, 101, 102, 191, Economics 125, Environmental Biology and Management 110, Environmental Studies 162, 173.
b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 168A-168B, 179.
c) Environmental policy and implementation: open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (requires approval of Political Science–Public Service adviser).

Total Units for the Major 60

Major Advisers. Consult Departmental Office.

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans.

UNITS

Political Science.....24
Select one plan.
Plan I: Upper division units in political science (may include 4 units of lower division course work) distributed among at least two of the three Groups, A, B, and C
Plan II: a 24-unit plan approved by a faculty adviser. Five units of internship may count toward the minor.

Teacher Credential Subject Representative. Consult Departmental Office. See also the section on the Teacher Education Program.

Graduate Study. The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.

Graduate Adviser. Consult Departmental Office.

Public Affairs Internship Program. This program is open to upper division students in any major who want to obtain an internship in the area of government and public service. Information and applications are is available from the Intern Coordinator, Political Science Department, 1246 Social Sciences and Humanities Building, 752-1989.

American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163. (See also under University requirements.)

Courses in Political Science (POL)

Lower Division Courses

1. American National Government (4) I. The Staff; II. Hill; III. The Staff
Lecture—3 hours; discussion—1 hour. Survey of American national government, including the constitutional system, political culture, parties, elections, the presidency, Congress, and the courts. GE credit: SocSci, Wrt.

2. Introduction to Comparative Politics (4) III. Andrews
Lecture—3 hours; discussion—1 hour. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well as to more formal political and governmental structures. GE credit: SocSci, Wrt.

3. International Relations (4) I. Siverson; II. Nincic; III. Goldman
Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics. GE credit: SocSci, Wrt.

4. Basic Concepts in Political Theory (4) I. Peterman
Lecture—3 hours; discussion—1 hour. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. GE credit: SocSci, Wrt.

5. Contemporary Problems of the American Political System (4) III. The Staff
Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies. GE credit: SocSci, Wrt.

7. Contemporary Issues in Law and Politics (4) I. Gates
Seminar—4 hours. A seminar which focuses on the political dimensions of American law and institutions. Examines the role of courts in resolving contemporary issues of law and politics including abortion, capital punishment, and civil rights. Limited enrollment. Open to students having no more than 40.1 units. GE credit: SocSci, Wrt.

***90X. Lower Division Seminar** (4) II. Gartner; III. Siverson
Seminar—4 hours. Prerequisite: lower division standing and consent of instructor. Examines fundamental issues and concepts that shape the study and practice of politics. Students will read, discuss and write about some of the most significant texts in political science in order to develop a foundation for the study of politics. Limited enrollment.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Local Government and Politics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Politics and government of local communities in the United States, including cities, counties, and special districts. Emphasizes sources and varieties of community conflict, legislative and executive patterns, expertise, decision making, and the politics of structure. Observation of local governing boards. GE credit: SocSci, Wrt.

***101. Urban Political Economy** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Historical development of urban political economies. Focuses on ways in which different groups have tried to use local government authority to achieve their objectives and why they succeeded or failed.

***102. Urban Public Policy** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political and economic relationships among central cities, suburbs, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and upon who governs and who benefits from the policies in these areas. GE credit: SocSci, Wrt.

***103. American Federalism** (4) I. The Staff
Lecture—3 hours; research paper. Prerequisite: course 1 or 5 recommended. American politics and policy in the context of national-state-local relations. Constitutional roots of Federalism, centralizing and decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental programs.

104. California State Government and Politics (4) I. Wandesforde-Smith
Lecture—3 hours; research paper. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations, and policy issues.

105. The Legislative Process (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies. GE credit: SocSci, Wrt.

106. The Presidency (4) III. Berman
Lecture—3 hours; discussion—1 hour; optional term paper. The American presidency's origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections. GE credit: SocSci, Wrt.

***107. Environmental Politics and Administration** (4) I. Wandesforde-Smith
Lecture—3 hours; discussion—1 hour. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation. GE credit: SocSci, Wrt.

***108. Policy Making in the Public Sector** (4) III. The Staff
Lecture—3 hours; research paper. The theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making. GE credit: SocSci, Wrt.

109. Public Policy and the Governmental Process (4) III. Wade
Lecture—3 hours; research paper. The processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation

of public goods, resources and opportunities. GE credit: SocSci, Wrt.

111. Systematic Political Science (4) II.
The Staff
Lecture/discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected concepts relevant to modern political concerns; and research design and execution.

112. Contemporary Democratic Theory (4) II.
Wade
Lecture—3 hours; discussion—1 hour. Major contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered in alternate years. GE credit: SocSci, Wrt.

113. American Political Thought (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present. GE credit: SocSci, Wrt.

***114. Quantitative Analysis of Political Data** (4) III. The Staff
Lecture—3 hours; term paper. Logic and methods of analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in political science research. Offered in alternate years. GE credit: SocSci, Wrt.

***115. Medieval Political Thought** (4) III.
Peterman
Lecture—3 hours; term paper. Prerequisite: course 118A. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history. GE credit: SocSci, Wrt.

116. Foundations of Political Philosophy (4) III.
Peterman
Lecture/discussion—3 hours; term paper. Analysis and evaluation of the seminal works of a major political philosopher or of a major problem in political philosophy. May be repeated once for credit when topic differs. Offered in alternate years.GE credit: SocSci, Wrt.

***117. Marxism** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Examination of the political and social philosophy of Karl Marx, with reference to the evolution of Marxism in the nineteenth and twentieth centuries.

118A. History of Political Theory (4) I. Peterman
Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas. GE credit: SocSci, Wrt.

118B. History of Political Theory (4) II.
Peterman
Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke. GE credit: SocSci, Wrt.

118C. History of Political Theory (4) III. The Staff
Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre. GE credit: SocSci, Wrt.

***119. Modern Political Thought** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Study in depth of philosophers considered central to modern political thought, especially nineteenth and twentieth century political thought. Emphasis will be upon an individual philosopher or concept rather than upon a survey of modern political thought.

120. Theories of International Politics (4) I.
The Staff; II. Siverson
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making analysis.

121. War (4) I. Gartner; III. Siverson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare. GE credit: SocSci, Wrt.

122. International Law (4) III.
Wandesforde-Smith
Lecture—4 hours. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes. GE credit: SocSci, Wrt.

123. The Politics of Interdependence (4) I, III.
The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficulties in managing complex interdependence and its implication on national policies and politics. GE credit: SocSci, Wrt.

124. The Politics of Global Inequality (4) III.
Money
Lecture—3 hours; term paper. Prerequisite: upper division standing; course 123 recommended. Longstanding division of the global system into richer and poorer regions poses many important problems in international political economy. Course presents a theoretical background to North-South issues and analyses of current problems in economic and political relations. GE credit: SocSci, Div, Wrt.

126. Ethnic Self-Determination and International Conflict (4) II. Rothchild
Lecture—3 hours; individual meetings with students to discuss term papers. Prerequisite: one international relations course recommended. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts, e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts. GE credit: SocSci, Div, Wrt.

***127. Nationalism and Imperialism** (4) II.
The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Theory of nation building illustrated by Western and non-Western experience. Offered in alternate years.

***128. International Communism** (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International communist movement; ideology organization, strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict and its effects on revolutionary struggle. Offered in alternate years. GE credit: SocSci, Wrt.

***129. Special Studies in International Politics** (4) II, III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied. GE credit: SocSci, Wrt.

130. Recent U.S. Foreign Policy (4) I. Nincic; II. Gartner; III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Broad survey of the development of U.S. foreign policy in twentieth century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues. GE credit: SocSci, Wrt.

131. Analysis of U.S. Foreign Policy (4) I.
Goldman; III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Detailed presentation and examination of the formulation of execution of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas. GE credit: SocSci, Wrt.

132. National Security Policy (4) II. Gartner
Lecture—3 hours; term paper. Prerequisite: upper division standing. Development of national security policies since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliance systems, and the international system. Prospects of security and stability through arms control. GE credit: SocSci, Wrt.

***133. The American Role in East Asia** (4) I.
The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role the United States has played in East Asia. Influence on Asian westernization of U.S. governmental East Asian policy, missionaries, traders, and returning students. Offered in alternate years.

134. Africa and U.S. Foreign Policy (4) I.
Rothchild
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Overview of American foreign policy toward Africa. Relationship to global adversaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on nonalignment, producer cartels, multinational corporations, continental integration, and trade and aid relations.

***136. Russian Foreign Policy** (4) II. The Staff
Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. The making and implementation of foreign policy after Soviet rule; the legacies of Tsarism and Bolshevism; resources, constraints and capabilities of the "new Russia" in the international system. GE credit: SocSci, Wrt.

***137. International Relations in Western Europe** (4) I. Money
Lecture—4 hours. Prerequisite: upper division standing. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, communism in Western Europe and the relationship between domestic politics and foreign policy.

***138. International Relations: East Asia** (4) II.
The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Analysis of international relations and diplomacy in East Asia. Emphasis upon twentieth century problems with examples from China, Japan, Korea, and Southeast Asia.

***139. Special Studies in Foreign Policy** (4) I.
Nincic
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Extensive examination of one or more special problems in foreign policy. May be repeated once for credit when topic differs.

140. Comparative Public Policy (4) II. The Staff
Lecture—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, communist and fascist experience.

***141. Communist Political Systems** (4) III.
The Staff
Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe. GE credit: SocSci, Wrt.

142. Politics and Inequality (4) I. Jackman
Lecture—3 hours; term paper or discussion—1 hour. Examines the linkages between politics and the distribution of social and economic goods. Topics include the impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods. GE credit: SocSci, Div.

***143. Politics in the Commonwealth of Independent States and the Baltic** (4) III.
The Staff
Lecture/discussion—4 hours. Prerequisite: course 2 and upper division standing. Creation of new political and economic structures in newly independent states; departures from central planning; dilemmas of cooperation; analysis of divergent reform strategies; inte-

gration into international political and economic system.

144. Russian Politics and Policy (4) I. Andrews
Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule.

***145. Government and Politics in Emergent Nations** (4) III. The Staff
Lecture—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. Offered in alternate years.

***146. Contemporary African Politics** (4) II. Rothchild
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Analysis of party systems, military coups, bureaucracy, regional integration, and disintegration, and economic development in Africa south of the Sahara.

***147. Politics and Policy in Western Europe** (4) III. Money
Lecture—4 hours. The evolution, politics, and contemporary problems of selected political systems of Western Europe.

148A. Government and Politics in East Asia: China (4) II. Montinola
Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy.

***148B. Government and Politics in East Asia: Pacific Rim** (4) III. The Staff
Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and evolution of political cultures and establishment of political institutions in selected countries of the Pacific Rim, namely Japan, Korea, Taiwan. Emphasis on post World War II.

148C. Government and Politics in East Asia: Southeast Asia (4) III. Montinola
Lecture—3 hours; term paper. Prerequisite: course 2 recommended. Evolution of political culture, institutions, economy of selected nations in Southeast Asia including Vietnam plus two or three other examples. Emphasis on imperialist legacy, nation building in multi-ethnic communities, contrasts between socialist and non-socialist development models. Offered in alternate years.

149. Politics of Development in Africa (4) III. Rothchild
Lecture/discussion—4 hours. Prerequisite: course 134 recommended. Analysis of the developmental process in sub-Saharan Africa. Emphasis will be placed upon state and state institution, state-society relations, ethnicity, socioeconomic class, women, ideology, party systems, bureaucracy, military and developmental choices.

150X. Judicial Politics and Constitutional Interpretation (4) I. Gates; II. Spriggs
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Politics of judicial policymaking; issues surrounding constitutional interpretation and decision making; prerequisite for courses on the politics of constitutional law.

151. The Constitutional Politics of the First Amendment and the Right to Privacy (4) III. Gates
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. The constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs, and the right to privacy. GE credit: SocSci, Wrt.

152. The Constitutional Politics of Equality (4) III. Gates
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered in alternate years. GE credit: SocSci, Div, Wrt.

153. The Constitutional Politics of the Justice System (4) II. Spriggs
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of the American criminal justice system; the issues surrounding constitutional doctrine and judicial policymaking on issues such as search and seizure, arrest, trial, incarceration, and other issues of due process. Offered in alternate years.

***154. Legal Philosophy** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law; law as an instrument of social control and the relationship between law and morality. Offered in alternate years.

155. Judicial Process and Behavior (4) III. Spriggs
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision making. Relationships among courts and other decision-making bodies. Offered in alternate years. GE credit: SocSci, Wrt.

160. American Political Parties (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Analysis of the structured operations of the party system in the United States; party functions and organizations, nomination processes, campaigns and elections, party trends and reforms. GE credit: SocSci, Wrt.

***161. Comparative Political Parties** (4) I. Andrews
Lecture—3 hours; discussion—1 hour. Organization, operation, governmental function and social bases of political parties especially in Great Britain and France but with some reference to other Western European countries.

162. Elections and Voting Behavior (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting. GE credit: SocSci, Wrt.

163. Group Politics (4) I. Wade
Lecture—3 hours; discussion—1 hour. Groups, institutions, and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic, and sectional groups; to parties, public and legislative groups, bureaucracies. GE credit: SocSci, Wrt.

164. Public Opinion (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and course 1 or 5, or consent of instructor. Nature of public opinion in America as it is "supposed to be" and as it is. Distribution of opinions among different publics and the significance of that distribution for system stability and institutions. Opinion polling and its problems. GE credit: SocSci, Wrt.

165. Mass Media and Politics (4) II. Terkildsen
Lecture—3 hours; discussion—1 hour. Organization of and decision making within the media; media audiences and the effect of the media on attitudes and behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation); the media in election campaigns. GE credit: SocSci, Wrt.

***166. Women in Politics** (4) II. Terkildsen
Lecture—3 hours; discussion—1 hour or seminar—1 hour. The role of women in American politics. Historical experiences; contemporary organizations and strategies; areas of legislative concern; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics. GE credit: SocSci, Div.

***167. Political Socialization** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 164 or consent of instructor. Who learns what about politics, and when and how they learn it. The process, content and sources of political learning, particularly in preadulthood, and the significance of such factors for the political system as well as for the development of the political self.

***168. Chicano Politics** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Political aspects of Chicano life in America; examines the Chicano's political role as it has been historically defined by different groups in society and the Chicano's responses to his/her political environment. GE credit: SocSci, Div.

***169. Political Elites** (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 4, or consent of instructor. Background, careers, motives and beliefs of political leaders. Place of elites in a democratic polity; elite-mass differences; conflict and consensus among elites. GE credit: SocSci, Div, Wrt.

170. Politics and Personality (4) I. Terkildsen
Lecture—3 hours; discussion—1 hour. How is conduct of politics influenced by personal qualities of political actors? Course focuses on developing criteria for analyzing political phenomena in psychological terms by examining selected writings of twentieth-century theorists and psychobiographies.

***171. The Politics of Energy** (4) II. Wandesforde-Smith
Lecture/discussion—4 hours. Prerequisite: upper division standing. Analysis of nature and performance of political processes for making energy choices at the international, national and state levels. Emphasizes interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation.

***172. American Political Development** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: some background in American politics is strongly recommended. Systematic analysis of contemporary issues in American political development: historical determinants of political change; the timing and character of institutional development; conditions for successful political action. Topics may include democratization, cultural change, party formation, state-building, constitutionalism, race relations.

173. Community Power and Change (4) II. Jackman
Lecture—3 hours; discussion—1 hour. An examination of the relationship between general community characteristics, the distribution of political power, and policy outputs in the United States. Alternative models of community political change are presented.

***174. Government and the Economy** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest. GE credit: SocSci, Wrt.

175. Science, Technology, and Policy (4) III. Hill
Lecture—3 hours; discussion—1 hour. Analysis of policymaking for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, science and military policy, technological risks, technology assessment and scientists and politics. GE credit: SocSci, Wrt.

***176. Power and Coercion** (4) II. Jackman
Lecture—4 hours. Prerequisite: course 1 or Sociology 1 recommended. Examination of the meaning, sources, and diverse expressions of power and coercion in our lives. Concepts are explored by applying them to a broad range of issues, such as sexual harassment, racial subordination, legislative policymaking, and ideological hegemony. GE credit: SocSci, Div.

***177. Modern Dictatorships** (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Selected political processes and institutions of dictatorships in Germany, Italy, Russia, Spain, Japan, and other states. Topics include executives, legislatures, parties, courts, bureaucracies, communications, and public opinion with comparisons to U.S. processes.

178. Political Development in Modernizing Societies (4) I. Jackman
Lecture—3 hours; discussion—1 hour. Nature and sequence of political development; its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration.

***179. Special Studies in Comparative Politics** (4) II. The Staff
Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to comparative politics. May be repeated once for credit.

***180. Bureaucracy in Modern Society** (4) II. Wandesforde-Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy. GE credit: SocSci, Wrt.

***181. The American Administrative System** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Introduction to the development and organization of administrative institutions in the American federal system; focus on design and reorganization, and the relationship of structure to performance, at the national, subnational, and local levels. GE credit: SocSci, Wrt.

***182. Administrative Decision Making and Public Policy** (4) II. The Staff
Lecture—3 hours; special assignments. Approaches to and models of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform. GE credit: SocSci, Wrt.

***183. Administrative Behavior** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

187. Administrative Theory (4) III. Hill
Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and control; an examination of the role of government bureaucracies in the total society. GE credit: SocSci, Wrt.

***188. Manpower Policy and Personnel Administration** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Politics and economics of effective manpower programs; planning manpower needs; recruitment, selection, and administration of public personnel; training and development; unions and collective bargaining; affirmative action; ethics and morality in the public service.

***189. Politics of Budgeting and Finance Administration** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Fiscal role of government in mixed economy and democratic society; politics of revenue and resource allocation; tax policy; inter-governmental financial relations; budget formulation and execution; alternative models of resource allocation; budget as a tool of management.

***190. International Relations** (4) II. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: open to majors in International Relations, or consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals.

***191. Special Studies in Local Government and Politics** (4) III. The Staff
Lecture—3 hours; fieldwork—1 hour. Prerequisite: consent of instructor; enrollment limited to advanced students. Intensive study of one or more topics relating to urban policy and politics, designed for advanced students. Group projects and fieldwork in one or more communities are emphasized.

192A. Internship in Public Affairs (5) I, II, III. Wandesforde-Smith (Chairperson in charge)
Prerequisite: enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science–Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: SocSci, Wrt.

192B. Internship in Public Affairs (5) I, II, III. Wandesforde-Smith (Chairperson in charge)
Prerequisite: course 192A; enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science–Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: SocSci, Wrt.

192W. Internship in the UC Davis Washington Center Program (6-8) I, III. Jentleson and staff
Internship—30-35 hours. Prerequisite: junior or senior standing and admission into the UC Davis Washington Center undergraduate program. Internship in Washington, D.C. with associated research project, under the supervision of a faculty sponsor. (P/NP grading only.)

193. Research in Practical Politics (2) I, II, III. The Staff
Research project—6 hours. Prerequisite: courses 192A, 192B; open only to Political Science–Public Service majors, for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science.

194HA-194HB-194HC. Special Study for Honors Students (2-3-5) I, II, III. The Staff
Directed research. Prerequisite: major in Political Science or Political Science–Public Service with junior standing and overall GPA of 3.5. Directed reading, research, and writing culminating in the preparation of a senior honors thesis under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

195. Special Studies in American Politics (4) II. Wandesforde-Smith, Terkildsen
Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to American politics. May be repeated once for credit when topic differs.

198. Directed Group Study (1-5) II. Andrews (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***201. Urban Government and Politics** (4) III. The Staff
Seminar—4 hours. Survey and analysis of the literature in the field of local government and politics in the United States. Approaches to the study of political reform, local autonomy, community power, representation, expertise, service delivery, policymaking and political change. Offered in alternate years.

***202. American State Government and Politics** (4) I. The Staff
Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Offered in alternate years.

***203A. American Government: The Presidency** (4) III. Berman
Seminar—4 hours. Thorough overview of the current research on political executives, with particular emphasis on the American presidency. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.

***203B. American Government: Congress** (4) I. The Staff
Seminar—4 hours. Thorough overview of the current research on Congress, with particular emphasis on political representation. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.

***203C. American Government: Courts** (4) II. Gates
Seminar—4 hours. Survey and analysis of the literature in the field of American government with a focus on courts. Emphasis on the development and testing of theories of behavior and processes.

***205. Field Research in Urban Politics and Policy** (4) III. The Staff
Seminar—2 hours; field research—2 hours. Examination of research design and methodologies appropriate to field research in community-level politics and policy, with an emphasis on elite interviewing and observation. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

***207. Environmental Public Policy** (4) II. Wandesforde-Smith
Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature.

***208. Policy Analysis** (4) II. Hill
Seminar—4 hours. Social science techniques applied to public policy formation and evaluation.

209. The American Political System (4) III. Wade
Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

211. Research Methods in Political Science (4) I. Hill
Seminar—4 hours. Prerequisite: Statistics 13; graduate standing or permission of instructor. Introduction to philosophy of science, research design for experimental and quasi-experimental settings, and data analysis. Topics include: logic of empirical research, measurement problems, research design, sampling, descriptive statistics, tabular analysis, measures of association, and introduction to correlation and regression.

212. Quantitative Analysis in Political Science (4) II. Nincic
Seminar—4 hours. Prerequisite: course 211. Topics usually covered in an introductory statistics course with an emphasis on applications in political science—descriptive statistics for samples, probability and probability distributions, hypothesis testing, ANOVA, bivariate regression, and introduction to multiple regression.

213. Quantitative Analysis in Political Science II (4) III. Spriggs
Seminar—4 hours. Prerequisite: courses 211, 212. More advanced topics in the use of statistical methods, with emphasis on political applications. Topics include: properties of least squares estimates, prob-

lems in multiple regression, and advanced topics (probit analysis, simultaneous models, time-series analysis, etc.).

214A-214B. Research in Political Science (2-2) I-III. The Staff
Seminar—2 hours. Prerequisite: courses 211, 212. Research seminar sequence required of all Ph.D. students. Design, execution and defense of an original piece of research in political science, culminating in a paper of publishable quality. (Deferred grading only, pending completion of sequence.)

***215. Introduction to Modeling Political Behavior** (4) II. Gartner
Seminar—3 hours. Prerequisite: courses 211 and 212. Introduction to formal and game theoretic analyses of politics. Students will learn basic game theory and modeling skills. We examine the benefits of modeling, and look at examples of formal analysis in a variety of political science sub-fields. Offered in alternate years.

218. Topics in Political Theory (4) II. The Staff
Seminar—3 hours; term paper. Topics will vary and may be the work of a single theorist, time period, or political concept, such as justice. Offered in alternate years.

***219A. Political Theory Sequence** (4) I. Peterman and staff
Seminar—3 hours; term paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussion of various interpretations of these authors. Offered in alternate years.

***219B. Political Theory Sequence** (4) II. Peterman and staff
Seminar—3 hours; term paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. Offered in alternate years.

223. International Relations (4) I. Siverson
Seminar—3 hours; term paper.

225. The International System (4) I. Gartner
Seminar—3 hours; term paper. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data generation and analysis.

***230. American Foreign Policy** (4) II. Nincic
Seminar—3 hours; term paper.

***231. U.S. Political Culture and Foreign Relations** (4) III. Rothchild
Seminar—3 hours; term paper. Relates U.S. political culture to formulation of foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision-making and implementation. Concludes by examining linkages between foreign policy behavior and democratic process. Offered in alternate years.

***241. Communist Political Systems** (4) III. The Staff
Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic analysis of selected topics dealing with the political process of communist political systems.

242. Seminar in Comparative Politics (4) II. Jackman
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Systematic survey of theories and methods used in the study of comparative politics.

***243. Comparative Institutional Change** (4) I. Andrews
Seminar—4 hours. Comparison of institutional changes in countries of the former Soviet Union and Eastern Europe during the period of transition to democracy. Special attention to institutions of mass representation—electoral and party systems and national legislatures. Offered in alternate years.

246. Policymaking in Third-World Societies (4) II. Rothchild
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policymaking process in Third-World countries are such topics as political resources, institutional resources, decision making, resource allocations, planning, and budgeting, implementation, and distribution of world resources. Offered in alternate years.

***248. Politics of East Asia** (4) III. The Staff
Seminar—3 hours; term paper. Selected contemporary problems of government and international relations in East Asia.

***250. Policy Development and Impact in U.S. Courts** (4) I. Spriggs
Seminar—3 hours; term paper. Prerequisite: graduate standing. Thorough overview of the literature regarding courts as policymaking institutions of government, with emphasis on the formation and implementation of judicial policy. Differences and similarities across the judicial, congressional, and executive branch policy processes. Offered in alternate years.

***260. Political Parties** (4) I. The Staff
Seminar—3 hours; term paper. Survey of selected topics in American and comparative parties.

261. Political Behavior (4) I. Terkildsen
Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion.

274. Political Economy (4) III. Montinola
Seminar—4 hours. Politics of economic policy as reflected in taxation, spending and regulation; impact of prices, employment, and growth on political demands; government responses to economic conditions; electoral politics and the political business cycle. Offered in alternate years.

***282. Concepts and Problems in Public Administration** (4) I. The Staff
Seminar—4 hours. Nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; means of controlling bureaucracy. Offered in alternate years.

***283. Organizational Behavior** (4) II. The Staff
Seminar—4 hours. Organizational behavior as it relates to public sector decision making.

***286. Administrative Values** (4) III. The Staff
Seminar—3 hours; term paper. Examination of American administrative values. Offered in alternate years.

290A. Research in American Government and Public Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy.

290B. Research in Political Theory (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

290C. Research in International Relations (4) III. Money
Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

290D. Research in Judicial Politics (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.

290E. Research in Political Parties, Politics, and Political Behavior (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior.

290F. Research in Comparative Government and Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

290G. Research in Public Administration (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

297. Internships in Political Science (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

299D. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Professional Course

390. The Teaching of Political Science (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (S/U grading only.)

Pomology

(College of Agricultural and Environmental Sciences)
T.M. DeJong, Ph.D., Chairperson of the Department
Department Office, 1035 Wickson Hall (916-752-0123)

Faculty

Fredrick A. Bliss, Ph.D., Professor
Patrick H. Brown, Ph.D., Associate Professor
Carlos H. Crisosto, Ph.D., Lecturer
Abhaya M. Dandekar, Ph.D., Associate Professor
Theodore M. DeJong, Ph.D., Professor
Louise Ferguson, Ph.D., Lecturer
Thomas M. Gradziel, Ph.D., Associate Professor
Scott Johnson, Ph.D., Lecturer
Adel A. Kader, Ph.D., Professor
John M. Labavitch, Ph.D., Professor
Gale McGranahan, Ph.D., Lecturer
Warren C. Micke, M.S., Lecturer
Elizabeth J. Mitcham, Ph.D., Lecturer
Dan E. Parfitt, Ph.D., Lecturer
Vito S. Polito, Ph.D., Professor
Daniel Potter, Ph.D., Assistant Professor
Kenneth A. Shackel, Ph.D., Associate Professor
Douglas V. Shaw, Ph.D., Associate Professor
Stephen M. Southwick, Ph.D., Lecturer
Ellen G. Sutter, Ph.D., Professor
Steven A. Weinbaum, Ph.D., Professor

Emeriti Faculty

Royce S. Bringhurst, Ph.D., Professor Emeritus
Dillon S. Brown, Ph.D., Professor Emeritus
Robert M. Carlson, Ph.D., Lecturer Emeritus
Peter B. Catlin, Ph.D., Lecturer Emeritus
Julian C. Crane, Ph.D., Professor Emeritus
William H. Griggs, Ph.D., Professor Emeritus
Paul E. Hansche, Ph.D., Professor Emeritus
Dale E. Kester, Ph.D., Professor Emeritus
George C. Martin, Ph.D., Professor Emeritus
F. Gordon Mitchell, M.S., Lecturer Emeritus
David E. Ramos, Ph.D., Lecturer Emeritus
Roger J. Romani, Ph.D., Professor Emeritus
Kay Ryugo, Ph.D., Professor Emeritus
Noel F. Sommer, Ph.D., Lecturer Emeritus
Kiyoto Uriu, Ph.D., Professor Emeritus

Related Major Programs. See the majors in Plant Biology, Agricultural Systems and Environment, Crop Science and Managment, and Biotechnology.

Related Courses. Pomology faculty also teach the following courses that contribute to majors and graduate programs in Agricultural Systems and Environment, Horticulture, and Plant Biology:

Agricultural Systems and Environment 1, 98, 107, 170A, 170B, Biological Sciences 1C, Environmental and Resource Sciences 144, Horticulture 203, Hydrologic Science 124, Integrated Studies 9, Plant Biology 144, 151, 153, 158, 160, 161A, 161B, 171, 172, 172L, 173, 174, 175, 196, 201, 202, 208, 212, 214, 290A, 291, 293, Science and Society 90C, 90X.

Graduate Study. For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Studies section in this catalog.

Courses in Pomology (POM)

Lower Division Courses

10. Fruits and Nuts of California and the World (3) II. Polito
Lecture—3 hours; one field trip on seventh Saturday of the quarter. Biological and environmental principles of fruit and nut crop production emphasizing California's tree crop industries. Topics include temperate and subtropical species and cultivars, biotechnology and genetic improvement, environmental physiology, plant and crop growth, pest control, harvest and storage and consumer issues. GE credit: SciEng, Wrt.

92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

Upper Division Courses

192. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

210. Plant Reproductive Morphology (4) III. Polito
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 105, or Botany 111A and 111B. Biology and morphology of flowering plant sexual reproduction. Specific topics include evocation, floral transition and organogenesis, ovule and pollen development, pollination, self-incompatibility, fertilization, fruit set and fruit morphology. Emphasis on species of pomological interest.

***212. Postharvest Biology and Biotechnology of Fruits and Nuts** (3) III. Kader, Mitcham
Lecture—3 hours. Prerequisite: Plant Science 112 or the equivalent. Review of postharvest biology of fruits and nuts in relation to biotechnological procedures used in handling, emphasizing research needs. Offered in alternate years.

***220. Quantitative Genetics and Selection Theory** (3) II. Shaw
Lecture—3 hours. Prerequisite: Animal Genetics 107, Plant Science 113, Agronomy 205A. Theory and application of quantitative genetic principles to the breeding, testing, and selection of horticultural crop plants. Topics include: heritability, selection using information from relatives, indirect selection, genetic correlations, multiple trait selection, inbreeding, crop stability, and field testing.

***221. Principles and Practices of Line Cultivar Breeding** (3) III. Bliss
Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113, Agronomy 205A. Application of genetic principles and selection theory to the production and testing of inbred lines in self- and cross-pollinated crops. Topics include types of cultivars, genetic parameters of inbreeding populations and breeding methods to produce superior inbreds. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III, Summer. The Staff (Chairperson in charge)
(S/U grading only.)

Population Biology (A Graduate Group)

Michael Turelli, Ph.D., Chairperson of the Group

Group Office, 2320 Storer Hall (916-752-8523)

Faculty. Includes 32 members from the Division of Biological Sciences; the Division of Environmental Studies; and the Departments of Anthropology; Agronomy; Entomology; Geology; Philosophy; and Wildlife, Fish and Conservation Biology.

Graduate Study. The Graduate Group in Population Biology emphasizes programs of study and research leading to the Ph.D. degree. The Group concentrates on population biology as the broad discipline that blends ecology, evolution, population genetics and systematics into a unified field. The course curriculum consists of first-year core courses offered by the Group faculty, seminars, and advanced courses in population biology, and related disciplines, chosen in consultation with a guiding committee.

Graduate Adviser. Consult the Population Biology Graduate Group Office.

Courses in Population Biology (PBG)

Graduate Courses

200A. Principles of Population Biology (5) I. Gillespie, Toft
Lecture—3 hours; discussion—2 hours. Prerequisite: course 231 concurrently and consent of instructor. Principles of single-species ecology and evolution. Topics include ecology of individuals, population growth models, structured populations, life history strategies, stochastic populations, basic population genetics theory, deleterious alleles in natural populations, and molecular population genetics.

200B. Principles of Population Biology (5) II. Schoener, Strauss, Strong
Lecture—3 hours; discussion—2 hours. Prerequisite: course 200A. Principles of multi-species communities. Topics include trophic-level interactions, epidemiology, competition, mutalism, food webs and trophic cascades, interactions between simple ecologic communities, island biogeography, succession, and large-scale patterns.

200C. Principles of Population Biology (5) III. Sanderson, Shaffer, Turelli
Lecture—3 hours; discussion—2 hours. Prerequisite: course 200B. Principles of macroevolution. Topics include evolutionary quantitative genetics, sex ratio evolution, sexual selection, Darwinism, speciation and hybridization, the fossil record, vicariance, biotic exchanges, and phylogeny reconstruction.

***203. Advanced Evolution** (3) III. Gottlieb
Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Offered in alternate years.

206. Ecology of Insect Parasitoids (4) II. Rosenheim
Lecture—3 hours; seminar—1 hour. Prerequisite: introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address current topics in behavioral, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological hypotheses emphasized. Offered in alternate years. (Same course as Entomology 206.)

209. Molecular Evolution (3) II. Gillespie, Langley
Lecture—3 hours. Prerequisite: Biological Sciences 103; Evolution and Ecology 100 recommended. Evolution from the molecular standpoint, including the evolution of genome structure and the organization of single genes and gene clusters, evolution of enzymes and metabolic pathways, molecular clocks, transposons and other movable genetic elements, and molecular polymorphisms. Offered in alternate years. (S/U grading only.)

212. Topics in Invertebrate Evolution (2) III. Grosberg
Seminar—2 hours. Prerequisite: graduate standing or consent of instructor and Evolution and Ecology 112-112L; courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topic differs. (S/U grading only.)

225. Terrestrial Field Ecology (4) III. Karban
Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics, or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Ecology/Entomology 225.)

231. Mathematical Methods in Population Biology (3) I. Hastings
Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Same course as Ecology 231.)

270. Research Conference in Evolutionary Biology (1) I. Shaffer; II. Turelli; III. Grosberg
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. May be repeated for credit. (S/U grading only.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by visiting lecturers, UCD graduate students and faculty. May be repeated for credit. (S/U grading only.)

290C. Research Conference in Population Biology (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor; concurrent enrollment in course 299. Presentation and discussion of faculty and graduate student research in population biology. May be repeated for credit. (S/U grading only.)

292. Topics in Ecology and Evolution (1) I, II, III. Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing. Seminar presented by visiting lecturers, UC Davis faculty and graduate students. May be repeated for credit. (Same course as Ecology 296.) (S/U grading only.)

296. Seminar in Geographical Ecology (2) III. Shapiro
Seminar—2 hours. Prerequisite: Evolution and Ecology 100 or 101 or consent of instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. May be repeated for credit. (S/U grading only.)

*Course not offered this academic year.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Population Health and Reproduction

(School of Veterinary Medicine)

Robert H. Bondurant, D.V.M., Chairperson of the Department

Department Office, 1114 Tupper Hall (916-752-1358; Fax: 916-752-4278)

Faculty

Barry A. Ball, D.V.M., Ph.D., Professor, Endowed Chair in Equine Reproduction
Robert H. BonDurant, D.V.M., Professor
Bruno B. Chomel, D.V.M., Ph.D., Associate Professor
Dean O. Cliver, Ph.D., Professor
Alan J. Conley, D.V.M., Ph.D., Assistant Professor
James A. Cullor, D.V.M., Ph.D., Associate Professor
Thomas B. Farver, Ph.D., Professor
Lynette A. Hart, M.A., Ph.D., Associate Professor
Charles A. Holmberg, D.V.M., Ph.D., Professor
Phillip H. Kass, D.V.M., Ph.D., Associate Professor
Kenneth M. Lam, Ph.D., Professor
Bill L. Lasley, Ph.D., Professor
Irwin K. M. Liu, D.V.M., Ph.D., Professor
James Murray, Ph.D., Professor *(Population Health and Reproduction, Animal Science)*
Joan D. Rowe, D.V.M., Ph.D., Associate Professor
Patricia S. Wakenell, D.V.M., Ph.D., Assistant Professor
Leon D. Weaver, D.V.M., Senior Lecturer

Emeriti Faculty

Domenico Bernoco, D.V.M., Libera Docenza, Associate Professor Emeritus
Charles E. Franti, Ph.D., Professor Emeritus
Constantin Genigeorgis, D.V.M., Ph.D., Professor Emeritus
Charles A. Hjerpe, D.V.M., Professor Emeritus
Jack A. Howarth, D.V.M., Ph.D., Professor Emeritus
John P. Hughes, D.V.M., Professor Emeritus
Richard H. McCapes, D.V.M. Senior Lecturer Emeritus
Margaret E. Meyer, Ph.D., Professor Emeritus
Hans P. Riemann, D.V.M., Ph.D., Professor Emeritus
Calvin W. Schwabe, D.V.M., M.P.H., Sc.D., Professor Emeritus
Clyde J. Stormont, Ph.D., Professor Emeritus
Richard Yamamoto, Ph.D., Professor Emeritus

Affiliated Faculty

Edward R. Atwill, D.V.M., Ph.D., Assistant Agronomist/Assistant Cooperative Extention Specialist
Ann Trommershausen Bowling, Ph.D., Adjunct Professor
Phillip Jardon, D.V.M., M.P.V.M., Clinician
Joan J. Jeffrey, D.V.M., M.S., Assistant Agronomist/Assistant Cooperative Extention Specialist
Jay F. Kirkpatrick, Ph.D., Associate Adjunct Professor
Donald J. Klingborg, D.V.M., Lecturer
Nicholas W. Lerche, D.V.M., M.P.V.M., Associate Adjunct Professor
Naida M. Loskutoff, Ph.D., Assistant Adjunct Professor
Mark Vanderlist, B.V.Sc., M.P.V.M., Clinician
George B. E. West, D.V.M., M.P.V.M., Lecturer

Courses in Population Health and Reproduction (PHR)

Lower Division Course

92. Internship in Veterinary Science (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion/laboratory—1-4 hours; clinic—3-36 hours; final report. Prerequisite: approval of project prior to period of internship by faculty sponsor. Supervised work experience in Reproduction. (P/NP grading only.)

Upper Division Courses

106. Human–Animal Interactions: Benefits and Issues (2) II. Hart
Lecture—2 hours. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health, and therapeutic perspectives, as well as effects of humans on animals.

111. Animal Hygiene (3) II. West
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

150. Food-Borne Infections and Intoxications (4) II. Cliver
Lecture—4 hours. Prerequisite: Food Science and Technology 104, Veterinary Microbiology and Immunology 127. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

192. Internship in Veterinary Science (1-12) I, II, III. The Staff
Discussion/laboratory—1-12 hours; clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in Reproduction. May be repeated for credit. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***202. Sampling in Health-Related Research** (3) II. Farver
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 or the equivalent; consent of instructor. A very thorough coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling and other sampling methods applied extensively in epidemiology and other health-related disciplines. Emphasis on application of the sampling methods. Offered in alternate years.

203. Multivariate Biostatistics (3) II. Farver
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 and 404, or the equivalent; consent of instructor. Multivariate procedures covered are principal component analysis, factor analysis, Two-group and k-group multivariate ANOVA, multivariate regression, Two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Offered in alternate years.

210A. Analytic Epidemiology I: Case Control Studies (3) III. Kass
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Statistics 130B and Preventive Veterinary Medicine 406 or the equivalent or consent of instructor. Theory and practice of epidemiologic data analysis. Topics include confounding, stratification, matching, interaction, and logistic regression. (Same course as Epidemiology 210A.)

210B. Analytic Epidemiology II: Cohort Studies (3) I. Kass
Lecture/discussion—3 hours. Prerequisite: course 210A. Theory and practice of epidemiologic data analysis. Topics include rates, rate standardization, cohort analysis, Poisson regression, and survival/failure-time methods. (Same course as Epidemiology 210B.)

212. Epidemiology of the Zoonoses (4) II. Chomel
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing or third-year standing in School of Veterinary Medicine, or consent of instructor. Epidemiological, biological, and ecological features of some major infections shared by humans and other animals. Wildlife and domestic animals zoonoses of major health and economic significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures.

***216L. Immunodiagnostic Techniques Laboratory** (2) II. Lam
Discussion—1 hour; laboratory—2 hours. Prerequisite: course 216 (may be taken concurrently) or consent of instructor. Application and interpretation of serologic techniques for diagnosis of animal diseases. (S/U grading only.) Limited enrollment.

220. Advanced Avian Medicine (3) III. Wakenell, Lam
Lecture—3 hours. Instruction on the methods of prevention of the major diseases of domestic poultry.

225. Preventive Avian Medical Practice (3) II. West, Wakenell
Lecture—3 hours. Prerequisite: enrollment in avian medicine option of MPVM program, third- or fourth-year standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic structure of the broiler, commercial egg and turkey industries, and the delivery of preventive veterinary medical services within these industries. Specific prevention and eradication programs pertaining to diseases of economic importance are covered.

***231. Pathophysiology of Mammalian Reproductive Processes** (3) III. Conley
Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior. Offered in alternate years.

***254. Public Health Aspects of Meat and Meat Products Technology** (3) III. Genigeorgis
Lecture—3 hours. Prerequisite: course 150 or consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

290A. Seminar (1) I, II, III. Liu
Seminar—1 hour. Discussion of current topics in animal reproduction and medicine, as well as presentation of research findings by graduate students and faculty. May be repeated for credit. (S/U grading only.)

290B. Current Topics in Avian Medicine (1) I, II, III. Lam, Wakenell
Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation.

292. Current Topics In Reproduction (1) I, II, III. Lasley
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (S/U grading only.)

Professional Course

397T. Tutoring in Veterinary Population Health and Reproduction (1-5) I, II, III. The Staff
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

Professional Courses

404. Medical Statistics III (4) II. Farver
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Preventive Veterinary Medicine 403. Continuation of Preventive Veterinary Medicine 403. Analysis of covariance, variable selection; analysis of multiway frequency tables; logistic regression; discriminant analysis; time dependent variation and trends; biomedical applications.

***409A-409B. Topics in Data Analysis** (2-3) II-III. The Staff (Chairperson in charge)
Discussion—2 hours (409A); discussion—3 hours (409B). Prerequisite: Preventive Veterinary Medicine 406 (may be taken concurrently) or consent of instructor. Approved for graduate degree credit. Emphasis on decision making with respect to the type and amount of data required for solving epidemiological problems and the selection and use of appropriate data in statistics and economics for processing, analyzing, and interpreting these data. (Deferred grading only, pending completion of course.)

***410A-410B. Topics in Applied Epidemiology** (3-2) II-III. The Staff (Chairperson in charge)
Discussion—3 hours (410A); discussion—2 hours (410B). Prerequisite: Preventive Veterinary Medicine 406 (may be taken concurrently) or consent of instructor. Approved for graduate degree credit. Collection of data, and/or specimens from field studies, serum banks or data banks. Laboratory examination of specimens and recording of results. Alternative approaches to presentation of data and conclusions and formulations of recommendation for further investigations. (Deferred grading only, pending completion of course.)

411. Disease Control and Eradication (3) III. Riemann
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Veterinary Medicine 409 or Preventive Veterinary Medicine 405. Studies of various approaches to control/eradicate diseases in animal populations. Design and economic evaluation of control programs.

***420. Zoonoses of Non-Human Primates** (2) II. Chomel
Lecture—2 hours. Prerequisite: second-, third-, or fourth-year standing in the School of Veterinary Medicine or Medicine or consent of instructor. Epidemiological, clinical, and biological features of zoonoses of non-human primates. Emphasis given to major zoonoses which are threatening to human health and their treatment and prevention. Focus also on management of non-human primates in research, zoological gardens and in the wild. Offered in alternate years.

421. Veterinary Public Health (3) III. Chomel
Lecture/discussion—3 hours. Broad coverage of the various functions of the veterinary profession towards human health with special emphasis on zoonoses and major livestock diseases prevention and control, food safety and hygiene and new environmental issues as well as animal welfare.

429B. Dairy Herd Health Management (4) III. Weaver
Lecture—40 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and production control. Lectures supplemented with visits to dairy farms to evaluate feeding programs and health management.

430. Issues in Animal Production and Resource Utilization (2) I. Weaver
Lecture—10 sessions; discussion/laboratory—three 5-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to interfaces of food animal production and environmental protection, wildlife preservation, animal well-being, food safety and human nutrition. Site visits to wildlife preserves, livestock production and processing facilities. (S/U grading only.)

432. Reproductive Technology in Mammals and Birds (0.7) III. BonDurant
Lecture—7 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Introductory course in the application of technology to the reproductive process in mammals and birds. Emphasis on domestic animals, but birds and non-domestic mammals discussed to a limited extent. A goal is to expose students to some of the "sexier" aspects of population/reproductive management. (S/U grading only.)

432L. Reproductive Technology in Mammals and Birds, Laboratory (0.3) III. BonDurant
Laboratory—3 sessions. Prerequisite: course 432 concurrently. Laboratory demonstrations and exercises in gamete freezing, thawing, and handling; artificial insemination of cattle; artificial insemination and other applications of reproductive technology in small ruminants. (S/U grading only.)

***439. Beef Cattle Nutrition** (1) III. The Staff
Lecture—10 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Economically sound methods for meeting nutrient requirements of feedlot and pasture beef cattle (including computer-assisted methods). Strategies for presenting nutritional and ration-associated diseases of beef cattle.

442. Equine Theriogenology (2) II. Liu
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Discussions of abnormal conditions and physiologic function in equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings associated with the abnormalities.

442L. Equine Theriogenology Laboratory (1) II. Liu
Laboratory—3 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Hands-on diagnosis and implementation of techniques related to reproductive examination of horses. Routine and current procedures performed on the farms. Designed to maximize the opportunity for assessment of the normal reproductive anatomy, the diagnosis and interpretations of physiologic conditions and for becoming comfortable in performing the various routine procedures.

445. Food Animal Theriogenology and Reproductive Performance (2) II. BonDurant
Lecture—2 hours. Prerequisite: Veterinary Medicine 446 with a grade of C or better, or consent of instructor. Physiological, pathophysiological, and management factors affecting the reproductive health and performance of food animals, with emphasis on dairy and beef cattle, and sheep. Minor emphasis on swine and goats. Assessment of, and intervention strategies for, herd reproductive performance.

445A. Food Animal Theriogenology (3) II. BonDurant
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

445B. Equine Theriogenology (3) II. Liu
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings.

445L. Food Animal Theriogenology Laboratory (1) II. BonDurant
Laboratory—3 hours. Prerequisite: course 445 concurrently. Obstetrical and gynecological diagnosis and treatment for food animals; breeding soundness examination of males; analysis and on-farm use of computerized reproductive records; embryo technology. (S/U grading only.)

446A. Food Animal Reproduction (1) III. Rowe
Lecture—6 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

446B. Equine Reproduction (1) III. Liu
Lecture—6 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings.

446C. Reproduction of Non-Domestic Animals (1) III. Lasley
Lecture—10 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Follows course 446A and provides information relating to reproduction in non-domestic mammals, birds, and reptile species. Concepts relating to the evaluation of reproductive status, diagnosis of infertility, assisted reproduction and contraception will be presented.

483. Pet Loss Support Rounds (1-2) I, II, III, IV. Hart
Discussion/laboratory—3-6 hours. Prerequisite: veterinary student status. Training and experience in responding to pet loss hotline callers who are experiencing grief associated with an animal's death. Students gain proficiency in supportive listening and referral to community resources and increase effectiveness in dealing with upset pet owners. (S/U grading only.)

Preventive Veterinary Medicine (A Graduate Program)

Group Office, 125 Surge IV (916-752-1383)

Graduate Study. The School of Veterinary Medicine offers a program of study and research leading to the Master's degree in Preventive Veterinary Medicine (M.P.V.M.). Detailed information on this program may be obtained by writing the Director, Office of the Dean, School of Veterinary Medicine.

Director. Ian A. Gardner (Medicine and Epidemiology).

Courses in Preventive Veterinary Medicine (MPM)

Professional Courses

402. Medical Statistics I (4) IV. Farver
Lecture—3 hours; laboratory—2 hours. Statistics in clinical, laboratory and population medicine: graphical and tabular presentation of data; probability; binomial, Poisson, normal, t-, F-, and Chi-square distributions; elementary nonparametric methods; simple linear regression and correlation; life tables. Microcomputer applications of statistical procedures in population medicine.

403. Medical Statistics II (4) I. Farver
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 402 or the equivalent. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; biomedical applications of statistical methods. Microcomputer applications to reinforce principles that are taught in lecture.

405. Principles of Epidemiology (5) I. Hird
Lecture—3 hours; discussion—2 hours. Prerequisite: course 402 or consent of instructor. Measuring disease, disease in populations, outbreak investigation, properties of tests, risk analysis, and descriptive and cross-sectional epidemiologic studies.

*Course not offered this academic year.

405L. Epidemiology Laboratory (3) I. Case
Laboratory—6 hours; lecture—1 hour. Prerequisite: grade of C or better in courses 402, 405, and 412 (may be taken concurrently). Course will integrate and reinforce concepts of epidemiology, statistics and microcomputer applications, using a problem-solving approach with examples from livestock health, public health, and wildlife health. Applications of the Epi Info, spreadsheet and database manager software programs.

406. Epidemiologic Study Design (4) II. Hird
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: grade of C or better in course 405 or the equivalent and consent of instructor. Clinical trials: objectives, random assignment of treatment, outcome, masking, and sample size calculations. Observational cohort studies: objectives, cohort and outcome selection, confounding and bias. Case-control studies: objectives, selection of cases and controls, bias.

408. Veterinary Research: Planning and Reporting (3) I. Thurmond
Lecture—26 sessions; laboratory—4 sessions. Prerequisite: course 402 or Statistics 102 with a grade of B– or better, and courses 412 and 405 (may be taken concurrently). Provides M.P.V.M. students and graduate students with guidelines of critical thinking, logistics, and organization that will help them undertake and communicate their research project.

412. Introduction to Information Management (3) IV. BonDurant
Lecture—1 hour; laboratory—6 hours. Basic knowledge and skills in microcomputer hardware, DOS commands, word processing, spreadsheets and communications packages. (S/U grading only.)

426. Applied Epidemiologic Problem Solving (1) II. Gardner
Laboratory—3 hours. Prerequisite: grade of C or better in course 405L. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation; descriptive statistical analysis using spreadsheets, database management, and Epi Info software. Builds on skills learned in courses 405L and 406.

Psychiatry

See Medicine, School of

Psychology

(College of Letters and Science)

Sally P. Mendoza, Ph.D., Chairperson of the Department

Department Office, 135 Young Hall (916-752-1880)

Faculty

Linda P. Acredolo, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Leo M. Chalupa, Ph.D., Professor
Richard G. Coss, Ph.D., Professor
Alan C. Elms, Ph.D., Professor
Robert A. Emmons, Ph.D., Professor
Karen P. Ericksen, Ph.D., Professor
Gail S. Goodman, Ph.D., Professor
Albert A. Harrison, Ph.D., Professor
Kenneth R. Henry, Ph.D., Professor
Joel T. Johnson, Ph.D., Professor
Neal E.A. Kroll, Ph.D., Professor
Leah A. Krubitzer, Ph.D., Assistant Professor
Debra L. Long, Ph.D., Associate Professor
George R. Mangun, Ph.D., Associate Professor
Sally P. Mendoza, Ph.D., Professor
Bruno A. Olshausen, Ph.D., Assistant Professor
Donald H. Owings, Ph.D., Professor
Theodore E. Parks, Ph.D., Professor
Robert B. Post, Ph.D., Professor
Richard W. Robins, Ph.D., Assistant Professor
Phillip R. Shaver, Ph.D., Professor
Stephanie A. Shields, Ph.D., Professor
Dean K. Simonton, Ph.D., Professor, *UC Davis Prize for Teaching and Scholarly Achievement*
Robert Sommer, Ph.D., Professor
Stanley Sue, Ph.D., Professor
Carol Tomlinson-Keasey, Ph.D., Professor
Niels G. Waller, Ph.D., Associate Professor
Andrew P. Yonelinas, Ph.D., Assistant Professor

Emeriti Faculty

Jarvis R. Bastian, Ph.D., Professor Emeritus
William F. Dukes, Ph.D., Professor Emeritus
Joseph Lyons, Ph.D., Professor Emeritus
Peter R. Marler, Ph.D., Professor Emeritus
William A. Mason, Ph.D., Professor Emeritus
G. Mitchell, Ph.D., Professor Emeritus
Robert M. Murphey, Ph.D., Professor Emeritus
Thomas Natsoulas, Ph.D., Professor Emeritus
Charles T. Tart, Ph.D., Professor Emeritus

Affiliated Faculty

Jacqueline Horn, Ph.D., Lecturer
Barbara Sommer, Ph.D., Lecturer

The Major Programs

Psychology provides knowledge of and means of studying human and animal behavior.

The Program. The department offers the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program for students with an interest in either biology or mathematics. The psychology program is extremely broad and represents a wide variety of topics. The courses are organized around three focal points: Personality/Social emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. Psychobiology emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. Perception/Cognition emphasizes how information from the physical world is sensed, perceived, and used, and examines the roles of consciousness, language, perception, and learning in behavior.

Preparatory Requirements. Before declaring a major in psychology, students must complete the following courses with a combined grade point average of at least 2.50. All courses must be taken for a letter grade. (Students in the Bachelor of Science, Biology program must complete Biological Sciences 1A.):

Psychology 1, 41 .....8 units
Statistics 13 or 102 .....4 units
Biological Sciences 1A
or
Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology, Physiology and Behavior 10 .....5 or 8 units
Sociology or cultural anthropology .....4 units

Career Alternatives. A degree in psychology provides broad intellectual foundations which are useful to the graduate for the development of careers in a variety of areas, including social work, the ministry, teaching, business, and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in psychology, or may go on to professional schools for training in veterinary and human medicine, law, and other professions.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**21-25**
Psychology 1 or the equivalent	4
Psychology 41	4
Statistics 13 or 102	4
Biological Sciences 1A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology and Behavior 10	5-8
One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units	4-5
(Strongly recommended that Psychology 41, and Statistics 13 or 102 be completed in the first year.)	
Depth Subject Matter	**40**
Two courses from two of the following three groups and one course from the remaining group	19-22
Group A: Psychology 100, 130, 131, 132, 133, 135	
Group B: Psychology 108, 129, 134, 150, 152, 160	
Group C: Psychology 112 (or Human Development 100A or 100B), 143, 145, 147, 168	
Additional units to achieve a total of 40 upper division units in psychology (A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.)	18-20
Total Units for the Major	**61-65**

B.S. Major Requirements:

Biology Emphasis

	UNITS
Preparatory Subject Matter	**52-61**
Psychology 1 or the equivalent	4
Psychology 41	4
Statistics 13 or 102	4
Mathematics 16A-16B or 21A-21B	6-8
Physics 10 or 7A-7B	4-8
Biological Sciences 1A, 1B	10
Chemistry 2A, 2B	10
Chemistry 8A-8B or 118A-118B or 128A-128B	6-8
One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units	4-5
(Strongly recommended that Psychology 41, and Statistics 13 or 102 be completed in the first year.)	
Depth Subject Matter	**49**
Seven Psychology courses distributed as specified:	
Group A: two courses from 100, 130, 131, 132, 133, 135	8
Group B: three courses from 108, 129, 134, 150, 152, 160	12-15
Group C: two courses from 112 (or Human Development 100A or 100B), 143, 145, 147, 168	8
Additional units to achieve a total of 40 upper division units in psychology (A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.)	9-12
Biological Sciences 101	4
Neurobiology, Physiology and Behavior 101	5
Total Units for the Major (Biology Emphasis)	**101-110**

Recommended
Psychology 154, 180B, 199 (on a psychobiological topic), Anthropology 154A, Environmental Studies 110, Evolution and Ecology 100, 101.

Mathematics Emphasis

UNITS

Preparatory Subject Matter 44-58
Psychology 1 or the equivalent 4
Psychology 41 4
Statistics 13 or 102 4
Mathematics 21A, 21B, 21C, ...12
Computer Science Engineering 30 or Engineering 5 3
Chemistry 10 or 2A-2B or 2AH-2BH 4-10
Physics 10 or 7A-7B 4-8
Biological Sciences 1A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology and Behavior 10 5-8
One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units 4-5
(Strongly recommended that Psychology 41, and Statistics 13 or 102 be completed in the first year.)

Depth Subject Matter 48
Five Psychology courses, distributed as specified:
Group A: two courses from 100, 130, 131, 132, 133, 135 8
Group B: two courses from 108, 129, 134, 150, 152, 160 7-10
Group C: one course from 112 (or Human Development 100A or 100B), 143, 145, 147, 168 4
Additional units to achieve a total of 40 upper division units in psychology 9-12
(A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.)
Psychology 103 5
One course from Psychology 104, 105, or the equivalent 4
One course sequence from Statistics 106-108, 130A-130B, 131A-131B 8

Total Units for the Major
(Mathematics Emphasis) **92–106**

Recommended for All Majors
Psychology 103 is strongly recommended for students who plan to do graduate work in any area of psychology. Psychology 41 is a prerequisite for most upper division courses. Psychology 41 and Statistics 13 or 102 should be completed in the first year.

Human Development course credit. Human Development 100A, 100B, 100C, 101, 102, 120, and 121 can be used toward satisfying the 40-unit upper division major requirement to a maximum of 12 units. Students who have completed Human Development 100A or 100B will receive 2 units of credit for Psychology 112.

Major Advisers. L.P. Acredolo, L.M. Chalupa, R.G. Coss, A.C. Elms, R.A. Emmons, K.P. Ericksen, G.S. Goodman, A.A. Harrison, K.R. Henry, J.T. Johnson, N.E.A. Kroll, L.A. Krubitzer, D.L. Long, G.R. Mangun, S.P. Mendoza, B.A. Olshausen, D.H. Owings, T.E. Parks, R.B. Post, R.W. Robins, P.R. Shaver, S.A. Shields, D.K. Simonton, R. Sommer, S. Sue, C. Tomlinson-Keasey, N.G. Waller, A.P. Yonelinas.

Honors and Honors Program. In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. Course 194HA-194HB or other approved courses can be used to satisfy the unit requirement. This project is to be written in thesis form and approved by the department. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Minor Program Requirements:

UNITS

Psychology 24
Psychology 1 or the equivalent 4
One course from each of the following three groups 11-13
Group A: Psychology 100, 130, 131, 132, 133, 135
Group B: Psychology 108, 129, 134, 150, 152, 160
Group C: Psychology 112, 143, 145, 147, 168
Additional units to achieve a total of 20 upper division units 7-9
One course selected from Human Development 100A, 100B, 100C, 101, 102, 120, 121 can be used toward satisfying the minor upper division unit requirement.

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

Graduate Adviser. See *Class Schedule and Room Directory.*

Courses in Psychology (PSC)

Lower Division Courses

1. General Psychology (4) I, II, III. The Staff
Lecture—4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only 2 units allowed to those who have taken course 15 or 16; no credit allowed to those who have taken both courses 15 and 16. GE credit: SocSci.

20. Freshman Psychology Seminar (4) III. The Staff
Seminar—4 hours. Prerequisite: freshman standing. Instructor will acquaint students with his or her program of research, the development of scientific questions from the literature, and the application of research methods to examine these questions. Critical thinking will be encouraged via expository writing and brief presentations.

41. Research Methods in Psychology (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent; completion of Statistics 13 or 102 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability and statistical inference.

90X. Lower Division Seminar (1-2) I, II, III. The Staff
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Psychology through shared readings, discussions, written assignments, or special activities such as fieldwork or laboratory work. May *not* be repeated for credit. Limited enrollment.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Primarily for lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100. Introduction to Cognitive Psychology (4) I, II, III. Kroll, Long
Lecture—4 hours. Prerequisite: courses 1 and 41. Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136.

103. Advanced Research Design and Data Analysis (5) I. Kroll, Johnson, Waller
Lecture—5 hours. Prerequisite: course 41 and either Statistics 13 or 102. Design and analysis of psychological investigations and the interpretation of quantitative data in psychology.

104. Applied Psychometrics: An Introduction to Measurement Theory (4) II. Waller
Lecture—4 hours. Prerequisite: upper division standing in Psychology, courses 41 and 103, Statistics 13. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory.

***105. Statistical Inference from Psychological Experiments** (4) Kroll
Lecture—4 hours. Prerequisite: upper division standing in Psychology, courses 41 and 103. Probability theory, sampling distributions, hypothesis testing, statistical inference, and nonparametric statistics, with applications in sensory, perceptual, comparative, physiological, and other areas of psychology. Students who have taken Statistics 134 may receive only 2 units of credit.

108. Physiological Psychology (5) I, II, III. Henry, Krubitzer, Mendoza
Lecture—4 hours; laboratory—2 hours. Prerequisite: courses 1, 41; at least one zoology or physiology course recommended. Relationship of brain structure and function to emotion, motivation, perception, states of consciousness, language, learning, and memory in humans and other animals; introduction to methods of physiological psychology.

112. Developmental Psychology (4) I, II, III. Acredolo, Goodman, Tomlinson-Keasey
Lecture—4 hours. Prerequisite: courses 1, 41. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction. Two units of credit allowed to students who have taken Human Development 100A or 100B.

***114. Gender and Social Development** (4) III. The Staff
Lecture—4 hours. Prerequisite: courses 1, 41. Biological and social factors that influence when and how psychological sex-related differences will be expressed in human development. Special attention to the scientific and social rationales which underlie the study of gender. GE credit: SocSci, Div, Wrt.

120. History of Psychology (4) II. Simonton
Lecture—3 hours; term paper. Prerequisite: courses 1, 41; upper division standing or consent of instructor. Development of psychological thought and research in context of history of philosophy and science. GE credit: SocSci, Wrt.

129. Sensory Processes (5) I, II. Henry, Krubitzer, Mendoza, Mangun
Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: course 1 or Biological Sciences 1B or consent of instructor, and course 41. Psychobiology of sensory systems in man and other animals. Relationship of behavior to physiology, structure and function of the senses.

130. Human Learning and Memory (4) I, II, III. Parks, Goodman, Yonelinas
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 41, 100, and either Statistics 13 or 102; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.

131. Perception (4) I, II, III. Olshausen, Parks, Post
Lecture—3 hours; independent library work. Prerequisite: courses 1, 41. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

132. Language and Cognition (4) I, III. Long
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, 100; or consent of instructor. Introduction to the cognitive processes involved in language comprehension and production. Topics include the biologi-

cal foundations of language, speech perception, word recognition, syntax, reading ability, and pragmatics.

133. The Development of Memory (4) I. Goodman
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, and 100; course 112 strongly recommended. Theory and research on memory development with focus on infancy and childhood.

134. Animal Learning and Motivation (5) I, II. Coss
Lecture—5 hours; term paper. Prerequisite: course 1 or 15 or consent of instructor; course 41. General theories of phyletic differences in learning and motivation drawing upon data from laboratory and field observations. Innate physiological mechanisms, developmental changes, effects of conditioning and other constraints on these processes are examined.

135. Cognitive Neuroscience: The Biological Foundations of the Mind (4) III. Mangun
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, and 100; or consent of instructor; courses 108, 129, or 131 highly recommended. Neuroscientific foundations of higher mental processes including attention, memory, language, higher-level perceptual and motor processes and consciousness. Emphasis on the neural mechanisms which form the substrates of human cognition, and the relationships of mind to brain.

143. Human Emotion and Feeling (4) II, III. Shaver
Lecture—4 hours. Prerequisite: introductory psychology course, and course 41. An introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge.

144. Environmental Awareness (4) II, III. Sommer, Coss
Lecture—4 hours. Prerequisite: course 1. Interactions of people with built environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology. GE credit: SocSci.

145. Social Psychology (4) I, II, III. Simonton, Johnson, Shaver
Lecture—4 hours. Prerequisite: courses 1, 41. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, III. Elms, Emmons, Ericksen, Robins
Lecture—4 hours. Prerequisite: courses 1, 41. The theories of Freud, Erikson, and other major twentieth-century approaches to personality. GE credit: SocSci, Wrt.

149. Gender and Human Reproduction (4) I, III. Ericksen
Lecture—4 hours. Prerequisite: courses 1, 41. The social psychology of human reproduction. Examines gender relations over the course of the individual's reproductive cycle.

150. Comparative Psychology (5) I, II, III. Owings
Lecture—4 hours; discussion or project—1 hour. Prerequisite: course 1 or 15 or consent of instructor; course 41. Perspectives in animal behavior: psychological, ethological, and social systems, with an emphasis on functional behavioral categories from the standpoint of adaptation and evolution.

152. Hormones and Behavior (3) III. Mendoza
Lecture—3 hours. Prerequisite: course 108 or Neurobiology, Physiology and Behavior 101 and 102. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Same course as Neurobiology, Physiology, and Behavior 152).

160. Health Psychology (4) I, II, III. Emmons
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 15; course 41. Psychological factors influencing health and illness. Topics include stress and coping, personality and health, symptom perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Application of principles in laboratory exercises.

165. Introduction to Clinical Psychology (4) I, II, III. The Staff
Lecture—4 hours. Prerequisite: courses 1, 41, 168, and either 112 or 145. Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey, based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

168. Abnormal Psychology (4) I, II, III. Emmons, Sommer, Waller
Lecture—4 hours. Prerequisite: courses 1, 41. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior. GE credit: SocSci.

***170. Psychology of Religious Experience** (4) Emmons
Lecture—4 hours. Prerequisite: courses 1 and 41. An overview of the major theories, issues, data, and research methodologies of the psychology of religion. Topics covered include religious experience and expression, religious development in childhood, adolescence, and adulthood, conversion, religious influences on physical and mental health, cross-cultural perspectives. GE credit: Div, Wrt.

175. Genius, Creativity, and Leadership (4) I. Simonton
Lecture—4 hours. Prerequisite: course 1 or 16; course 41. The phenomenon of genius is examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity and leadership in art, music, literature, philosophy, science, war, and politics. GE credit: SocSci, Wrt.

177. Psychobiography and Life History (4) II, III. Elms
Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor; course 41. Case-history research as a nonquantitative approach to studying personality. Psychological interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. GE credit: SocSci, Wrt.

180A. Research in General Experimental Psychology (4) II, III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in general experimental psychology (general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when content differs.

180B. Research in Psychobiology (4) III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in psychobiology (animal learning and motivation, comparative psychology, physiological psychology, sensory psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when specific content differs.

180C. Research in Personality and Social Psychology (4) I, III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when specific content differs.

181. Interactive Computer Programming for Psychological Experiments (4) II. Kroll
Lecture—2 hours; laboratory—4 hours. Prerequisite: consent of instructor, course 41 and one of courses 130, 132, or 136. Instruction in programming with an emphasis on programming desk-top computers as an interactive research tool.

183. Organizational Psychology (4) III. Harrison
Lecture—4 hours. Prerequisite: introductory psychology course; course 41. Survey of interrelationships among psychological processes, interpersonal dynamics, and organizational forms. Topics include motivation, communication, decision making, leadership, personnel selection and training, stress and conflict, career development, organizational development, and organization-community relations.

190. Seminar in Psychology (4) I, II. The Staff
Seminar—4 hours. Prerequisite: junior or senior standing; major in psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.

190X. Upper Division Seminar (1-2) I, II, III. The Staff
Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Psychology. Emphasis on student participation in learning. May not be repeated for credit. Limited enrollment.

192. Fieldwork in Psychology (1-6) I, II, III. Harrison, Sommer
Fieldwork—1-6 hours. Prerequisite: upper division standing in psychology and consent of instructor. Supervised internship off and on campus, in community and institutional settings. Maximum of four units may be used towards satisfaction of upper division major requirement. May be repeated once for credit. Limited enrollment (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (3-3) I-II, II-III. The Staff
Independent study—9 hours. Prerequisite: senior standing in Psychology and qualifications for admission into college honors program, and consent of instructor; at least one course from 180A, 180B, 180C or 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Psychology (1-3) I, II, III. The Staff
Tutoring—1-3 hours. Prerequisite: upper division standing and consent of instructor. Intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200. Proseminar in Psychology (3) I. The Staff
Seminar—2 hours; independent study—1 hour. Prerequisite: graduate standing in Psychology or consent of instructor. Introduces matriculating graduate students to research activities of departmental faculty. (S/U grading only.)

201. Research Preceptorship (4) I, II, III. The Staff
Laboratory—3-4 hours; discussion—3-5 hours. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

204. Advanced Applied Psychometrics: An Introduction to Measurement Theory (4) II. Waller
Lecture—4 hours. Prerequisite: course 41, 103, Statistics 13. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory.

***205. Advanced Statistical Inference from Psychological Experiments** (5) Kroll
Lecture—5 hours; project and term paper. Prerequisite: graduate student standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and hypothesis testing. A term paper will be required which develops a research proposal with a detailed discussion of the statistical techniques to be employed.

***206. Statistical Analysis of Psychological Experiments** (4)
Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square designs, and tests of trends.

207A. Causal Modeling of Correlational Data (4) II. Simonton
Lecture—4 hours. Prerequisite: course 205, 206 or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral sciences. Emphasis is on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques.

***207B. Applied Multivariate Analysis of Psychological Data** (4) Waller
Lecture—4 hours. Prerequisite: course 205, 207A or consent of instructor. Review of the major methods of multivariate data analysis for psychological data. Students will program statistical routines using a linear algebra-based computing language. Contemporary methods, such as LISREL, will also be covered.

***208. Physiological Psychology** (4) Chalupa, Henry, Mendoza
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

212. Developmental Psychology (4) I. Acredolo, Shields, Goodman
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

***220. History of Psychology** (4) The Staff
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. A lecture-seminar on the history of psychology and on the applicability of early psychological theory and research to contemporary investigations. Offered in alternate years.

***230. Cognitive Psychology** (4) Kroll, Long, Goodman, Mangun, Parks
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the mental processes by which knowledge is acquired, manipulated, stored, retrieved and used. Offered in alternate years.

***231. Sensation and Perception** (4) Post
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of sensory processes and perception in experience and their effects on behavior. Offered in alternate years.

245. Social Psychology (4) III. Johnson
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

247. Personality (4) I. Emmons, Ericksen, Robins
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

***250. Comparative Psychology** (4) The Staff
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

***251. Topics in Genetic Correlates of Behavior** (4). Waller
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior. May be repeated for credit when topic differs. Offered in alternate years.

***252. Topics in Psychobiology** (4) Chalupa, Owings, Mendoza
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Critical study in a selected area of psychobiology. May be repeated for credit when content differs. Offered in alternate years.

261. Cognitive Neuroscience (4) III. Mangun
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Same course as Neuroscience 223.)

263. Topics in Cognitive Psychology (4) II. Acredolo, Goodman, Kroll, Long, Parks, Post
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes. May be repeated for credit when content differs. Offered in alternate years.

264. Topics in Psycholinguistics (4) III. Long
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Discussion of fundamental issues in the psychology of language. May be repeated for credit when content differs. Offered in alternate years.

***265. Topics in Psychology of Consciousness** (4) The Staff
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in the psychology of consciousness. May be repeated for credit when content differs. Offered in alternate years.

***270. Topics in Personality Psychology** (4) Elms, Emmons, Ericksen, Shaver
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Critical study of a selected area of personality psychology. May be repeated for credit when content differs.

290. Seminar (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students.

291. Current Research in Psychology (2) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. Topics relevant to current research in psychology will be discussed and methods employed in contemporary research will be evaluated. Students present a seminar on their own research. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (S/U grading only.)

299. Research (2-9) I, II, III. The Staff (S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

*Course not offered this academic year.

Professional Course

390A-390B. The Teaching of Psychology (6-4) II-III. The Staff
Discussion, lecture, practice. Prerequisite: advanced graduate standing in psychology or a closely related discipline and consent of instructor. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only; deferred grading only, pending completion of sequence.)

Radiation Oncology

See Medicine, School of

Radiology

See Medicine, School of

Range and Wildlands Science

See Agronomy and Range Science; Range and Wildlands Science, below; and Range Science

Range and Wildlands Science

(College of Agricultural and Environmental Sciences)

Admission into the Range and Wildlands Science major has been discontinued. Students interested in this area should refer to the Agricultural Systems and Environment major, Range and Natural Resources specialization.

The Major Program

Range and wildlands science is the study of the biological and physical components of land resources which are used mostly for grazing domestic livestock, but which also provide wildlife habitats, watersheds, recreation, and open space.

The Program. The major provides background in the biological, physical, and social sciences. Comprehensive study in the plant, animal, soil, and resource sciences supplements the core of range management courses. Integration of the knowledge of a variety of specialized fields is learned as a basis for land management oriented toward the multiple use concept and the maintenance of environmental quality.

Career Alternatives. Range and wildlands science graduates, especially those with some experience, may be employed as consultants, extension specialists, ranch managers, or ranchers. They may also qualify for the position of Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired, it is recommended that trainee or apprenticeship experience with that agency be included in the major program of study as an internship. In addition, the training provided by this major should give an excellent background for natural resource management positions.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 63-67
Animal science (Animal Science 2) 4
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A, 2B, 8A, 8B) 16
Computer science (Agricultural Science and Management 21, Engineering 5, or Computer Science Engineering 10) 3
Economic principles (Agricultural and Resource Economics 1, Economics 1A, or 1B) 4-5
Geology (Geology 1-1L) 4
Mathematics (Mathematics 16A; 16B recommended) 3-6
Physics (Physics 1A, 1B) 6
Soil science (Soil Science 100) 4
Statistics (Agricultural Science and Management 150) 4

Breadth/General Education 6-24
Satisfaction of General Education requirement to include two non-introductory courses in Agricultural and Resource Economics, Economics, Environmental Studies, or Geography.

Depth Subject Matter 51-56
Plant physiology (Botany 111 or Water Science 104) 3-4
Plant ecology (Botany 117 or Plant Science 101) 4
Meteorology (Geography 3, Atmospheric Science 105) 3-4
Soil science, two upper division courses 6-8
Watershed management (Water Science 141) 3
Animal nutrition (Nutrition 115) 4
Wildlife ecology or management, one upper division course in wildlife, fish and conservation biology, or zoology 3-4
Forage crops (Agronomy 112) 3
Select units from Range Science: 18
Range and wildland plants (Range Science 100)
Range ecology (Range Science 133, 134, 135)
Range field course (Range Science 105)
Range livestock production (Range Science 160)
Revegetation of disturbed lands (Range Science 145)
Range Science 192, 198, 199 (not more than a total of 3 units can be counted)
Aerial photo interpretation and remote sensing (Geography 106) 4

Restricted Electives 6-8
Two upper division natural science or applied biological science courses in one or two of the following: animal science, botany, entomology, genetics, geography, mathematics, nematology, plant pathology, plant science, environmental and resource sciences, water science, or weed science.

Unrestricted Electives 17-47

Total Units for the Major 180

Major Adviser. Contact department office.

Advising Center for the major is in 152 Hunt Hall.

Graduate Study. See the Ecology Graduate Group.

Range Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Department of Agronomy and Range Science.

Related Courses. See Agricultural Systems and Environment 101, 112, 130, 131, 134, 135, 137, Nutrition 115, Soil Science 105, 120, Wildlife, Fish and Conservation Biology 151.

Courses in Range Science (RMT)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 152 Hunt Hall.

Lower Division Course

92. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

192. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Department Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Department Chairperson in charge)
Prerequisite: senior standing and consent of instructor. (P/NP grading only.)

Graduate Courses

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Religious Studies

(College of Letters and Science)

————, Ph.D., Program Director

Program Office, 522 Sproul Hall (916-752-9932)

Committee in Charge

Emily Albu, Ph.D. *(Classics)*
Lincoln D. Hurst, Ph.D. *(Religious Studies)*
Naomi Janowitz, Ph.D. *(Religious Studies)*
Phyllis Jestice, Ph.D. *(History)*
Whalen Lai, Ph.D. *(Religious Studies)*
Jay Mechling, Ph.D. *(American Studies)*
Jacob Olupona, Ph.D. *(African American and African Studies)*
Peter Schaeffer, Ph.D. *(German)*

Faculty

Lincoln D. Hurst, Ph.D., Associate Professor
Naomi Janowitz, Ph.D., Associate Professor
Whalen W. Lai, Ph.D., Professor

Affiliated Faculty

Bruce Rosenstock, Ph.D., Lecturer
Linda Hess, Ph.D., Lecturer

The Major Program

Majoring in religious studies provides an opportunity to explore and analyze the great written and oral traditions of the world's religions: Hinduism, Buddhism, Judaism, Christianity, Islam, contemporary groups in the U.S., and African religions.

The Program. The major introduces students to the academic study of religion. The religious studies major offers a broad choice of courses including history, philosophy, sociology, anthropology, American studies, classics, and medieval studies. For some students, religious studies is an appropriate second major and might combine well with anything from philosophy to international agricultural development, from history to international relations. The religious studies program has also designed four options for minor programs: religious studies, Asian religions, Judaism, and Christian studies.

Career Alternatives. The emphasis in religious studies courses on developing analytical thinking skills and clear written expression is an asset for many career goals. As a strong liberal arts program, the major can lead to research and/or teaching on all levels, as well as careers in related areas such as the ministry, counseling, social work, and other helping professions. Because the major integrates so many academic areas, it is also an excellent background for graduate programs, especially in the humanities, and for professional schools including law, business, and foreign service.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24
At least one course from each of the following groups 20
(a) Religious Studies 1, 2
(b) Religious Studies 21, 23, 40, 60, 70, 75
Anthropology 2 or, with approval from adviser, a lower division course related to religion from African American and African Studies, American Studies, Philosophy, Native American Studies, or other departments 4

Depth Subject Matter 40
Five upper division Religious Studies courses plus Religious Studies 100 24
Two upper division History courses related to religion 8
Sociology, philosophy, anthropology 8
Two upper division courses related to religion in the above disciplines such as Philosophy 105, 145, Sociology 146, 149, Anthropology 124; or, with approval from adviser, in other disciplines such as Medieval Studies, Native American Studies, African American and African Studies, Classics, or other departments.

Total Units for the Major 64

Course Equivalents
The major advisers have a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended
A reading knowledge of a foreign language is highly recommended. Consult major adviser for a complete list of recommended upper division courses.

Major Advisers. W.W. Lai, N. Janowitz, L. Hurst.

Minor Program Requirements:

The following four minor program options and others responsive to students' needs are subject to approval by the major adviser or the Curriculum Committee. The four areas of emphasis are Religious Studies, Asian Religions, Judaism, and Christian Studies.

UNITS

Religious Studies 20
Lower division course 4

Upper division courses 16
Religious Studies 100 required.
Some substitutions from other departments or programs allowed with consent of adviser.

Preministerial Adviser. L.D. Hurst.

Jewish Studies. Students interested in Jewish studies should contact N. Janowitz of Religious Studies or H. Murav of Comparative Literature.

Courses in Hebrew (HEB)

Lower Division Courses

1. Elementary Classical Hebrew (5) I. The Staff
Lecture—4 hours; discussion—1 hour. Introduction to Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from the Bible. (Students who have successfully completed, with a C- or better, Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Classical Hebrew (5) II. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible. Continuation of course 1.

3. Elementary Classical Hebrew (5) III. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible and from post-Biblical Hebrew texts. Continuation of course 2.

Upper Division Courses

100. Biblical Prose (3) I. Rosenstock
Lecture/discussion—3 hours. Prerequisite: course 3. Selections from the historical narratives and novellas of the Hebrew Bible. Offered in alternate years. GE credit: ArtHum, Wrt.

101. Biblical Poetry (3) II. Rosenstock
Lecture/discussion—3 hours. Prerequisite: course 3. Selections from the Psalms, prophets, wisdom literature, and love poetry of the Hebrew Bible. Offered in alternate years. GE credit: ArtHum, Wrt.

102. Post-biblical Hebrew (3) III. Rosenstock
Lecture/discussion—3 hours. Prerequisite: course 3. Selections from early rabbinic texts, medieval religious and secular writing, and modern Hebrew literature. Offered in alternate years. GE credit: ArtHum, Wrt.

Courses in Religious Studies (RST)

Lower Division Courses

1. Survey of Religion (4) III. Lai and staff
Lecture—3 hours; discussion—1 hour. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.); readings from the Bible, Bhagavad Gita, the Koran, selections from Plato and early Buddhist writings. GE credit: ArtHum, Div, Wrt.

2. Myth, Ritual, and Symbolism (4) I, III. Lai, Janowitz
Lecture—3 hours, discussion—1 hour. Myths, rituals and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena; validity of different approaches to the study of religion. GE credit: ArtHum, Div, Wrt.

3A-C. Topics in Comparative Religion (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Introduction to the methods used in comparative religion, focusing on a particular theme in a number of religious traditions: ***(A)** The Experential Dimension: Pilgrimage; **(B)** The Mythic Dimension: Death and the After-life; ***(C)** The Ritual Dimension: Sacrifice. May be repeated for credit in a different subject area. GE credit: ArtHum, Div, Wrt.

***4. Eastern Religions** (4) I. Lai
Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism, and Taoism from their origins to the present.

***10. Introduction to Religious Studies** (2) II. Lai
Lecture—2 hours. Topic of importance in more than one religious tradition as an illustration of the problems and methods of religious studies. May be repeated for credit in a different subject area.

21. Hebrew Scriptures (4) I. Janowitz
Lecture—3 hours; term paper. Selected texts from the Hebrew Scriptures (Genesis—II Chronicles) and review of modern scholarship on the texts from a variety of perspectives (historical, literary, sociological, psychological). Course work is based on an English translation and no knowledge of Hebrew is required. GE credit: ArtHum, Div, Wrt.

23. Introduction to Judaism (4) II. Janowitz
Lecture/discussion—3 hours; term paper. Introduction to the study of religion using examples from the rituals, art and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. GE credit: ArtHum, Div, Wrt.

40. New Testament (4) I. Hurst
Lecture—3 hours; discussion—1 hour. New Testament literature from critical, historical, and theological perspectives. GE credit: ArtHum, Wrt.

***60. Introduction to Islam** (4) III. Metcalf
Lecture/discussion—4 hours. Introduction to topics at core of Islamic tradition including Muhammad,the Qur'an, Islamic law, Sufism and sects as well as to selected topics including Islamic revival.

75. Chinese Philosophy: An Introduction (3) I. Lai
Lecture—2 hours; discussion—1 hour. Introduction to Chinese philosophy from classical to modern times: emphasis on basic metaphysics and its change over time, including Confucian humanism, Taoist cosmologics, the Han synthesis of Tao, Yin-yang and Five Elements; its impact on Buddhism, Sung new synthesis and conflict with the West. Offered in alternate years.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Special Study for Lower Division Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Upper Division Courses

100. Study of Religion: Issues and Methods (4) III. Janowitz
Lecture—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields.

102. Christian Origins (4) I. Hurst
Lecture/discussion—3 hours; term paper. Prerequisite: course 40; course 23 recommended. Beginning of the Christian faith seen in relation to milieu in which it originated. Offered in alternate years.

***110. Life, Meaning and Identity** (4) II. Lai
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 2 or upper division standing. Study of religious lives, the quest for meaning and for personal identity; how religions frame the problems of life; how cultural and personal crises affect youthful identity; the nature and structure of dreams, myths, and ideals. Offered in alternate years.

115. Mysticism (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: one lower division Religious Studies course (except 10, 98, or 99). Historical and descriptive analysis of selected key figures in mystical traditions and readings of representative mystical texts. Analytic term paper. Offered every 3-4 years. GE credit: ArtHum, Div, Wrt.

***122. Studies in Biblical Texts** (4) III. Janowitz
Lecture—3 hours; term paper. Prerequisite: course 21. Study of a book from the Prophets or writings from critical, historical, and religious perspectives. May be repeated once for credit in different subject area.

124. Topics in Judaism (4) III. Janowitz
Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, religion, or literature. May be repeated once for credit in different subject area.

125. Dead Sea Scrolls, Apocrypha, and Pseudepigrapha (4) III. Rosenstock
Lecture/discussion—4 hours. prerequisite: courses 21 or 40. Survey of the major apocryphal and pseudepigraphical writings of the ancient Near East and their historical, social, and religious importance. GE credit: Wrt.

130. Topics in Religious Studies (4) II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 2 or consent of instructor. Thematic study of a phenomenon in more than one religious tradition or of the relationship between religion and another cultural phenomenon; review of theory and method included. May be repeated twice for credit in different subject area.

140. Christian Theology (4) III. Hurst
Lecture/discussion—3 hours; term paper. Prerequisite: course 40; course 102 recommended. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy.

***141A. New Testament Literature: Synoptic Gospels** (4) II. Hurst
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Life and thought of the early Church as reflected by the Synoptic Tradition—Matthew, Mark, Luke and Acts. Offered every third year to alternate with 141B, 141C. GE credit: ArtHum, Wrt.

***141B. New Testament Literature: John** (4) III. Hurst
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Life and thought of the early Church as reflected by the Johannine Tradition—the Gospel and letters of John. Offered every third year to alternate with 141A, 141C. GE credit: ArtHum, Wrt.

141C. New Testament Literature: Paul (4) II. Hurst
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Life and thought of the early Church as reflected by the Pauline tradition—the letters of Paul. Offered every third year to alternate with 141A, 141B. GE credit: ArtHum, Wrt.

***142. Tyndale and the Beginnings of the English Bible** (4) I, II. Schaeffer
Lecture/discussion—3 hours; term paper. Prerequisite: course 40 recommended. Study of Tyndale's *New Testament* translation as a literary and cultural monument in the context of previous Biblical translation, the historical situation in the 16th century, and the influence of this version on the English language and its literature. Offered in alternate years. GE credit: ArtHum, Wrt.

***145. Contemporary American Religion** (4) II. Hurst
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 and History 17B recommended. Examination of several major movements and phenomena in twentieth-century American religion. Offered in alternate years.

***150. Religious Ethics** (4) II. Lai
Lecture/discussion—4 hours. Prerequisite: course 4. Study of the religious bases to ethics through concentration on the ethical tracts of one major tradition, or through a comparison of the attitudes of two or more traditions to a common ethical issue. Offered every three years.

168. Hinduism (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 4. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with mention of Jainism, Buddhism, and Sikhism and their relation to the mainstream of Hindu religion. Offered in alternate years.

170. Buddhism (4) I. Lai
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 4. Study of Buddhism in its pan-Asian manifestations, from its beginning in India to its development in Sri Lanka and Southeast Asia, Central Asia, China and Japan; teachings and practices, sociopolitical and cultural impact. Offered in alternate years.

172. Ch'an (Zen) Buddhism (4) II. Lai
Lecture/discussion—3 hours; term paper. Prerequisite: course 4 recommended. Doctrines and methods of the Patriarchs and great masters, both ancient and modern, in the framework of the orthodox Buddhist tradition. Doctrinal basis of meditational techniques.

178A-E. Undergraduate Proseminar in Religion and Culture (2) II. The Staff
Lecture/discussion—2 hours. Prerequisite: upper division standing and one course in religious studies or consent of instructor. Individual topics are discussed by lecturers from this campus and elsewhere. Each student writes a term paper in one of these areas. Content alternates among the following: ***(A)** Idioms of Religion; ***(B)** Cultural and Social Context of Religion; ***(C)** Religion and Mind; ***(D)** Religion and Visual Arts; ***(E)** Religion, Music, and Drama. (P/NP grading only.)

189. Senior Colloquium (4) II. The Staff (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Primarily for seniors in Religious Studies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions.

190. Seminar (4) I. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor; required of all Religious Studies majors. Allows majors to integrate their disciplined study of the field. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse religious traditions. Offered in alternate years.

194HA-194HB. Special Study for Honors Students
(1-5) I, II, III. The Staff (Director in charge)
Independent study. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Rhetoric and Communication

(College of Letters and Science)

Charles Berger, Chairperson of the Department

Department Office, 108 Sproul Hall (916-752-1222)

Faculty

Rina Alcalay, Ph.D., Associate Professor
Robert A. Bell, Ph.D., Professor
Charles R. Berger, Ph.D., Professor
Michael T. Motley, Ph.D., Professor
John L. Vohs, M.A., Senior Lecturer

Emeriti Faculty

James J. Murphy, Ph.D., Professor Emeritus,
Academic Senate Distinguished Teaching Award
Ralph S. Pomeroy, Ph.D., Professor Emeritus

The Major Program

The major in rhetoric and communication focuses on the ways human beings produce and respond to verbal and nonverbal messages.

The Program. The program of study in rhetoric and communication examines communication processes at several different levels of analysis. Courses dealing with communication at the individual, interpersonal, organizational and societal levels of analysis are offered. Classes addressing such topics as communication and cognition, message systems, interpersonal communication, nonverbal communication, communication and persuasion, organizational communication, mass media effects and public communication campaigns explore communication at these levels of analysis. Related social science courses are also part of the major.

Career Alternatives. Rhetoric and Communication graduates have found careers in such fields as broadcast and print journalism, administration, sales, management, politics and government, education, social work, and public relations. A rhetoric and communication degree is also excellent preparation for law school or other graduate programs.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**21**
Anthropology 4 or Linguistics 1	4
Rhetoric and Communication 1 or 3	4
Psychology 1	4
Sociology 1	5
Statistics 13	4
Depth Subject Matter	**44**
Communication theory, Rhetoric and Communication 114	4
Message codes and research methods, Rhetoric and Communication 115 and one of 103 or 105 or 135	8
Social interaction studies, Rhetoric and Communication 134 and one of 130 or 136	8
Mass communication processes and effects, Rhetoric and Communication 141, and one of 143 or 145 or 152	8
Select four of the following additional courses with approval of faculty adviser (the four courses must be other than those chosen to fulfill the above requirements): Rhetoric and Communication 103, 105, 130, 135, 136, 138, 140, 142A, 142B, 143, 145, 151, 152, Anthropology 117, 120, Linguistics 163, 171, Political Science 164, 165, Psychology 132, Sociology 126, 128, 135, 148.	16
Total Units for the Major	**65**

Grading recommendation. Although not required, it is recommended that all courses offered in satisfaction of the major, except variable-unit courses, be taken for a letter grade.

Major Advisers. Faculty (contact department).

Advising Office. Staff adviser, 106 Sproul Hall; Peer adviser, 118 Sproul Hall.

Minor Program Requirements:

	UNITS
Rhetoric and Communication	**24**
One course from Rhetoric and Communication 1, 3, 50	4
A coherent sequence of at least five upper division courses in rhetoric and communication selected with the approval of a minor adviser	20

Graduate Study. The Department of Rhetoric and Communication offers programs of study and research leading to the M.A. degree in Rhetoric and Communication. Detailed information may be obtained from the Graduate Adviser, Department of Rhetoric and Communication.

Graduate Adviser. R. Bell.

Courses in Rhetoric and Communication (RCM)

Subject A. Students must have satisfied the Subject A requirement before taking any course in Rhetoric and Communication.

Lower Division Courses

1. Introduction to Public Speaking (4) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—3 hours. Practice in the preparation and delivery of speeches based on contemporary principles and strategies of informing and persuading audiences. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

3. Interpersonal Communication Competence (4) I, II, III. Vohs
Lecture—2 hours; discussion—2 hours. Communication in interpersonal contexts. Sender, receiver, and message variables, and their interaction with communication competence. Participation in simulations and experiential exercises.

***90X. Lower Division Seminar** (1-4) I, II, III. The Staff (Chairperson in charge)
Seminar—1-4 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Rhetoric and Communication through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May *not* be repeated for credit. Limited enrollment.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

103. Analysis of Message Systems (4) I, II. The Staff
Lecture—4 hours. Examination of elements of the communication process, including sources, messages, media, and receivers. Study of the role of these elements as they are influenced by various communicative situations. GE credit: SocSci.

105. Semantic and Pragmatic Functions of Language (4) I, II. The Staff; III. Motley
Lecture—4 hours. Prerequisite: course 115. The role of language in shaping attitudes and perceptions of self and others. The use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse. GE credit: SocSci.

114. Contemporary Theories of Human Communication (4) II, III. The Staff
Lecture/discussion—4 hours. Rhetoric as a social science, characteristics of social theories, components of theories, development and testing of hypothesis, general models, theories, and research. GE credit: SocSci.

115. Empirical Methods in Communication (4) I, II. Bell
Lecture—4 hours. Prerequisite: course 114 and Statistics 13 or the equivalent. Survey of social scientific research methods commonly employed in the communication discipline. Topics include research design, measurement, sampling, questionnaire construction, survey research, experimental research, content analysis, and interaction analysis. GE credit: SocSci.

130. Group Communication Processes (4) I, III. Vohs
Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership, as they relate to communication processes. GE credit: SocSci.

134. Interpersonal Communication (4) I. Berger; II. Motley
Lecture—4 hours. Prerequisite: course 1 or 3, or 10 or the equivalent. Communication between two individuals in social and task settings. One-to-one communication, verbal and nonverbal, in developing relationships. Consideration of theory and research on

relevant variables such as shyness, self-disclosure, reciprocity, games, and conflict. GE credit: SocSci.

135. Nonverbal Communication (4) III. Berger
Lecture—4 hours. Examination of the interaction between nonverbal communication and verbal communication channels in influencing outcomes in interpersonal and mass mediated communication contexts. Underlying functions served by nonverbal communication will also be considered. GE credit: SocSci, Div.

136. Organizational Communication (4) I, II. Vohs
Lecture—4 hours. Examines communication in various organizational situations. Focuses on the use of effective communication strategies for achieving organizational and individual goals. Emphasis is placed on identifying and amending ineffective communication within organizations. GE credit: SocSci.

***138. Communication and Cognition** (4) I. Berger
Seminar—4 hours. Prerequisite: upper division standing. Relationships between communication and cognition. Models of discourse comprehension and production, the influence of language attitudes on social judgments, and the effects of information processing on decision making are explored. Offered in alternate years. GE credit: SocSci.

140. Mass Communication and the Public (4) I, II. The Staff
Lecture—4 hours. Current issues in mass communications policy, with emphasis on the broadcast media. Examination of the economic and legal influences on media performance; the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites. GE credit: SocSci.

141. Mass Communication Theory and Research (4) II. The Staff; III. Alcalay
Lecture—4 hours. Prerequisite: course 115, or the equivalent course in social science research methods. Recent developments in the study of mass communications content and effects, with emphasis on the broadcast media. Special attention to the function of television for selected audiences: children, minorities, the aged. GE credit: SocSci.

***142A. News Policies and Practices in Television** (2) II. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the broadcast media, as examined by a practicing professional.

***142B. News Policies and Practices in the Press** (2)
Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing, and reporting the news in the print media, as examined by a practicing professional.

***143. Media Criticism: Broadcast** (4) II, III. The Staff
Lecture—1 hour; discussion—3 hours; one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture. GE credit: SocSci.

145. Mass Communication and Social Change (4) I. Alcalay
Lecture—4 hours. Prerequisite: course 115 or the equivalent. Study of communication campaigns as a way to effect social change. Effect on people's behaviors which occur via mass media and interpersonal communication channels. Focus on theory and practice of campaigns in such areas as health, intercultural and international communication. GE credit: SocSci.

152. Theories of Persuasion (4) II. Bell; III. The Staff
Lecture—4 hours. Prerequisite: course 115. Survey of communication and social psychological theories of persuasion. Examination of influence tactics and message design. Contexts of application include product advertising, propaganda campaigns, and health promotion. GE credit: SocSci.

161. Cultural Perspectives on Health Communication (4) II. Alcalay
Lecture—4 hours. Prerequisite: upper division standing. Study of various cultures through health communication campaigns and representative media and cultural products (e.g., literary artifacts, films). Exploration of health promotion campaigns as manifestations of cultural values and beliefs about sexuality, human relations, religion, morality, illness, and health.

***180. Current Topics in Communication** (4) II, III. The Staff
Seminar—4 hours. Prerequisite: upper division standing with a major in Communication or consent of instructor.Groups study of a special topic in communication. May be repeated once for credit. Enrollment limited.

***190X. Upper Division Seminar** (1-4) I, II, III. The Staff (Chairperson in charge)
Seminar—1-4 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Rhetoric and Communication. Emphasis upon student participation in learning. May *not* be repeated for credit. Limited enrollment.

192. Internship in Communication (1-6) I, II, III. The Staff
Internship—3-18 hours. Prerequisite: declared major in Communication and 20 units of upper division Communication courses. Work-research projects, usually at off-campus sites, under departmental supervision. May be repeated for credit up to 12 units. Units do not count toward major requirements. (P/NP grading only.)

194H. Senior Honors Thesis (4) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour; individual tutoring on research project—3 hours. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty adviser.

197T. Tutoring in Communication (2-4) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in Communication and consent of Department Chairperson. Tutoring in undergraduate Communication courses, including leadership of discussion groups affiliated with departmental courses. May be repeated for credit up to a total of six units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

Seniors may take graduate courses with consent of instructor.

***213. Theory Development in Communication Inquiry** (4) I. Berger
Seminar—4 hours. This course explores meta-theoretical approaches to developing social-scientific theories of human communication. Perspectives include covering-laws, systems, rules, axiomatic theory construction, causal modeling, scientific realism and grounded theory. Research design and measurement implications of these perspectives are examined.

***214. Mass Communication Theory and Research** (4) I. Alcalay
Seminar—4 hours. Prerequisite: course 220 or the equivalent. Examines the basic theories, models, and assumptions of mass communication. Reviews the current state of this discipline and major research developments. Special emphasis on research regarding media and violence, women and minorities, political communication, and new technologies.

215. Mass Communication and Social Change (4) I. Alcalay
Seminar—4 hours. Prerequisite: courses 220 and 214, or the equivalent. To gain an understanding of current theories and concepts in persuasion and mass communication. To explore how principles of persuasion are used in communication campaigns. To acquire skills in the planning, implementation, and evaluation of campaigns. Offered in alternate years.

***220. Empirical Methods in Communication** (4) I. Motley
Lecture—4 hours. Prerequisite: course 115 or consent of instructor. Introduction to the use of experimental and descriptive research methods in communication research. Topics include survey research, interviewing, experimental and quasi-experimental design, and statistics.

***240. Advocacy in Contemporary Society** (4) III. The Staff
Seminar—4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocative stance. Analysis of the persuasive impact of argumentation occurring in current public controversies. Offered in alternate years.

***242. Proseminar in Symbolic Behavior** (4) I. Motley
Seminar—4 hours. Prerequisite: course 220. Examination of language and/or other symbolic codes in communication. Investigated phenomena may include stylistic variation, speech arts, cognitive processing, communication rules, and audience effects. Offered in alternate years.

243. Persuasion Theory (4) I. Bell
Lecture/seminar—4 hours. Prerequisite: course 152 or consent of instructor. Major scientific theories of persuasion. Research programs related to persuasion theories.

***244. Organizational Communication** (4) III. Vohs
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

***246. Perspectives on Relational Communication** (4) II. The Staff
Seminar—4 hours. Prerequisite: course 212. Critical survey of the current state of inquiry on communication in personal relationships, i.e., friendship, romantic, and marital relationships. Issues examined include the role of communication in constructing, maintaining, and dissolving relationships.

***248. Media Criticism** (4)
Seminar—4 hours. Prerequisite: a course in criticism. Examines broadcast, print, and visual media by means of rhetorical, psychological, semiological, sociological, and cultural studies and perspectives. Comparison of media and of critical theory scope in understanding media messages. Offered in alternate years.

***249. Interpersonal Communication Theory** (4) I. Bell
Lecture/seminar—4 hours. Prerequisite: course 134 or consent of instructor. Major theories of interpersonal communication and related research.

***251. Special Topics in Interpersonal Communication** (4) III. Berger
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in interpersonal communication. May be repeated for credit when topic differs.

***252. Special Topics in Mass Communication** (4) III. Alcalay
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in mass communication theory and research. May be repeated for credit when topic differs.

***253. Negotiation** (4) Vohs
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on negotiating. Offered in alternate years.

*Course not offered this academic year.

***260. Communication Applications** (2-4) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; supervised field work—3-9 hours. Prerequisite: course 220. Fieldwork in communication. Organization and implementation of a research project for a specific application of a communication program. May be repeated once for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours.

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299R. Thesis Research (1-12) I, II, III. The Staff (Chairperson in charge)
Independent study—3-36 hours. Prerequisite: graduate standing in Rhetoric and Communication. (S/U grading only.)

Russian

(College of Letters and Science)

James Gallant, Ph.D., Program Director

Program Office, 616 Sproul Hall (916-752-4999)

Committee in Charge

Yuri Druzhnikov, Ph.D., Professor
James Gallant, Ph.D. *(Russian)*
Harriet Murav, Ph.D. *(Russian)*
Daniel Rancour-Laferriere, Ph.D. *(Russian)*

Faculty

Yuri Druzhnikov, Ph.D., Professor
James Gallant, Ph.D., Lecturer
Harriet Murav, Ph.D. Associate Professor
Daniel Rancour-Laferriere, Ph.D., Professor

Emeriti Faculty

Valerie A. Tumins, Ph.D., Professor Emerita

The Major Program

The Russian major introduces students to a culture rich in art, language, and literature and presents an important skill needed to enter the fields of foreign affairs, world politics, and international trade, or to begin graduate work in literature, history, and international relations.

The Program. The department offers a choice of three emphases. The common basis for the first two is extensive training in the Russian language. The *Russian Literature* emphasis concentrates on the evaluation of Russian literary movements and cultural trends. The second area of study, the *Russian Language* emphasis, focuses on linguistics and practical language skills. The third area, the *Russian Area Studies* emphasis, provides an interdisciplinary program offering training in the Russian language and literature and in the historical development and contemporary social, political, and economic conditions of the former Soviet Union.

Internships, Study Abroad, and Career Alternatives. Students who have completed two years of Russian language study can participate in the Education Abroad Program in Moscow. Many of our students also participate in summer, semester, and year programs sponsored by CIEE and ACTR in St. Petersburg and Moscow. Russian majors may participate in internships where they can serve as translators and interpreters for schools and business firms throughout Northern California. Upon graduation, many Russian majors enter the business world or enter graduate programs in Slavic studies and international relations. The department encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, or economics in order to maximize their career possibilities.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 0-38

Literature/Language emphasis
Russian 1 through 6 (or the equivalent)...0-30
Russian 41, 42.....8
Recommended, Linguistics 1.

Area Studies emphasis
Russian 1 through 6 or the equivalent ...0-30
Russian 41 or 42 or the equivalent course in basic literary analysis.....4

Depth Subject Matter 36-44

Russian Literature emphasis
Russian 101A, 101B, 101C 12
Russian 102 or 103 or 105 4
Russian 121, 123.....8
Russian 127 or 128 4
Additional upper division units chosen in consultation with adviser.....8

Russian Language emphasis
Russian 101A, 101B, 101C 12
Russian 102 or 105 4
Russian 103 or 104 4
Russian 160.....4
Additional upper division units chosen in consultation with adviser.....12

Russian Area Studies emphasis
Russian 105.....4
Russian 101A, 103, or 104 4
Russian 150.....4
Three literature courses to be chosen from Russian 121, 123, 126, 128, 140, 141...12
History 137B, 137C 8
Three courses, with no more than two in one area, to be chosen from the following two areas: *(a)* History 137A, 138, 102F; *(b)* Social sciences—Political Science 136, Economics 117, Geography 124 12
(To meet special interest course needs, a student should obtain written approval from an adviser.)

Total Units for the Major 44-78

Major Adviser. J. Gallant.

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The Literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

UNITS

Russian 20
Russian Language emphasis.....**20**
Russian 6.....4
Russian 101A, 101B, 101C 12
One course from Russian 102, 103, 104, 105, 160 4
Russian Literature emphasis **20**
Russian 41 or 42 4
Russian 121, 123; and 140 or 141 12
One course from Russian 120, 126, 150, 154 4
Russian Area Studies emphasis.....**20**
Three courses to be chosen from Russian 121, 123, 126, 150, 154 (Russian 41 or 42 or the equivalent course in basic literary analysis required).....12
One course from History 137B, 137C 4
One course from Political Science 136, Economics 117, Geography 124 4

Teaching Credential Subject Representative. J. Gallant. See also under Teacher Education Program.

Graduate Study. The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser. *Admission into the graduate program in Russian is closed for the 1997-98 academic year.*

Graduate Adviser. D. Rancour-Laferriere.

Prerequisie credit. Credit normally will not be given for a course if that course is the prerequisite for a course already completed.

Courses in Russian (RUS)

Lower Division Courses

Course Placement. Students who have learned Russian at home must consult the department for placement instructions. Students with two years of Russian in high school normally continue in Russian 2; those with three years, Russian 3; those with four years, Russian 4.

1. Elementary Russian (5) I. The Staff
Discussion—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Russian (5) II. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.

3. Elementary Russian (5) III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.

4. Intermediate Russian (4) I. The Staff
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.

5. Intermediate Russian (4) II. The Staff
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 4. Grammar review. Introduction to literature. Conversational practice.

6. Intermediate Russian (4) III. The Staff
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature.

10. Elementary Conversation (2) II, III. The Staff
Discussion—2 hours. Prerequisite: course 1; course 2 or 3 (concurrently). Conversational practice to improve pronunciation and master spoken idioms. May be repeated for credit up to a maximum of 6 units.

***41. Survey of Nineteenth-Century Russian Literature (in English)** (4) I. Murav
Lecture—3 hours. Introduction to dominant literary trends, major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in alternate years. GE credit: ArtHum, Wrt.

***42. Survey of Twentieth-Century Russian Literature (in English)** (4) II. Rancour-Laferriere
Lecture—3 hours. Introduction to major literary trends such as Symbolism, Acmeism, Futurism, Neorealism, and Socialist Realism. Readings from representative writers such as Gorky, Bely, Pasternak, Solzhenitsyn, and Tertz. Offered in alternate years. GE credit: ArtHum, Wrt.

***44. Children's Literature in Russia** (4) I. Druzhnikov
Lecture—3 hours; term paper. Knowledge of Russian not required. History and theory of children's literature, with special reference to Russian and Soviet examples. Analysis of genres, technique, and folklore elements, contrasted with those of the West. Students will write their own literature for children. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

98. Directed Group Study (1-5) I, II, III. The Staff
Discussion—1-5 hours. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

101A. Advanced Russian (4) I. Gallant
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 6. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

101B. Advanced Russian (4) II. Gallant
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversational exercises utilizing literary and colloquial variants of current Soviet speech.

101C. Advanced Russian (4) III. Gallant
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101B. Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversational exercises utilizing literary and colloquial variants of current Soviet speech.

102. Russian Composition (4) II. Gallant
Discussion—3 hours; individual tutorial with instructor. Prerequisite: course 6. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Soviet and American lifestyles; current events. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.

***103. Literary Translation** (4) III. Murav
Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in alternate years.

***104. Scientific Translation** (4) III. Rancour-Laferriere
Discussion—3 hours; individual translation projects—1 hour. Prerequisite: course 101A. Techniques of translating Russian scientific texts. Science students will select articles from their fields of interest; Russian students will work on materials assigned by instructor. Offered in alternate years.

105. Advanced Russian Conversation (4) III. Druzhnikov
Conversation—3 hours; preparation of texts—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. Offered in alternate years.

***121. Nineteenth-Century Russian Prose (in English)** (4) I. Druzhnikov
Lecture—3 hours; term paper. Development of prose from Pushkin and Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected sequentially: Turgenev, Goncharov, Pisemsky, Saltykov, Chekhov. Romanticism, the Natural School, critical realism, and psychological realism are covered. Offered in alternate years. GE credit: ArtHum.

123. Twentieth-Century Russian Prose (in English) (4) II. The Staff
Lecture—3 hours; term paper. Examination of various trends including Acmeism, Symbolism, Neorealism, and Socialist Realism in development of prose. Readings from such writers as Gorky, Zamiatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in alternate years. GE credit: ArtHum, Wrt.

***126. The Russian Theater (in English)** (4) II. Murav
Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present, including Turgenev, Tolstoy, Chekhov, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in alternate years. GE credit: ArtHum, Wrt.

***127. Nineteenth-Century Russian Poetry** (4) II. Rancour-Laferriere
Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovsky, Pushkin, Delvig, Baratynsky, Lermontov, Nekrasov, Tjutchev, and Fet. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.

128. Twentieth-Century Russian Poetry (4) II. Druzhnikov
Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to principles of Russian versification followed by historical and poetic analysis of the following figures: Brjusov, Blok, Akhmatova, Mandelshtam, Esenin, Mayakovsky, Khlebnikov, Pasternak, Evtushenko, Voznesensky, and Brodsky. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.

129. Russian Film (4) III. Murav
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. In English; films with English subtitles. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***130. Contemporary Soviet Culture** (4) III. Murav
Lecture—3 hours; written work. Prerequisite: upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the intricate relationship between artists and the government. Topics include: history of censorship, official and dissident art, recent changes in the cultural scene. Offered in alternate years. GE credit: ArtHum, Wrt.

***131. Literature of Revolution** (4) II. Murav
Lecture—3 hours; essays. Prerequisite: History 3 or 4C, and/or any introductory literature course. Study of impact of revolution on society and culture; the major artistic, political and historical works surrounding the Russian revolutions of 1905 and 1917. Offered in alternate years. GE credit: ArtHum, Wrt.

***132. Nature and Culture in the Soviet Union** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course in environmental studies. Presents a history of the Soviet environmental movement from the 1920s to the present, showing the influence of Stalinism on environmental ethics; concepts of society and nature in Soviet literature and film; and international implications of Soviet environmental policy. No knowledge of Russian required. GE credit: ArtHum, Wrt.

139. Pushkin (in English) (4) I. Druzhnikov
Lecture/discussion—3 hours; term paper. The life and works of Pushkin, the most prominent poet of Russia. Evaluations of Pushkin by both Russian and Western scholars. Images of Pushkin and the official myths that surround him. No knowledge of Russian required. GE credit: ArtHum, Div, Wrt.

140. Dostoevsky (in English) (4) III. Murav
Lecture—3 hours. Reading and analysis of Dostoevsky's principal works such as *Crime and Punishment, The Idiot, The Brothers Karamazov,* and *The Diary.* Study of social and political views as reflected in Dostoevsky's works. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

141. Tolstoy (in English) (4) I. Rancour-Laferriere
Lecture—3 hours. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his *Confession,* a major novel such as *War and Peace* or *Anna Karenina,* and representative shorter fiction. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***142. Women's Autobiography (in English)** (4) I. Murav
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: any introductory course in literature. An examination of Russian women's autobiography from the 18th through the 20th centuries, emphasizing the way in which the genre of autobiography serves as a means of the writer's creation of herself, as opposed to her definition by others. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***143. Alexander Solzhenitsyn** (4) II. Rancour-Laferriere
Lecture/discussion—3 hours; term paper. Prerequisite: any introductory literature course or consent of instructor. Examination of the literary and political writings of the major Russian dissident in the biographical context in which they were created. Knowledge of Russian not required. GE credit: ArtHum, Div, Wrt.

150. Russian Culture (4) III. The Staff
Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to nineteenth century. Russian art, music, philosophy, church, traditions, and daily life. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

151. Soviet Writers and Censorship (4) II. III. Druzhnikov
Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course from the GE Literature Preparation List or consent of instructor. Literature and censorship in the Soviet Union. Personal responsibility of the author vs. conformism to state morality. Soviet myths and Soviet realities. GE credit: ArtHum, Wrt.

***154. Russian Folklore** (4) III. Rancour-Laferriere
Lecture—3 hours; term paper. Knowledge of Russian not required. Russian folklore, rituals, and history will be analyzed and compared with folklore of other peoples. Sociological implications of attitudes toward family unit, children, etc. Influences of folklore on Russian literature and historiography. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

***160. Russian Phonology and Morphology** (4) II. Gallant
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 101A, 101B, or consent of instructor. Linguistic analysis of the Russian sound system and of Russian word-formation. Offered in alternate years.

166. Representations of Sexuality in Russian Literature (4) I. Rancour-Laferriere
Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written literature from a dual, feminist-psychoanalytic perspective. Monogamy, free love, sexism, homosexuality, incest, androgyny, and others as depicted by such writers as Pushkin, Gogol, Tolstoy, Dostoevsky, Akhmatova, Blok, Tolstaia, and others. GE credit: ArtHum, Div, Wrt.

192. Research Essay (2) I, II, III. The Staff
Prerequisite: a Russian literature course (may be taken concurrently). A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit.

194H. Special Study for Honors Students (4) I, II, III. The Staff
Independent study—4 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Russian studies.

195H. Honors Thesis (4) I, II, III. The Staff
Independent study—4 hours. Prerequisite: course 194H. Writing an honors thesis, under the direction of a faculty member, on a topic in Russian studies.

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

***200. Old Church Slavic** (4) I. Gallant
Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic. Offered in alternate years.

*Course not offered this academic year.

***202. History of the Russian Language** (4) II. Gallant
Seminar—3 hours; individual reading projects—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and development of Russian literary language. Reading in the original texts from eleventh to eighteenth century. Offered in alternate years.

***204. Descriptive Russian Grammar** (4) III. Gallant
Lecture—3 hours; reading projects—1 hour. Introduction to modern Russian phonology and morphology. Offered in alternate years.

***210A. Style and Syntax** (4) I. Druzhnikov
Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

***210B. Style and Syntax** (4) II. Druzhnikov
Discussion—3 hours; reading projects—1 hour. Prerequisite: course 210A or consent of instructor. Examination of stylistic differences between spoken and written Russian.

***210C. Russian Style and Syntax** (4) III. Druzhnikov
Discussion—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and talks on political, economical, social, and cultural topics, lead and participate in discussions. Conducted in Russian.

***220. Old Russian Literature** (4) II. The Staff
Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as *The Song of Igor's Campaign, Zadonshchina*, Epifany's *Lives,* Ivan IV's cycle of epistles. May be repeated for credit when topic differs. Offered in alternate years.

***221. Eighteenth-Century Russian Literature** (4) II. The Staff
Seminar—3 hours. Advanced study of literary movements and styles in prose or poetry. The works of writers such as Kantemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit topic differs. Offered in alternate years.

***222. Nineteenth-Century Russian Literature** (4) I. Rancour-Laferriere, Murav
Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when topic differs. Offered in alternate years.

***223. Early Twentieth-Century Russian Literature** (4) I. Rancour-Laferriere
Seminar—3 hours. Advanced study of one or more of the modernist movements in Russian literature, including Symbolism, Acmeism, and Futurism. May be repeated for credit when topic differs. Offered in alternate years.

***224. Soviet Russian Literature** (4) III. Rancour-Laferriere, Druzhnikov
Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the development of genres, schools, styles, techniques, and various formal elements. May be repeated for credit when topic differs. Offered in alternate years.

***230. Pushkin Studies** (4) I. Druzhinikov
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: graduate standing or consent of instructor. The life and works of Pushkin; the history of Pushkin studies up to and including present-day controversies about Pushkin. Evaluations of Pushkin by both Russian and Western scholars. Images of Pushkin and the official myths that surround him. Conducted in Russian; readings in Russian and English.

***231. Humor and Satire** (4) III. Druzhnikov
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Origin and value of humor and satire in 18th-20th century Russian literature. Humor and satire as psychological phenomena and in literary theory. Classical writers as satirists. Link between satire and democratization of Russia. Conducted in Russian; readings in Russian and English. Offered in alternate years.

***250. Languages of Culture: Formalism, Semiotics, and Dialogue** (4) I. Murav
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Critical paradigms of formalism, semiotics, and "post-Structural" methods of M. Bakhtin, viewed in their historical and philosophical contexts. Extensions and critical evaluations of these paradigms in literary criticism, history, anthropology.

***260. Psychoanalysis and Literature** (4) I. Rancour-Laferriere
Seminar—3 hours; term paper. Survey of psychoanalytic thinking from Freud, Jung, and Klein down to current object-relations theories. Application of psychoanalysis to literary works chosen by students participating in the seminar.

***298. Group Study** (1-5) I, II, III. The Staff (Director in charge)

***299. Research** (1-12) I, II, III. The Staff (Director in charge)
(S/U grading only.)

Professional Course

***300. The Teaching of Russian** (2) I. The Staff
Discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Workshop in language teaching methods. Students audit classes in progress and teach under faculty supervision. Required of new and prospective teaching assistants. (S/U grading only.)

Science and Society

(College of Agricultural and Environmental Sciences)

Susan B. Kaiser, Ph.D., Program Director

Ross B. MacDonald, Ph.D., Program Associate Director

Program Office, 228 Mrak Hall (916-752-8669)

Committee in Charge

Lynette A. Harta, Ph.D., Associate Professor *(School of Veterinary Medicine)*
Janet L. Hethorn, Ph.D., Assistant Professor *(Environmental Design)*
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing)*
Annie King, Ph.D., Associate Professor *(Avian Science)*
Ross B. MacDonald, Ph.D. *(Science and Society)*
David S. Reid, Ph.D., Professor *(Food Science and Technology)*
Howard G. Schutz, Ph.D., Professor Emeritus *(Food Science and Technology)*
John Stanfield, Ph.D., Professor *(African American and African Studies, Sociology)*
Ariena H.C. van Bruggen, Ph.D., Associate Professor *(Plant Pathology)*
Steven A. Weinbaum, Ph.D., Professor *(Pomology)*
Barry W. Wilson, Ph.D., Professor *(Avian Sciences, Environmental Toxicology)*

Faculty

Lynn Epstein, Ph.D., Associate Professor *(Plant Pathology)*
Ian Garnett, Ph.D., Senior Lecturer *(Animal Science)*
Thomas R. Gordon, Ph.D., Associate Professor *(Plant Pathology)*
Jan W. Hopmans, Ph.D., Associate Professor *(Land, Air, and Water Resources)*
Bruce A. Jaffee, Ph.D., Associate Professor *(Nematology)*
Adel A. Kader, Ph.D., Professor *(Pomology)*
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing)*
Ross B. MacDonald, Ph.D. *(Science and Society)*
James D. Murray, Ph.D., Professor *(Animal Science)*
Dan E. Parfitt, Ph.D., Lecturer *(Pomology)*
Kathryn Radke, Ph.D., Associate Professor *(Avian Sciences)*
David S. Reid, Ph.D., Professor *(Food Science and Technology)*
David Rizzo, Ph.D., Assistant Professor *(Plant Pathology)*
Pamela C. Ronald, Ph.D., Assistant Professor *(Plant Pathology)*
Joe J. Stasulat, Ph.D., *(Land, Air, and Water Resources)*
Brett M. Tyler, Ph.D., Professor *(Plant Pathology)*
Ariena H.C. van Bruggen, Ph.D., Associate Professor *(Plant Pathology)*
Steven A. Weinbaum, Ph.D., Professor *(Pomology)*
Linda S. Whent, Ph.D., Lecturer *(Agronomy and Range Science)*
Barry W. Wilson, Ph.D., Professor *(Avian Sciences, Environmental Toxicology)*

The Program. Science and Society is an interdepartmental teaching program administered by the College of Agricultural and Environmental Sciences that offers students throughout the campus the opportunity to discover the connections that link the social, biological, and physical sciences with societal issues and cultural discourses. Course work examines discovery processes in relation to societal values, public policy and ethics, including issues associated with cultural diversity. Whenever possible, outside the classroom opportunities are included as part of the learning experience.

The Science and Society teaching program serves students of all majors and interests. It can allow lower division students who have not yet declared a major a meaningful context for exploring diverse subject matters. The minor for the program includes, in addition to Science and Society courses, upper division courses from both the College of Agricultural and Environmental Sciences and the College of Letters and Science in the areas of History and Philosophy of Science, Policy and Decision Making, Communication of Science, and Culture, Ethics and Applications.

Related courses. See Agricutural and Resource Economics 120, 147, 148, Agricultural Systems and Environment 1, 101, 122, Animal Science/International Agricultural Development 102, Community and Regional Development 118, 162, 174, Avian Sciences 13, Environmental Studies 115, 126, 160, 164, 165, Fiber and Polymer Science 110, Geography 142, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Philosophy 104, Plant Biology 12, 104, Plant Pathology 140, Political Science 156, 175, Rhetoric and Communication 115, 140, Wildlife, Fish and Conservation Biology 10.

Minor Program Requirements:

UNITS

Science and Society 22-28
Science and Society 1 4
Science and Society 2, 5, 15, 20, 90A, 90B , 90C or 90X 2-4
Science and Society 120 or 170 3-4
One course from each of the four following areas:
History and Philosophy of Science: Community and Regional Development 118, 162, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Philosophy 104, 107, 108, or 109 4
Policy and Decision Making: Agricultural and Resource Economics 120, 147, 150, Consumer Science 100, Environmental Studies 160, 165, Political Science 175, Sociology 155, or 181 3-4
Communication of Science: Agricultural Education 172, Agricultural Systems and Environment 122, Anthropology 120, Community and Regional Development 174, 175, Linguistics 163, Political Science 165, Rhetoric and Communication 115, 130, 135, 138, 140, or 145 3-4

Culture, Ethics and Applications : Agricultural Systems and Environment 101, Community and Regional Development 142, Environmental Studies 126, 164, Fiber and Polymer Science 110, International Agricultural Development 104, Plant Biology 151, Plant Pathology 140, Science and Society 105, or Sociology 144 3-4

Minor Adviser: S.B. Kaiser.

Courses in Science and Society (SAS)

Lower Division Courses

1. Preparing for the 21st Century (4) I, II, III. The Staff
Lecture/discussion—3 hours; discussion—1 hour. Through an interactive panel format and discussion, contemporary issues and their role in the 21st century are creatively examined, including global population trends, economic and environmental changes, cultural diversity and biodiversity, nutrition and food safety, fiber and textiles, changing consumer cultures. GE credit: SciEng or SocSci, Div, Wrt.

2. Feeding the Planet: Influences on the Global Food Supply (3) II. Reid
Lecture/discussion—3 hours. Scientific principles and dynamic interactions involved in food production, food processing, nutrition, shelf life and marketing from differing viewpoints. Physical, biological and social science issues influencing the availability and safety of the food supply worldwide. GE credit: SciEng or SocSci, Wrt.

***3. Science, Technology and Society** (4) III. Kenney
Lecture—4 hours. Impact of developments in science and technology on the individual in society and how economics, politics, culture and values affect technological development. Not open for credit to students who have completed former course Applied Behavioral Sciences 18. GE credit: SciEng or SocSci, Wrt.

5. Pathways to Discovery: Science and Society (3) I, II, III. The Staff (Kaiser in charge)
Lecture/discussion—3 hours. Highlights a current issue and/or controversy found in contemporary society and looks at how this problem impacts and is affected by the physical, social and biological sciences. Course varies with topic offered. May be repeated twice for credit. GE credit: SciEng or SocSci, Wrt.

15. AIDS and Society (4) II. Radke
Lecture—3 hours; discussion—1 hour. Biology of HIV transmission and AIDS and how a biological agent acts on and influences the structure of contemporary society. Includes the psychology of risk and stigma, gender issues, changes in social relationships and public policy, global implications. GE credit: SciEng or SocSci, Div, Wrt.

20. Genetics and Society (3) III. Ronald, Tyler
Lecture/discussion—3 hours; two field trips. Examination of basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery and the public perception of the process. Presentation, evaluation and critical discussions of the present and future impact of genetics on society. GE credit: SciEng or SocSci, Wrt.

90A. Issues in Environmental and Resource Sciences (2) I, III. The Staff
Seminar—2 hours; two Saturday field trips. Prerequisite: limited to lower division students. Discussion of historical and current issues in environmental and resource sciences. Lectures, reading and field trips will provide background for selected topics.

90B. Observing and Writing in Biology (2) I. Jaffee
Seminar—1 hour; laboratory—1 hour; term paper. Students will observe the interactions between microscopic organisms, conduct simple laboratory experiments, describe and analyze observations and discuss scientific observations and writing.

90C. Herbal Medicine: Rejuvenation and Relevance for the 21st Century (2) II. Weinbaum
Seminar—2 hours; one Saturday field trip. Discussion of the historical and current usage of medicinal plants in both traditional cultures and our own culture. Both supportive and negative as well as rational and irrational viewpoints will be covered. Field trip will teach herb identification.

90X. Lower Division Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Science and Society through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May be repeated for credit. Limited enrollment.

92. Internship in Science and Society (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship on and off campus, in the community, or in institutional settings. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Discussion—3-15 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Courses

105. Organismal Interactions in Everyday Life (3) II. van Bruggen
Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 10 or 1A. Ecology and evolution of organismal interactions and the importance of these interactions to human health and welfare and a sustainable environment. Students will debate environmental issues on scientific, political, and ethical grounds. GE credit: SciEng, Wrt.

120. Science and Contemporary Societal Issues (3) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: upper division standing. Study of a contemporary societal issue/problem emphasizing critical thinking with information drawn from several disciplines. Multiple instructors illustrate the necessity of an interdisciplinary and cooperative approach in solving important issues. Topic will vary. May be repeated once for credit. GE credit: SciEng or SocSci, Wrt.

190X. Upper Division Seminar (1-4) I, II, III. The Staff
Seminar—1-4 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Science and Society. Emphasis upon student participation in learning. May be repeated for credit. Limited enrollment.

192. Internship in Science and Society (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship on or off campus, in the community, or in institutional settings. (P/NP grading only.)

197T. Tutoring in Science and Society (1-5) I, II, III. The Staff
Tutoring—3-15 hours. Prerequisite: upper division standing; completion of course being tutored or the equivalent. Tutoring of students in Science and Society courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another Science and Society course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Science and Society (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Social and Ethnic Relations

(College of Letters and Science)

The interdisciplinary minor in Social and Ethnic Relations explores the racial, ethnic, class and gender aspects of human relations in the modern world. Students study human societies and cultures from a multi-ethnic perspective and across established academic departmental lines. The minor is jointly sponsored by the African American and African Studies Program, the Asian American Studies Program, the Department of Native American Studies, and the Women's Studies Program.

Minor Program Requirements:

UNITS

Social and Ethnic Relations 24

Select one course from each of the following six groups to total 24 units. Courses applied toward the satisfaction of a major may not also be offered in satisfaction of the minor. No more than four units (one course) may be lower division.

(a) African American and African Studies 100; Anthropology/Native American Studies 134; Women's Studies 102

(b) African American and African Studies 123, 133, 145A

(c) Asian American Studies 1, 2, 100, 110, 130

(d) Chicana/o Studies 130, 132

(e) Native American Studies 1, 10, 130A, 130B, 130C, 157, 180

(f) Women's Studies 103, 104, 180

Advising. Contact the African American and African Studies Program, 280 Kerr Hall, 916-752-1548.

Social Theory and Comparative History

William W. Hagen, Ph.D., Program Director and Professor *(History)*

Program Office, 2231 Social Sciences and Humanities Building (916-752-8707)

Graduate Study. The program comprises course work and research leading to the Ph.D. with a designated emphasis in Social Theory and Comparative History. The program provides theoretical training and interdisciplinary perspective to Ph.D. candidates in the five participating departments (Anthropology, Economics, History, Political Science, Sociology). Students from other departments are also welcome. All students must fulfill all Ph.D. requirements of their home department. The additional requirements leading to the designated emphasis include: *(1)* four graduate courses (Social Theory and Comparative History 250 or History 204, Sociology 242A, and two courses sponsored by the Social Theory and Comparative History program, one of which must be offered by a department other than the student's home department); *(2)* presentation of a Social Theory and Comparative History field as one area of specialization in the departmental Ph.D. qualifying examination; *(3)* an oral discussion, following passage of the Ph.D. qualifying examination, based on the student's dissertation prospectus; *(4)* completion of the dissertation to the satisfaction of the student's thesis committee, one of whose members will be a representative of the Social Theory and Comparative History program.

Graduate Adviser. Consult the Program Office for advising and detailed information on application and requriements.

Courses in Social Theory and Comparative History (STH)

Graduate Courses

250. Research in Social Theory and Comparative History (4) I. The Staff
Seminar—3 hours; term paper. Prerequisite: admission to Social Theory and Comparative History Designated Emphasis. Theoretically informed research in comparative history. Students read exemplary works and learn to frame their own research projects. Presentations include Center for Comparative Research faculty and visitors discussing current research.

290. Advanced Topics in Social Theory and Comparative History (4) I, II, III. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor and History 204 or Sociology 242A. Interdisciplinary study of particular substantive problems in social theory and comparative history. Topics vary.

295. Advanced Group Research in Social Theory and Comparative History (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Participation in research workshops sponsored by the Center for Comparative Research in History, Society, and Culture. May be repeated for credit. (S/U grading only.)

Sociology

(College of Letters and Science)

Lyn H. Lofland, Ph.D., Chairperson of the Department

Department Office, 1282 Social Sciences and Humanities Building (916-752-0782)

Faculty

Nicole W. Biggart, Ph.D., Professor *(Sociology, Management)*
Fred Block, Ph.D., Professor
Lawrence E. Cohen, Ph.D., Professor
James C. Cramer, Ph.D., Associate Professor
Diane H. Felmlee, Ph.D., Associate Professor
Luis Guarnizo, Ph.D., Assistant Professor *(Human and Community Development)*
Jack A. Goldstone, Ph.D., Professor
T. Ryken Grattet, Ph.D., Assistant Professor
John R. Hall, Ph.D., Professor
Frank Hirtz, Ph.D., Assistant Professor *(Human and Community Development)*
Mary Jackman, Ph.D., Professor
Carole E. Joffe, Ph.D., Professor *(Sociology, Women's Studies)*
Carl C. Jorgensen, Ph.D., Associate Professor
David J. Kyle, Ph.D., Assistant Professor
Ming-Cheng Lo, Ph.D., Assistant Professor
Lyn H. Lofland, Ph.D., Professor
Donald A. Palmer, Ph.D., *(Management)*
Belinda Robnett, Ph.D., Assistant Professor *(Sociology, Women's Studies)*
Kimberlee A. Shauman, Ph.D., Assistant Professor
Vicki Smith, Ph.D., Associate Professor
Judith Stacey, Ph.D., Professor *(Sociology, Women's Studies)*
John H. Stanfield, Ph.D., *(African American and African Studies, Sociology)*
John T. Walton, Ph.D., Professor *(Anthropology, Sociology)*
Diane L. Wolf, Ph.D., Associate Professor

Emeriti Faculty

Bruce M. Hackett, Ph.D., Professor Emeritus
John F. Lofland, Ph.D., Professor Emeritus
Leon H. Mayhew, Ph.D., Professor Emeritus
Julius A. Roth, Ph.D., Professor Emeritus
John F. Scott, Ph.D., Professor Emeritus

The Major Programs

Sociology is the study of human society in all its manifestations. Its aim is to discover the process and structure of human interaction, to identify the main forces that sustain or weaken social groups, and determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellectual quest for knowledge about the fundamental nature of things.

The Program. The Department of Sociology offers two major programs, Sociology and Sociology–Organizational Studies.

Students selecting the Sociology major may choose from four options offered within this major. The *General* Sociology emphasis allows students to obtain a broad understanding of the concepts, methods, and theories of sociology. This option is designed for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. Students with a special interest in the areas of *Law and Society* or *Social Services* may choose a more specialized program of courses and practical experience within the sociology major. These options prepare students for careers in such areas as law, corrections, social work or counseling. The *Comparative Studies and World Development* emphasis provides a sociological perspective on social and economic changes throughout the world, with a stress on relationships between "developed" and "underdeveloped" societies. It prepares students for graduate training leading to careers in international fields. Students are encouraged to consider the Education Abroad Program for their junior year, especially one in a developing country.

The Sociology–Organizational Studies major develops a broad understanding of the political, social, and economic organizations that comprise modern society. This major emphasizes a sociological perspective, but incorporates a multidisciplinary field of study. The major introduces students to a range of theories and methods that social scientists use in the analysis of organizations. Majors in Sociology–Organizational Studies will be prepared for a variety of career options, particularly in the field of management. The major specifically meets entry requirements for programs of professional training leading to a Masters degree in public or private management, and may also lead to further study in any of the disciplinary areas incorporated in the major.

Sociology

A.B. Degree Requirements:

General emphasis:

UNITS

Preparatory Subject Matter 24-25
Sociology 1, 2, or 3; 46A and 46B (or the equivalents) 12-13
Select units from Anthropology 2, 20 4
Select units from History 4A, 4B, 4C, 8, 9A, 9B, 10, 15, 16, 17A, 17B 4
Select units from Philosophy 5, 6, 14 4

Depth Subject Matter 44
A. Sociology 100 4
B. Select one course from each of the following four clusters 16

Individual, Culture and Society:
Sociology 125, 126, 135 4

Stratification and Social Differentiation:
Sociology 130, 132, 140 4

Organizations and Institutions:
Sociology 118, 131, 146, 180A 4

Social Dynamics:
Sociology 141, 143A, 170 4

C. Select three upper division courses from one of the following clusters (not counting courses taken to fulfill requirement B) ..12

Individual, Culture and Society:
Sociology 120, 122, 125, 126, 127, 128, 129, 131, 132, 134, 135, 143B, 148, 150, 152, 172, 173, 175, 176

Stratification and Social Differentiation:
Sociology 118, 128, 129, 130, 132, 133, 134, 140, 145A, 145B, 172, 185, and not more than one of the following courses: African American and African Studies 123, Asian American Studies 100, Chicano/a Studies 110, or Native American Studies 115

Organizations and Institutions:
Sociology 118, 119, 124, 131, 133, 139, 144, 146, 149, 150, 154, 155, 159, 180A, 180B, 181, 182, 183, 185

Social Dynamics:
Sociology 123, 125, 138, 141, 143A, 145A, 145B, 147, 148, 156, 157, 170

Student-initiated thematic cluster
developed with a faculty adviser and approved by the Sociology Undergraduate Curriculum Committee

D. Eight units of Sociology beyond courses taken to fulfill above requirements, and outside of the course cluster used to fulfill requirement C.
E. One integrative course (prerequisite: senior standing and completion of requirement for Preparatory Subject Matter, Depth Subject Matter, requirement A, and at least two of the courses for requirement B). Choose from Sociology 190X, 191, 194HA-194HB.

Total Units for the Major 68-69

(General emphasis)

Law and Society emphasis:

UNITS

Preparatory Subject Matter 29
Sociology 1, 3; 46A and 46B (or the equivalents†) 17
Select units from Anthropology 2, 20 4
Select units from History 4A, 4B, 4C, 8, 9A, 9B, 10, 15, 17A, 17B 4
Select units from Philosophy 5, 14 4

Depth Subject Matter 44
Sociology 100 4
Select units from Sociology 125, 126, 135 ...4
Select units from Sociology 130, 132, 140 ...4
Select units from Sociology 118, 131, 146, 180A 4
Sociology 155 4
Select units from Sociology 120, 150, 152 ...8
Select units from Sociology 118, 148, 156, 157; no more than one of the following courses: Philosophy 119, Political Science 122, 154, Environmental Studies 161; no more than one of the following courses: African American and African Studies 121, 145, Asian American Studies 155, Chicano/a Studies 130, 132, Native American Studies 117, 118 12
Select from Sociology 190X, 192, 194HA-194HB 4
(Required prerequisite: senior standing and completion of Sociology 100 and 8 units from Sociology 118, 125, 126, 130, 132, 135, 140, 146, 180A.)

Total Units for the Major 73

(Law and Society option)

Social Services emphasis:

UNITS

Preparatory Subject Matter 28
Sociology 2, 3; 46A and 46B (or the equivalents†) 16
Psychology 1 4
Select units from African American and African Studies 10, 15; Asian American Studies 1, 2; Chicano Studies 10, 20; Native American Studies 10, 70 8

Depth Subject Matter 44
Sociology 131, 140, 185 12
Select units from upper division human psychology 4

Select seven courses distributed as specified 28
Social Issues:
Sociology 119, 120, 122, 124, 139, 143A, 144, 146, 150, 152, 154, 155, 170 8
Social Interaction:
Sociology 126, 127, 128, 143B, 148, 157 4
Race and Ethnicity:
African American and African Studies 100; Community and Regional Development 176; Asian American Studies 110, 111, 150; Chicano Studies 110; Native American Studies 112, 124; Sociology 129, 130 134 4
Gender:
Sociology 132, 133, 145B, 172 4
Organizational Behavior:
Sociology 158, 180A, 180B, 181, 182, 183 4
Methodology:
Sociology 103, 106 (or the equivalents†), 192, 194HA, 194HB 4

Total Units for the Major 72

(Social Services option)

Comparative Studies and World Development emphasis:

UNITS

Preparatory Subject Matter 30–57
Sociology 1; 46A and 46B (or the equivalents†) 13
Economics 1A, 1B 10
Anthropology 2 4
At least 4 units from Geography 2-2G, History 10, Political Science 2 4
Course work in language instruction in modern foreign language equivalent to 26 units at UCD 26

Depth Subject Matter 48
Sociology 100, 141, 145A, 170 16
Economics 115A, Anthropology 126 8
At least twelve units from Sociology 118, 130, 131, 143A, 144, 145B, 156 12
Regional focus, three courses from one of the following groups 12
(a) *Africa/Middle East:*
Anthropology 140A, 140B, 142, Economics 175, Geography 125A, 125B, History 115A, 115B, 115C, 116, Political Science 134, 146
(b) *Latin America/Pacific:*
Anthropology 144, 147, Geography 122A, 122B, History 161A, 161B, 162, 165, Spanish 135, 136
(c) *Asia:*
Anthropology 149, Economics 171, 172, 173, Geography 126, 127, History 193, 194A, 194B, 194C, Political Science 138, 148A, 148B, Religious Studies 168, 172, Sociology 147

Total Units for the Major 79-105

(Comparative Studies and World Development)

Sociology—Organizational Studies

A.B. Degree Requirements:

UNITS

Preparatory Subject Matter 27
Sociology 1, 2, 46A, 46B (or Statistics 13) 17
Economics 1A, 1B 10

Depth Subject Matter 44
Sociology 180A, 180B 8
Sociology 106 4
Select units from Psychology 183, Rhetoric and Communication 130, 136 4
Select 16 units from one of the following two clusters and select 4 units from the other cluster 20
(1) Public Administration
Community and Regional Development 158, 163, 168, Economics 151B, Political Science 107, 180, 181, 183, 187, 188, Sociology 103, 181.
(2) Business and Society
Agricultural and Resource Economics 112, American Studies 125, Community and Regional Development 162, 164, Economics 116, 121A, 1231B, History 187A, 187B, 194D, Sociology 138, 139, 159, 183.
Select units from Sociology 128, 130, 132, 140, 145A, 145B, 172 4
Select from Sociology 190X, 192, 194HA-194HB 4
(Required prerequisite for 190X or 192: senior standing and completion of all major requirements other than 12 units of the cluster requirements.)

Total Units for the Major 71

Major Advisers. Consult the Departmental Advising Office, 1282 Social Sciences and Humanities Building.

Honors Program. An Honors Program is available to Sociology and Sociology–Organizational Studies majors who have demonstrated excellence in their field of study. To be eligible for the program, students must have a grade-point average of 3.5 in the major and the recommendation of a faculty sponsor familiar with their work. In addition to meeting the standard major requirements, the honors student writes an honors thesis and participates in a two-quarter honors seminar (course 194HA-194HB). Successful completion of the Honors Program, when combined with College GPA requirements, enables the student to graduate with Highest Honors or with High Honors.

Minor Program Requirements:

Students in other disciplines may elect to minor in Sociology by choosing a sociological subject emphasis listed below. On transcripts, the minor will appear as a minor in Sociology.

UNITS

Sociology 20

Sociology–General emphasis
Select units from Sociology 100, 126, 140, 170, 180A 8
One course from three clusters (see cluster lists under Sociology Major—General Emphasis) 12

Sociology–Organizational Studies emphasis
Sociology 180A and 180B 8
Select units from Agricultural and Resource Economics 112, American Studies 125, Community and Regional Development 162, 163, 164, Economics 100, Political Science 180, 181, 183, 187, 188, Psychology 183, Rhetoric and Communication 134, 136 8
Select units from Anthropology 122, History 174A, 179, 187A, 187B, 194D, Sociology 118, 139, 141, 156, 159, 175, 181, 183...4

Sociology–Social Service emphasis
Sociology 185, plus 4 units selected from Sociology 131, 132, 133, 145B 8
Four units from Sociology 129, 130, 133, 134, 140, 172 4
Four units from Social Issues cluster and four units from Social Interaction cluster (See cluster lists under Sociology Major—Social Services emphasis) 8

Sociology–Law and Society emphasis
Sociology 155, plus 4 units selected from Sociology 120, 150, 152 8
Four units from Sociology 129, 130, 131, 132, 133, 134, 172 4
Four units from Sociology 118, 139, 140, 141, 145A or 145B, 180A or 180B, 185 4
Four units from Sociology 100, 122, 124, 126, 128, 143A or 143B, 156, 157, or 191 4

Minor Advisers. Consult the departmental Advising Office, 1282 Social Sciences and Humanities Building.

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information and applications regarding graduate study may be obtained at the department office.

Graduate students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Women's Studies, Social Theory and Comparative History, or Native American Studies. See these headings for further details on these interdisciplinary programs.

Graduate Advisers. Consult the Graduate Administrative Assistant, 1289 Social Sciences and Humanities Building.

Courses in Sociology (SOC)

Lower Division Courses

1. Introduction to Sociology (5) I. The Staff; III. Kyle
Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality. GE credit: SocSci.

2. Self and Society (4) I. Felmlee; II. The Staff; III. L. Lofland
Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociological social psychology. Includes the study of the character of the self, identity, roles, socialization, identity change, emotion and social interaction. GE credit: SocSci, Wrt.

3. Social Problems (4) I, II. The Staff; III. Robnett
Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement. GE credit: SocSci, Wrt.

4. Immigration and Opportunity (4) III. Cramer
Lecture—3 hours; discussion—1 hour or term paper. Social and demographic analysis of immigration: motives and experiences of immigrants; immigration and social mobility; immigration, assimilation, and social change; multicultural societies. Detailed study of immigration into the U.S., with comparative studies of Europe, Australia, and other host countries. GE credit: SocSci, Div, Wrt.

5. Global Social Change: An Introduction to Macrosociology (4) I. Goldstone
Lecture—3 hours; discussion—1 hour. An introduction to change and diversity in world history, including the United States. Examines population and family, technological change and economic development, power and status, culture and identity. GE credit: SocSci, Div, Wrt.

25. Sociology of Popular Culture (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Social mechanisms that shape modern popular culture. High, folk, and mass culture: historical emergence of popular culture. Mass media, commercialization, ideology and cultural styles. Theories and methods for analyzing cultural expressions in pop music, street art, film, television, and advertising. GE credit: SocSci, Wrt.

46A. Introduction to Social Research (4) I. The Staff; II. Lo
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling.

46B. Introduction to Social Research (4) II. Felmlee; III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

90X. Lower Division Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in sociology through shared readings,

*Course not offered this academic year.

discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May *not* be repeated for credit. Limited enrollment.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Classical and Modern Sources of Sociological Theory (4) II. Hall; III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Historical introduction of sociological thought, with special reference to its 19th-century origins and 20th-century lines of development. Consideration of theoretical texts may include works of Marx, Durkheim, Simmel, early critical theorists, Parsons, and the Chicago School. Not open for credit to students who have received credit for course 165A. GE credit: Wrt.

103. Evaluation Research Methods (4) I. The Staff
Lecture—3 hours; discussion—1 hour or field research (instructor's option). Prerequisite: course 46A and 46B, or Statistics 13 or the equivalent. Surveys applications of research methods to the evaluation of social programs, primarily emphasizing methodological issues, e.g., research design and data collection; uses of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project.

106. Intermediate Social Statistics (4) I. Shauman; III. Cramer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 46B or Statistics 13 or the equivalent. Intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures, and mathematical models especially relevant to sociological analysis.

118. Political Sociology (4) I. Goldstone; III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

***119. Peace Institutions** (4) II. J. Lofland
Lecture—3 hours; discussion—1 hour or term paper or project. Survey and analysis of private and public groups and organizations working for world peace by means other than preparing for war or supporting such preparations. Particular focus on peace institutions in the political, economic, scientific, religious, and educational realms.

120. Deviation and Society (4) I, II. Gratlet
Lecture—3 hours; discussion—1 hour or term paper or research project. Theory and studies of deviation in relation to societal reaction, group processes and social roles. Stigma and incapacity; cosmetic defect. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society. GE credit: Wrt.

122. Sociology of Adolescence (4) II. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural problem.

123. American Society (4) I. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. The demographic and social structure of American society and population, with emphasis on ethnic and class groups as bases for political and economic interest. Attention to selected current social controversies.

***124. Sociology of Education** (4) I. The Staff
Lecture—3 hours; term paper or discussion—1 hour (instructor's option). Education and the social structure. Class size, curriculum, and economies of scale. Relations between families and schools in socialization; familial ascription and educational achievement. Education and industrialization. Organizational and occupational structure of schools. Discussion of selected controversies.

125. Sociology of Culture (4) I. Hall
Lecture/discussion—3 hours; term paper. Sociological approaches to study of historical and contemporary culture and mass media, and their structuring in relation to social actors, institutions, stratification, power, the production of culture, audiences, and the significance of culture in processes of change. Offered in alternate years. GE credit: SocSci.

126. Social Interaction (4) III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 2. Everyday interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis. GE credit: Wrt.

127. Sociology of Death (4) I. L. Lofland
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Overview of attitudes toward, structural effects of, and methods of coping with death and death-related behaviors. Particular attention to social psychological aspects of death and dying, to death occupations, and to death rituals in various cultures. GE credit: Wrt.

128. Interracial Interpersonal Dynamics (4) II, III. Jorgensen
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: one course from courses 1, 2, 3, Afro-American Studies 10, Asian American Studies 1, 2, Chicano Studies 10, Native American Studies 1, 20. Analysis of the influences of cultural differences and racial stratification on interpersonal interaction in instrumental settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minority/majority relationships. GE credit: Div, Wrt.

129. Sociology of Black Experience in America (4) II. Jorgensen
Lecture—3 hours; discussion—1 hour or research or term paper (instructor's option). Survey of historical and contemporary theoretical sociological perspectives on the Black experience in United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologists. GE credit: Div.

130. Race Relations (4) I. Jorgensen; III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Functions of the social definitions of race and racial groups. Analysis of racial conflict, oppression, and other forms of ethnic stratification. Models of ethnic interaction and social change. Emphasis on racial relationships within the U.S. GE credit: Div.

131. The Family (4) I, III. The Staff
Lecture—3 hours; discussion—1 hour. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the social implications of family transformation. GE credit: SocSci, Div, Wrt.

132. The Sociology of Gender (4) I. Robnett; II. The Staff
Lecture—3 hours; discussion—1 hour. Analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society, drawing on a historical and comparative perspective. Offered in alternate years. GE credit: SocSci, Div.

***133. Sexual Stratification and Politics** (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 or the equivalent or consent of instructor. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theorists such as Engels, Freud, J.S. Mill, de Beauvoir, Juliet Mitchell, D. Dinnerstein. Attention to selected issues in social movements for and against sexual equality. GE credit: Div.

***134. Sociology of Racial Ethnic Families** (4) II. The Staff
Lecture—3 hours; discussion—1 hour or term paper. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are considered in relation to socio-historical dynamics. Offered in alternate years. GE credit: Div, Wrt.

135. Social Relationships (4) II. Felmlee
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 1, 2 or 3, and upper division standing. Social and cultural factors influencing friendships and intimate relationships. Topics include relationship development, relationship maintenance, and relationship loss. Offered in alternate years. GE credit: Div, Wrt.

138. Economic Sociology (4) II. Block
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or 1B and upper division standing in the social sciences. Overview of the rapidly growing field of economic sociology. Focus on variations in the ways that markets are organized. The relationship between individual and collective rationality will also be emphasized. Offered in alternate years.

139. Corporations and Society (4) I. Block
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or 2 or 3, and upper division standing. The study of the history and power of the modern corporation; corporate organization; politics, the state, and the corporation; labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism.

140. Social Stratification (4) I. The Staff; II. Shauman
Lecture—3 hours; discussion—1 hour or term paper or research project (instructor's option). Systems of social ranking, theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure.

141. Industrialization and Social Change (4) I. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries. GE credit: Wrt.

***142. Sociology of Transportation** (4) III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological factors in transportation. Consequences of transport mode development on social organization, sociological influences in transport mode choice. Transportation issues in public policy.

***143A. Urban Society** (4) I. L. Lofland
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Theories of city origins. Analysis of the historic process of urbanization and of varying city types. Comparison of American and European experience of metropolitanization, counterurbanization, and neighborhood change. Consideration of competing theories of urban growth and change and competing visions of the urban future. Offered in alternate years.

***143B. Sociology of City Life** (4) I. L. Lofland
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1

or the equivalent; course 143A recommended. Critical dissection of the "loss of community" issue. Analysis of the organization of primary ties in the city, of the culture of urban public life and of the learning of city skills. Offered in alternate years. GE credit: Wrt.

***144. Agriculture and Society** (4) Walton, Wolf
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: advanced standing in the social sciences or one year of course work in agricultural and environmental sciences. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor force and family farms. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. Offered in alternate years.

145A. Sociology of Third World Development (4) II. Kyle
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; upper division standing. Introduction to theories and contemporary issues in the sociology of development. Topics such as urbanization, rural/agrarian change, class, status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes are analyzed within a comparative-historical framework. GE credit: Div, Wrt.

145B. Gender and Rural Development in the Third World (4) III. Wolf
Seminar—4 hours. Prerequisite: course 1; upper division standing. Political-economic analysis of women and work during the process of socioeconomic change in the world with particular attention to the family/household context. Offered in alternate years. GE credit: Div, Wrt.

***146. Sociology of Religion** (4) II. Hall
Lecture—3 hours; discussion—1 hour or term paper or research project. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Secularization in the modern world and the rise of secular ideologies. Offered in alternate years. GE credit: SocSci, Div, Wrt.

147. Sociological Perspectives on East Asia (4) II. Lo
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. Offered in alternate years.

***148. Collective Behavior** (4) The Staff
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Study of behavior of human crowds and masses in extraordinary circumstances, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions.

149. Religion and American Society (4) II. Hall
Lecture—3 hours; class project. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Civil religion, religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social institution, and religion, politics, and social stratification. Offered in alternate years. GE credit: Div, Wrt.

150. Criminology (4) I, III. Cohen
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of criminal behavior in relation to social structure and the criminalization process.

152. Juvenile Delinquency (4) I. The Staff; II. Cohen; III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control.

154. Sociology of Health Care (4) III. Joffe
Lecture—3 hours; discussion—1 hour or term paper or research project. Overview of sociological research in medicine and health care, with emphasis on the organizational, institutional, and social psychological aspects.

155. Sociology of Law (4) I, II. Grattet, III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform.

156. Social Movements (4) I. J. Lofland; III. Lo
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Analysis of several aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, development, effects. Frequent use of sound and film materials. GE credit: SocSci.

***157. Social Conflict** (4) III. J. Lofland
Lecture—3 hours; discussion—1 hour or term paper or project. Analysis of the causes, dynamics, and regulation of social conflict within and between various kinds of social groupings with particular reference to nonviolent methods of waging and regulating conflict.

***158. Consumer-Vendor Relationships** (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Examine the relationship between consumers and the vendors of goods and services using case materials, student projects, and relevant literature in sociology and related fields. Emphasis will be on organizational structure and bargaining power.

159. Sociology of Occupations (4) III. Smith
Lecture—3 hours; discussion—1 hour or term paper or research project. Natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines, and occupational-related self-definitions; occupational politics.

***170. Population** (4) II. Cramer
Lecture—3 hours; discussion—1 hour or term paper or research project. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, socio-psychological factors affecting fertility. GE credit: SocSci.

172. Ideology of Class, Race and Gender (4) I. Jackman
Lecture—4 hours. Examination of popular belief systems that accompany relations between social classes, whites and blacks, and men and women in the United States. How do dominant groups attempt to justify each relationship, and is there ideological conflict or consensus between groups. GE credit: Div, Wrt.

***173. Sociology Through Literature** (4) Walton
Lecture—3 hours; discussion—1 hour or term paper or research project. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc. Offered in alternate years.

***175. Mass Communication** (4) III. Lofland
Lecture—3 hours; term paper. Prerequisite: course 1 or 2. Examines the relationship between the media and social structures. History of media–state relations. Media as reflector and shaper of values. Emphasis on current European and Marxist and pluralist theories rather than on content analysis. Offered in alternate years.

***176. Sociology of Knowledge** (4) I. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Critical analysis of the social foundations of knowledge in society. The history, problems and dilemmas in classical sociology of knowledge. Contemporary applications. Natural and social sciences as social systems. Sociology of personal knowledge in everyday life.

180A. Complex Organizations (4) II. Smith
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1; Economics 1A and 1B recommended. Develops a sociological approach to organizations theory. Designed to introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis.

180B. Complex Organizations (4) III. Smith
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of instructor. Builds on concepts and skills developed in course 180A. Deals with the issues of organizational decision making, design, and survival. Emphasis on relations between organizations and the effects of those relations in both the public and private sectors.

181. Social Change Organizations (4) II. J. Lofland
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 1. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations and grassroots citizen groups. Topics treated include formation, decision making and leadership, strategies and tactics, factionalism and coalitions, effectiveness. Offered in alternate years. GE credit: Wrt.

***182. Experimental and Utopian Communities** (4) III. Hackett
Lecture—3 hours; discussion—1 hour. The social structure of intentional, experimental or Utopian settlements and communitarian movements, including comparison with other small settlement forms: villages, neighborhoods, monasteries, encampments and nonsettlement communities based on occupation, ethnicity, and religion.

183. Comparative Organizations (4) I. Biggart
Lecture/discussion—3 hours; term paper. Prerequisite: course 180A or 180B; upper division standing. Examination of economic and political organizations of major industrial nations. Discussion of historical, cultural, social, and political influences on industrial patterns and practices, alternative theoretical models for explaining differential development. Societies may include Sweden, Japan, Germany, Taiwan, and South Korea. Offered in alternate years.

185. Sociology of Social Welfare (4) II. Joffe; III. The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of the evolution and current organization of welfare functions in modern societies.

***189. Social Science Writing** (4) II. Walton
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 46A, upper division standing, and 12 units of social science. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing. Offered in alternate years.

190X. Seminar in Sociological Anaysis (4) III. Hall
Seminar—3 hours; term paper. Prerequisite: upper division standing and course 100 (former course 165A). In-depth examination at an upper division level of a special topic in Sociology. Emphasis on student participation in learning. May *not* be repeated for credit. Limited enrollment.

***191. Workshop in Contemporary Sociological Theory** (4) III. The Staff
Lecture—2 hours; workshop—1 hour; term paper. Prerequisite: course 100 (former 165A) and senior standing. Workshop in contemporary sociological theory that allows students to explore the uses of theory in empirical inquiry on problems of interest to students. Contemporary theory considered in relation to classical and modern influences, concept formation, theory construction, and explanation. Not open for credit to students who have received credit for course 165B.

192. Internship and Research Practicum (2-12) I, II, III. The Staff
Internship—3-33 hours; discussion—1 hour. Prerequisite: upper division standing; course 46A; approval of proposed internship. Supervised internship and

*Course not offered this academic year.

study in an agency, organization or institution; application of core concepts in sociology to the work experience. May be repeated for credit only by permission. Maximum of 4 units of course 192 may be counted toward the Sociology major. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4) I-II. Block
Seminar—3 hours; term paper. Prerequisite: senior standing and admission to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty adviser. (Deferred grading only pending completion of sequence.)

195. Special Topics in Sociological Analysis (4) III. Kyle
Seminar—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. In-depth examination of topics in sociology. Emphasis on student research and writing. May be repeated for credit when topic differs.

197T. Tutoring in Sociology (1-4) I, II, III. The Staff
Tutorial—3-12 hours. Prerequisite: upper division standing; completion of appropriate course with distinction. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, and leading discussion groups. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: open to seniors only. (P/NP grading only.)

Graduate Courses

201. Social Research (4) II. Jackman
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing, or consent of instructor. Survey of sociological inquiry, taught as practicum. Philosophy of social science; values and research; research agendas and research problem formulation; research process; explanation vs. interpretation; study design; concept formation, measurement, sampling, data acquisition, inference; rhetoric and presentation of findings.

206. Quantitative Analysis in Sociology (4) I. Cohen
Lecture—4 hours. Prerequisite: course 106. Survey of the statistical models and methods that serve as a foundation for quantitative research in sociology, with an emphasis on multivariate regression analysis, as well as measurement theory and time series analysis. (S/U grading only.)

***207A-207B. Methods of Quantitative Research** (4-4) I. Felmlee; II. Shauman
Lecture—3 hours; paper. Prerequisite: course 106 or the equivalent. Principles of study design, examination of measurement, survey research methods and multivariate analysis. Course will stress actual practice of techniques. Students will carry out quantitative data analysis using packaged computer programs. (Deferred grading only, pending completion of sequence.)

215. Economy, Polity, and Society (4) III. Block
Seminar—3 hours; paper. Prerequisite: consent of instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy.

***220. Deviance, Law, and Social Control** (4) I. Cohen
Seminar—3 hours; projects. Prerequisite: course 120 or consent of instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects.

***225. Cultural Sociology** (4) II. Walton/Hall
Seminar—3 hours, term paper. Explores the varied ways in which culture is understood in the social sciences and the research questions that follow from contrasting viewpoints. The approach is historically informed and focused on changing cultural forms in relation to industrialization and post-modernism. Offered in alternate years.

***226. Sociological Social Psychology** (4) I. L. Lofland
Seminar—3 hours; seminar paper—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced study of the varying approaches, methods, issues and topical concerns of sociological social psychology. Analysis of central and representative historical and contemporary works.

***227. Sociology of Reproduction** (4) II. Joffe
Lecture—3 hours; discussion—1 hour. Recent social science scholarship in such areas as teenage pregnancy, family planning, abortion, adoption, AIDS, and new reproductive technologies; focus on the current situation in the United States. Offered in alternate years.

230. Ethnic (Race) Relations (4) I. Jackman
Lecture—3 hours; paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research.

***234. Gender, Family, and Society** (4) II. Wolf
Seminar—3 hours; seminar paper. Prerequisite: graduate standing or consent of instructor. The major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalist, Marxist, psychoanalytic, feminist and critical theoretical approaches to these subjects (e.g., Engels, Parsons, Freud, Horkheimer, Goode, Lasch, Mitchell). Emphasis on macro and historical questions.

***242A-242B. Comparative Methods in Historical Sociology** (4-4) II-III. Goldstone
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relevance of psychological and sociological theories to historical interpretation; the verifiability of historically grounded hypothesis; the meaning of analogy, correspondence and causality. Offered in alternate years. (If taken as a sequence, deferred grading only, pending completion of sequence.)

***243. Urban Society** (4) L. Lofland
Seminar—3 hours; paper. Broad overview of the issues and concerns of the field of urban sociology. Special emphasis on the human experience of urban living in contemporary, cross-cultural or historical settings.

***245. Developing Societies** (4) III. Walton
Seminar—3 hours; term paper or project. Prerequisite: graduate student status or familiarity with problems of developing societies. Analysis of social and economic problems of developing societies from the standpoint of theory and research on modernization and underdevelopment. Nature of third world dependency and interdependence in the global political economy. Offered in alternate years.

***248. Social Movements** (4) I. J. Lofland
Seminar—3 hours; paper. Analysis of current issues in and contributions to the study of collective behavior and social movements; particular focus upon the strategies and tactics of social movements.

***254. Sociological Issues in Health Care** (4) I. The Staff
Seminar—3 hours; paper. Prerequisite: open to graduate or professional students. Sociological perspectives and methods directed to health care issues. Students select topics for supervised research. The course will have a theme (described in advance) each time it is offered. Paper on research will be required. (S/U grading only.)

***255. Sociology of Law** (4) III. The Staff
Seminar—4 hours. Prerequisite: consent of instructor. Analysis of the nature of the legal process and its impact on social behavior. Will consider (1) nature and functions of law, (2) the organization and administration of law, and (3) the capacity of law to affect social behavior.

265A. Classical Sociological Theory (4) I. Stanfield
Lecture—3 hours; discussion—1 hour. Introduces graduate students to the work of the main classical thinkers in the tradition of social theory, such as Marx, Durkheim, Weber, Simmel, Freud, G.H. Mead, and Parsons, locating them within the historical, cultural, and philosophical milieu in which their ideas originated.

265B. Theory in Contemporary Sociology (4) III. Lo
Lecture—3 hours; discussion—1 hour. Prerequisite: course 265A. Explores the uses of theories in contemporary sociology by tracing their connections with classical sociological writings and their relations to broader theoretical concerns of contemporary social thought, with particular emphasis on relevance to the current historical, cultural and social milieu.

270. Social Demography (4) II. Cramer
Seminar—4 hours. Prerequisite: course 170 or consent of instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphases on the determinants of fertility-related attitudes and behavior, on less-developed countries, and on contemporary empirical studies.

***280. Organizations and Institutions** (4) I. Smith
Seminar—4 hours. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military, and economic structure.

290. Seminar (4) III. Joffe
Seminar—3 hours; term paper. (S/U grading only.)

***292A-292B. Field Research** (4-4) II-III. Wolf
Seminar—3 hours; field trips. Prerequisite: graduate standing in Sociology or consent of instructor. The process of collecting, analyzing and reporting qualitative social data: techniques of intensive interviewing, participant-observation and document analysis; generating, developing, and evaluating analytic frameworks; recording, storing, retrieving, and writing up qualitative data. Emphasis on application of principles; each participant completes a fieldwork project. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

293. Proseminar in Sociology (2) I. The Staff
Seminar—2 hours. Prerequisite: first-year Sociology graduate students only. Introduction to graduate training in sociology. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (S/U grading only.)

295. Special Topics Seminar (4) II. Smith
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Research topics in sociology. Topic will vary according to faculty interest and student demand.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

390A. The Teaching of Sociology (2) II. The Staff
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing; required for first-time teaching assistants. Practical instruction in teaching methods for qualitative and quantitative courses. Pedagogical issues involved in critical sociological analysis. (S/U grading only.)

390B. The Teaching of Sociology (2) III. The Staff
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. Practical instruction in devising course syllabi, lectures and assignments for Associate-Instructors and others interested in college teaching. Discussion of pedagogical methods of teaching qualitative and quantitative courses. (S/U grading

only.)

Professional Course

***466. Research Paper Workshop** (2) I. The Staff Workshop—1.5 hours; discussion—0.5 hours. Prerequisite: Master of Arts standing. A workshop to assist advanced graduate students in the preparation of an original research paper. Students present their research papers and discuss issues in theory, research design, data, empirical inference, and verbal and written presentation of a professional research paper. (S/U grading only.)

Soil and Water Science

(College of Agricultural and Environmental Sciences)

The Major Program

Soil and water science is concerned with the use and protection of our land and water resources. The major teaches graduates sound scientific principles for managing soil and water resources to benefit both agriculture and the environment.

The Program. Major programs include land use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, and related environmental problems. (For example, the emphasis on water quality would include more than the minimum number of units of physical and biological sciences, while an emphasis in resource allocation and land-use planning would include more courses in the social, political, and economic areas.)

Internships and Career Alternatives. Before they graduate, many students receive practical work experience through student internships with state and federal agencies, soil and plant labs, and growers. Students also have the opportunity to work on research projects with faculty members and to develop individual research or study topics. Graduates are qualified for managerial and technical positions with environmental and agricultural businesses. They are also prepared for positions in advising, planning, land appraisal, and research and teaching with private, government, and international organizations involved with soil and water development, use, and conservation. Some graduates also continue in master's and doctoral programs in soil science, water science, ecology, and plant physiology.

B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement.....4-12
See College requirement 0-8
Oral expression (Rhetoric 1) 4

Preparatory Subject Matter 74
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A-2B-2C and a more advanced course).....18
Computer science (Agricultural Systems and Environment 21, Engineering 5).....3
Economics or agricultural economics (Economics 1A, 1B).....5
Geology (Geology 50).....3
Mathematics (Mathematics 16A, 16B).....6
Physics (Physics 7A-7B-7C) 12
Statistics (Statistics 13, Agricultural Systems and Environment 120).....4
Additional physical sciences, biological sciences, and/or mathematics with approval of adviser 8

Breadth/General Education.....15-33
Satisfaction of General Education requirement 6-24
At least one upper division course from each of the following areas, with approval of adviser, *(1)* resource management, *(2)* environmental law, *(3)* environmental economics and decision making 9

Depth Subject Matter 30
Soil Science 100.....4
Hydrologic Science 100.....5
Additional upper division units in soil science and hydrologic science.....21

Restricted Electives 27
To supplement or expand areas of student interest selected with approval of adviser 24
Special study or experience (192 or 199 course in the major area) 3

Unrestricted electives.....4-30

Total Units for the Degree.....180

Specific Courses of Instruction
For specific courses of instruction in this major, see course listings under Atmospheric Science, Plant Science, Environmental and Resource Sciences, Soil Science, and Hydrologic Science.

Major Adviser. R. Dahlgren.

Advising Center for the major is located in 148 Hoagland Hall (mornings) or 111A Veihmeyer Hall (afternoons) (916-752-1669).

Graduate Study. Graduate programs are available in Soil Science as well as Hydrologic Science. Detailed information can be obtained from the Graduate Adviser and the *Graduate Announcement*. See also the Graduate Studies section in this catalog.

Related Courses. See courses in Agricultural and Resource Economics, Agricultural Systems and Environment, Agronomy, Chemistry, Biological and Agricultural Engineering, Civil and Environmental Engineering, Environmental Studies, Environmental Toxicology, Geology, International Agricultural Development, Plant Biology, Range Science, and Vegetable Crops.

Soil Science

See Geology; Soil Science, below; Soil Science (A Graduate Group); and Soil and Water Science

Soil Science

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Land, Air and Water Resources.

Minor Program Requirements

The Department of Land, Air and Water Resources, Soils and Biogeochemisty Program, offers a minor program in soil science for students in the Hydrologic Science, Environmental and Resource Sciences, Environmental Toxicology, Agricultural Systems and Environment, International Agricultural Development, and Environmental Biology and Management majors.

UNITS

Soil Science 20
Soil Science 100.....4
Courses selected from Soil Science 102, 105, 107, 109, 111, 118, 120, Plant Science 135, Hydrologic Science 124.....16

Minor Adviser. R.J. Southard.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees in Soil Science are available. Information regarding these programs can be obtained from the graduate adviser and the *Graduate Announcement*. See also the Graduate Studies section in this catalog.

Graduate Adviser. L.E. Jackson (Vegetable Crops).

Courses in Soil Science (SSC)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 148 Hoagland Hall (916-752-1669) or check the Soils and Biogeochemistry Web site at http://qavis.ucdavis.edu/soils/ .

Lower Division Courses

10. Concepts of Soil Science (3) I. Dahlgren
Lecture—3 hours. Soils as natural bodies formed by interactive environmental processes; the global ecosystem; their response to use and management; conservation practices for sustainable use of soil resources; and the role of soils in current agricultural and environmental issues. Not open for credit to students who have successfully completed course 100 or similar introductory course in soil science. GE credit: SciEng, Wrt.

92. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Principles of Soil Science (4) I. Horwath
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-1B, Physics 1A-1B, Biological Sciences 1A, and consent of instructor; Geology 50, Biological Sciences 1C, Microbiology 2, and Chemistry 8A recommended. Formation, properties and behavior of soils. Nature and interactions of solid, aqueous, gaseous, and biotic components. Soil-plant-atmosphere relationships. Soil development and geography, management, and conservation.

102. Soil and Water Chemistry (5) II. Zasoski
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Soil solution and solid-phase chemistry of soils in relation to agricultural and environmental concerns. Interactions between soil solids, precipitates and solution phases: mineralogy, ion exchange, adsorption, weathering and buffering, soil colloidal behavior, models of solution and solid-phase interactions.

105. Field Studies of Soil Resources (8) Extrasession summer. Dahlgren, Singer, Southard
Fieldwork—daily for five weeks, off campus; lecture—1 week, on campus. Prerequisite: consent of instructor; course 120 recommended. Study of soils in the field throughout California. Emphasis on identification, description and classification of soils; relation of soils to geology, vegetation, climate and human activities; role of soils in land use and as components of California ecosystems.

107. Soil Physics (4) I. Rolston, Hopmans
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Water Science 100, Mathematics 16A, or the equivalent. Description of soil physical properties. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil physical properties on transfer processes.

109. Soil Fertility and Fertilizers (4) III. Horwath
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in elements of soil science. Forms and availability of plant nutrient elements in soils; effects of fertilizers and soil amendments on crop and soil characteristics; conduct and interpretation of soil fertility assays.

111. Soil Microbiology (4) II. Scow
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1C and Biological Sciences 1C. Major

groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microbe relationships. Transformations of organic and inorganic pollutants.

118. Soils in Land Use and the Environment (4) III. Singer
Lecture—3 hours; discussion—1 hour; one one-day field trip. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation.

120. Soil Genesis, Morphology, and Classification (5) III. Southard
Lecture—4 hours; laboratory—3 hours (includes five one-day weekend field trips). Prerequisite: course 100; Geology 50 recommended. Recognition and description of soils; chemical, biological and physical processes of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field.

192. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

207. Transport Processes in Soils (4) II. Rolston, Hopmans
Lecture—3 hours; discussion/computer laboratory—2 hours. Prerequisite: course 107 and Mathematics 22B; knowledge of a computer programming language. Physical and mathematical description of nonsteady transport processes in soil and the unsaturated zone. Emphasis on analytical and numerical solutions to water, gas, solute (contaminants), and heat transport processes and the chemical and biological reactions attenuating solute movement. Offered in alternate years.

208. Soil-Plant Interrelationships (3) II. Richards
Lecture—3 hours. Prerequisite: course 100, Plant Biology 111B, or consent of instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics; nutrient assimilation and crop quality. Offered in alternate years.

***209. Physiology and Ecology of Mycorrhizal Symbioses** (3) I. Bledsoe
Lecture/discussion—3 hours. Prerequisite: Plant Biology 111 or consent of instructor; course 100 recommended. Structure, function and evolutionary development of mycorrhizal fungi and the root-fungal symbiosis. Emphasis on regulation of carbon and nutrient exchanges between host and symbiont. Course integrates mycorrhizal physiology and ecology in an ecosystem context. Offered in alternate years.

211. Advanced Soil Microbiology (3) III. Scow
Lecture—3 hours. Prerequisite: Chemistry 8A-8B; course 111; Biological Sciences 102, 103 or an equivalent course recommended. Microbial metabolism of organic chemicals in soil, both natural and xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil. Offered in alternate years.

***214. Soil Mineralogy** (5) III. Dahlgren
Lecture—3 hours; laboratory—6 hours. Prerequisite: course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the common minerals in soils and rocks. Weathering reactions and stability of minerals in the weathering environment. Application of analytical methods in mineral analysis, including x-ray, microscopic and chemical analysis for characterization of mineral systems. Offered in alternate years.

216. Physical Geochemistry (3) I. Casey
Lecture—3 hours. Prerequisite: course 102 or Chemistry 110A or Geology 115 and Mathematics 119. First half emphasizes equilibrium thermodynamics, including choices of standard states, ideal solutions, and use of the Gibbs-Duhem relation. Second half covers geochemical kinetics including simple rate laws, transition state theory, solute diffusion, and experimental methods.

***218. Soil Erosion and Conservation** (3) II. Singer
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in alternate years.

219. Ecosystem Biogeochemistry (4) III. Dahlgren, Bledsoe
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Ecology 219.)

***220. Pedology** (3) II. Southard
Lecture—3 hours. Prerequisite: consent of instructor; course 120 recommended. Topics selected from studies of soil-forming processes, soil-geomorphic relations, mineral weathering, new developments in soil classification, and development of pedologic theory. Topics vary from year to year. May be repeated once for credit. Offered in alternate years.

222. Organic Chemistry of Soil (3) II. Horwath
Lecture—3 hours. Prerequisite: Chemistry 8A, 8B, Mathematics 16A, 16B, course 100 or the equivalent. Structure and function of soil organic matter, biochemistry of humic substance formation, relationship of organic matter to nutrient cycling and sustainability in agricultural and natural ecosystems, reactions of organics with humic substances in soil and water, methods for characterization. Offered in alternate years.

290. Special Topics in Soil Science (1) I, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Oral presentation and discussion of scientific material and procedures for review and critique of publications. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Soil Science (A Graduate Group)

Robert J. Zasoski, Ph.D., Chairperson of the Group

Group Office, 148 Hoagland Hall (916-752-1669)

Faculty. Includes faculty members from the Departments of Biological and Agricultural Engineering; Agronomy and Range Science; Civil and Environmental Engineering; Land, Air, and Water Resources; Nematology; Pomology; Vegetable Crops; and Viticulture and Enology.

Graduate Study. The Graduate Group in Soil Science offers programs of study and research leading to the M.S. and Ph.D. degrees. Soil science focuses on the physical, chemical and biological processes that govern the quality and distribution of soils in relation to landform evolution, geochemical environments, and organism habitats. Research in soil science includes the study of soil as a global natural resource, as a critical component of the environment, and as a resource to sustain agricultural and wildland ecosystems. Students may specialize in environmental quality; soil physics; soil chemistry; soil genesis, morphology and classification; soil fertility and plant nutrition; soil microbiology and biochemistry; soil-plant-water relationships; or general soil science. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advisers. P.H. Brown (Pomology), G.S. Pettygrove (Land, Air, and Water Resources).

Graduate Admissions Officer. L.E. Jackson (Vegetable Crops), 754-9116.

Spanish

(College of Letters and Science)

Robert Blake, Ph.D., Chairperson of the Department

Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0835)

Faculty

Marta E. Altisent, Ph.D., Associate Professor
Samuel G. Armistead, Ph.D., Professor
Robert Blake, Ph.D., Professor
Cecilia Colombi, Ph.D., Associate Professor
Linda Egan, Ph.D., Assistant Professor
Neil Larsen, Ph.D., Associate Professor
Adrienne Martín, Ph.D., Assistant Professor
Almerindo E. Ojeda, Ph.D., Associate Professor *(Linguistics)*
Robert M. Scari, Ph.D., Professor
Máximo Torreblanca, Ph.D., Professor *(Linguistics)*
Hugo J. Verani, Ph.D., Professor

Emeriti Faculty

Zunilda Gertel, Ph.D., Professor Emerita
Mario González, Ph.D., Lecturer Emeritus
Didier T. Jaén, Ph.D., Professor Emeritus
Daniel S. Keller, Ph.D., Professor Emeritus
Fabián A. Samaniego, M.A., Senior Lecturer Emeritus

Affiliated Faculty

Francisco Alarcón, M.A., Lecturer
Norma López-Burton, M.A., Lecturer

The Major Program

The major program assures proficiency in all four language skills—speaking, understanding, reading, and writing—and acquaints students with the intellectual and cultural contributions of the Spanish-speaking world through a study of its language, literature, and traditions.

The Program. The department's lower division program gives students a solid foundation in the Spanish language, either through the traditional elementary and intermediate language series or through an accelerated three-course sequence of Spanish for native speakers. Linguistics 1 introduces students to a systematic study of language in general and serves as an introduction to upper division courses in Spanish linguistics. At the upper division level, students receive a broad introduction to basic concepts and the practice of literary criticism and to the four areas of study represented in the department's curriculum: Spanish linguistics, Spanish literature, Spanish-American literature, and Hispanic literatures and cultures in the United States. Students are encouraged to work closely with the department's academic advisers in designing a program of studies tailored to their indi-

vidual needs and interests. Many students combine the Spanish major with another major in the humanities or social sciences.

Education Abroad Program options. The department encourages its majors to consider study in a Spanish-speaking country with our Education Abroad Program (EAP). It is now possible for our students to complete significant portions of the Spanish major in the EAP centers at both the lower (Preparatory Subject Matter) and upper division levels through newly introduced options as described below.

Career Alternatives. The program, alone or in combination with other major programs, may lead to advanced study of the language or literature of Spain and Spanish America, and to careers not only in teaching, but also in other professions such as library science, law, medicine, and in government, social service, or business.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 4-37

Spanish 1, 2, 3, 21, 22, 23, and 240-33 or Spanish 31, 32, 33.....0-15
Spanish 21, 22, and 23 may be taken in the EAP Taxco or Morelia programs. Course 23 may be substituted by an equivalent course taken on EAP.

Linguistics 1 4
In consultation with a departmental adviser and with the consent of the department chairperson, Linguistics 1 may be taken concurrently with upper division courses.

Depth Subject Matter 45-48

One course in each of the following five areas 19-20
- Spanish 100 4
- Spanish 111N, 115N, or 116.....3-4
- Spanish 130, 131N, or 134N.....4
- Spanish 150N, 151N, or 157.....4
- Spanish 117, 174, or 176.....4

Students planning to take Spanish 110 should do so at the beginning of the upper division sequence or concurrently with Spanish 100.

Seven elective courses to be chosen in consultation with the student's major adviser 26-28
Several electives may be taken with EAP, preferably concentrated in two of the following areas. Other combinations are possible with the approval of the major adviser:
(a) Spanish literature,
(b) Spanish-American literature,
(c) Chicano/Latino literature,
(d) Spanish linguistics

Students may, with the approval of their adviser, take up to three elective courses outside the Spanish department in such programs as Anthropology (e.g., Anthropology 144), Chicana/o Studies (e.g., Chicana/o Studies 154, 155, 156), Comparative Literature, History (e.g., History 161A, 161B, 164, 165, 166A, 166B, 168W, 169A, 169B), and Linguistics (e.g., Linguistics 115, 116).

Total Units for the Major 49-85

Major Advisers. M.E. Altisent, C. Colombi, A. Martín, R. M. Scari (Master Adviser), H. Verani.

Advising. Given the great flexibility in the Spanish major, it is important that students design their programs in close consultation with their major adviser. This is especially important for students who intend to use their major as preparation for graduate study, for those who are planning a teaching career, and for those who wish to take advantage of our EAP options.

Minor Program Requirements:

UNITS

Spanish 23-24

One course in each of the following five areas:
- Spanish 100 4
- Spanish 111N, 115N, or 116.....3-4
- Spanish 130, 131N, or 134N.....4
- Spanish 150N, 151N, or 157.....4
- Spanish 117, 174, or 176.....4
- One upper division elective in Spanish 4

As many as, but no more than three of the required upper division courses for the minor may be completed with EAP. Consult a departmental adviser.

Prerequisite credit. Credit normally will not be given for a course if that course is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson only.

Honors Program. Candidates for high or highest honors in Spanish must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of Spanish 194H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of their junior year (135 units), have attained a cumulative GPA of 3.5 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in Spanish are in addition to the regular requirements for the major in Spanish.

Teaching Credential Subject Representative. C. Colombi. See also under Teacher Education Program.

Graduate Study. The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Studies Office and the Department of Spanish. The Department also offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

Graduate Adviser. Consult department.

Courses in Spanish (SPA)

Course placement: Students with two years of high school Spanish normally take Spanish 2, those with three years take Spanish 3, and those with four years take Spanish 21. It is recommended that transfer students who have successfully completed a two-year sequence at the junior college level continue their study by taking Spanish 24 or 100.

Lower Division Courses

1. Elementary Spanish (5) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Spanish (5) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

3. Elementary Spanish (5) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

8. Elementary Spanish Conversation (2) I, II, III. The Staff
Discussion—3 hours. Prerequisite: course 3; course 21 (concurrently) recommended. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. Not open to native speakers or to upper division students.

21. Intermediate Spanish (5) I, II, III. The Staff
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3. Designed to review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. It is recommended that students transfering from other institutions start the second-year program at this point. (Former course 4.)

22. Intermediate Spanish (5) I, II, III. The Staff
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21. Continuation of Spanish 21. Focus on more difficult grammatical concepts and further practice in composition. Development of all language skills through exercises and reading of modern texts. (Former course 5.)

23. Spanish Composition I (4) I, II, III. Colombi in charge
Lecture—3 hours; frequent writing assignments. Prerequisite: course 22. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects.

24. Spanish Composition II (4) I, II, III. Colombi in charge
Lecture—3 hours; term paper. Prerequisite: course 23. Development of advanced level writing skills, with particular emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects.

28. Intermediate Spanish Conversation (2) I, II, III. Blake in charge
Discussion—3 hours. Prerequisite: course 8 or 22. Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations. (Former course 9.)

31 Intermediate Spanish for Native Speakers I (5). I. The Staff
Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 3 or the equivalent, or consent of instructor. First course of a three-quarter series designed to provide bilingual students whose native language is Spanish with the linguistic and learning skills required for successfully completing upper division courses in Spanish. Intensive review of grammar and composition. (Former course 7A.)

32. Intermediate Spanish for Native Speakers II (5). II. The Staff
Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 31 or consent of instructor. Continuation of intensive review of grammar and composition. Development of all language skills through reading of modern texts, presentation/discussion of major ideas, vocabulary expansion, and writing essays on topics discussed. Designed for students whose native language is Spanish. (Former course 7B.)

33. Intermediate Spanish for Native Speakers III (5) III. The Staff
Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 32 or consent of instructor. Development of writing skills, with emphasis on experimenting with various writing styles: analytical, argumentative, and creative. Analytical review of literary genres. Written essays will be assigned. Students will develop a research paper. Designed for students whose native language is Spanish. (Former course 7C.)

*Course not offered this academic year.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

Course 100 is prerequisite to all upper division literature courses.

100. Principles of Hispanic Literature and Criticism (4) I, II, III. Altisent, Martín, Scari, Verani
Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Principles of literary criticism applied to the study of fiction, drama, poetry and essay of major literary writers of the Hispanic world.

110. Advanced Spanish Composition (4) I, II, III. Scari
Lecture—3 hours; frequent writing assignments. Prerequisite: course 24 or 33. Practice in expository writing with emphasis on clarity and idiomatic expression. Practical application and review of selected grammar topics. (Part of former courses 110A and 110B.)

111N. The Structure of Spanish: Sounds and Words (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. A linguistic description of the sound patterns of Spanish and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. (Former course 132.)

112N. The Structure of Spanish: Words and Phrases (3) II, III. Blake, Ojeda
Lecture—3 hours. Prerequisite: course 111N. A study of Spanish word and phrase structure, with special emphasis on the constituent structure of noun and verb phrases. Theoretical and practical comparisons with English and with other Romance languages. (Former course 131.)

113. Spanish Pronunciation (3) I, II. Torreblanca
Lecture—3 hours. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers. (Former course 133.)

114N. Contrastive Analysis of English and Spanish (4) III. Colombi, Ojeda
Lecture—3 hours; extensive writing. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor; courses 111N and 112N recommended. Contrastive analysis of English and Spanish, error analysis, introduction to structuralist and transformational linguistics. Individual and group conferences. (Former course 137.)

115N. How Spanish Grew: Its Origins and Development (4) I, II. Blake, Torreblanca
Lecture—3 hours; term paper. Prerequisite: course 24 or 33 and Linguistics 1, or consent of instructor. The Spanish language from its roots in spoken Latin to modernity. Course stresses the close relationship between historical events and language change, as well as the role that literature plays in language standardization.

116. Applied Spanish Linguistics (4) I, II. Blake, Colombi
Lecture—3 hours; extensive writing. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. An exploration of the major theoretical and practical issues concerning learning Spanish as a second language. Especially designed for students interested in teaching Spanish as a career.

117. Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory (4) I. Colombi, Alarcón
Lecture—3 hours; extensive writing. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor; course 116 and Linguistics 116 recommended. Designed for students interested in teaching Spanish to native speakers. Focus on cultural diversity of the main Spanish-speaking populations in the U.S.; applied language teaching methodologies in the context of teaching spanish to native speakers at different levels. Conducted primarily in Spanish.

118. Topics in Spanish Linguistics (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: courses 111 and 112. A study of specialized topics in Spanish linguistics, for example: language and use; text and context; language and society; bilingualism; Spanish dialectology; syntax and semantics. May be repeated once for credit when topic differs.

123. Creative Writing in Spanish (4) III. Alarcón
Discussion—4 hours. Prerequisite: course 24 or 33, or consent of instructor. Intensive writing of poetry or fiction in Spanish or in a bilingual (Spanish/English) format. Students will write both in prescribed forms and in experimental forms of their own choosing. Offered in alternate years.

130. Survey of Spanish Literature to 1700 (4) I. Armistead, Martín
Lecture—3 hours; term paper. Prerequisite: course 100. Survey of Spanish literature (narrative, poetry and drama) to 1700, Emphasis on the multicultural birth of the Spanish culture, the formation and growth of the Spanish language and letters through its written records and the literature of the early period. (Part of former courses 103A and 103B.)

131N. Survey of Spanish Literature 1700 to Present (4) II. Altisent, Scari
Lecture—3 hours; term paper. Prerequisite: course 100. Survey of modern Spanish literature, providing an overview of main literary movements (romanticism, realism, naturalism, modernism, avant-garde). Emphasis on the philosophical and historical background and on the European context for modern Spanish literature. (Part of former courses 104A and 104B.)

132N. Medieval and Renaissance Spanish Literature (4) I. Armistead
Lecture—3 hours; term paper. Prerequisite: course 100. Introduction to the study of the principal works and authors of Medieval and early 16th-century Spanish literature. (Part of former courses 112 and 103A.)

133N. Golden Age Literature of Spain (4) I. Martín
Lecture—3 hours; term paper. Prerequisite: course 100. Introduction to the study of the principal authors and literary movements of 16th- and 17th-century Spain and Spanish American colonial literature. (Part of former courses 103B , 109 and 115.

134N. Don Quijote (4) II. Martín
Lecture—3 hours; term paper. Prerequisite: course 100. A critical reading of *Don Quijote* by Cervantes. Focused interpretations of important passages and characters in the context of the socio-cultural background of the period. *Don Quijote* as prototype for the modern novel. Offered in alternate years. (Former course 111.)

135N. Spanish Romanticism (4) III. Scari
Lecture—3 hours; term paper. Prerequisite: course 100. Romanticism as a philosophical concept, and as a literary movement in Spain, with emphasis on its distinctive, specific "Romantic" qualities and its literary expression in five leading authors of the early nineteenth century. (Former course 114.)

136N. The Spanish Novel of the 19th Century (4) II. Scari
Lecture—3 hours; term paper. Prerequisite: course 100. Literary realism in Spain, focusing on Leopoldo Alas (Clarín), Emilia Pardo Bazán and Benito Pérez Galdós. The unique characteristics of Spanish realism and its historical roots in Cervantes and the picaresque. (Former course 119.)

137N. Twentieth-Century Spanish Fiction (4) III. Altisent
Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the main literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Sender, Cela, Matute, Ayala and others. (Former course 120A.)

138N. Modern and Contemporary Spanish Poetry (4) III. Altisent
Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Aleixandre, Hernández Hierro and others. Offered in alternate years. (Former course 120C.)

139. Modern Spanish Theater (4) I. Altisent
Lecture—3 hours; term paper. Prerequisite: course 100. Study of the main dramatic trends and playwrights of modern Spanish theater. Selected works by Valle Inclán, García-Lorca, Mihura, Buero-Vallejo, Arrabal and others. Offered in alternate years. (Former course 120B.) GE credit: ArtHum, Div.

140N. Modern Spanish Essay (4) II. Scari
Lecture—3 hours; term paper. Prerequisite: course 100. Ortega, Unamuno and the modern Spanish essay. Their concept of Spain and their relations with other movements and thinkers.

141. Spanish Culture (4) III. The Staff
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 24 or 33. The development of Spanish culture(s) from the Romans to the present, focusing on important historical periods. Topics include art, history of ideas, and everyday cultural manifestations. (Former course 134.) Offered in alternate years. GE credit: ArtHum, Div.

142. Special Topics in Spanish Cultural and Literary Studies (4) I, II, III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 100. Special topics in the study of Spanish literature and culture. May be repeated twice for credit when topic differs. (Part of former course 151.)

148. Cinema in the Spanish-Speaking World in Translation (4) I. Altisent, Colombi
Lecture—3 hours; film viewing—1 hour; term paper. Prerequisite: completion of the Subject A requirement. Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Offered in alternate years. GE credit: ArtHum, Wrt.

149. Latin-American Literature in Translation (4) III. Verani
Lecture/discussion—3 hours; term paper. Prerequisite: English 3 or the equivalent. Reading, lectures and discussions in English of works by Borges, Cortázar, Fuentes, García Márquez, Paz and others. May not be counted toward the major in Spanish. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

150N. Survey of Spanish-American Literature to 1900 (4) I. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. Spanish American literature from prehispanic texts and the Chronicles of the Conquest to Romanticism and Modernism. Reading selections include fiction, poetry, drama and essays. (Former course 105A.)

151N. Survey of Spanish-American Literature 1900 to Present (4) II. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. Spanish-American literature from Modernism to the present. Reading selections include fiction, poetry, drama, and essays. (Former course 105B.)

153. Spanish-American Short Story (4) I. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Spanish-American short story during the 19th and 20th centuries. Emphasis on the contemporary period. Offered in alternate years. (Former course 128.)

154. Spanish-American Novel (4) II. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Spanish-American novel during the 19th and 20th centuries. Emphasis on significant contemporary works. Offered in alternate years. (Part of former courses 108A and 108B.)

155. Mexican Novel (4) II. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Mexican novel during the

19th and 20th centuries. Emphasis on the narrative of the Revolution and significant contemporary works. (Former course 129.)

156. Darío, Modernism and Its Legacy (4) II. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. Modernism as an authentic expression of Latin American literature and its influence on 20th-century poetry and prose. In depth analysis of the works of Darío and other major Modernist writers. Offered in alternate years. (Former course 125.)

157. 20th Century Masters in Spanish-American Literature (4) III. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. Study of major 20th-century Spanish-American writers and their cultural and literary milieus. Offered in alternate years. (Part of former courses 127 and 138.)

158. Spanish-American Poetry: From Vanguardism to Surrealism and Beyond (4) II. Verani
Lecture—3 hours; term paper. Prerequisite: course 100. Study of vanguardism, surrealism, and more recent movements of 20th-century poetry. An in-depth analysis of the works of such major poets as Neruda, Vallejo, and Octavio Paz. Offered in alternate years.

159. Special Topics in Spanish-American Literature and Culture (4) I, II, III. Egan, Verani
Lecture—3 hours; term paper. Prerequisite: course 100. Special topics in the study of Spanish-American literature and culture. May be repeated twice for credit when topic differs. Offered in alternate years.

170. Spanish-American Culture (4) III. Colombi
Lecture—3 hours; discussion—1 hour or term paper. Prerequsie: course 24 or 33. Major developments in the arts and social institutions of Spanish America and areas other than Mexico. Readings, lectures and discussions in Spanish. (Former course 136.) GE credit: ArtHum, Div.

171. Music from Latin America (4) I. Ortiz
Lecture—3 hours; discussion—1 hour. Prerequisite: Spanish 24 or 33. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica nortena, musica andina) as well as its implications in other musical genres. Taught in Spanish. For non-majors. Offered in alternate years. (Same course as Music 127.)

172. Mexican Culture (4) III. Egan
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 24 or 33. The development of Mexican culture from the Aztec-Mayan era to the present. Study includes important periods such as the Conquest and Colonialism, the Independence movement, and changes from the Revolution to contemporary Mexico. Reading, lectures and discussions in Spanish. (Former course 135.) GE credit: ArtHum, Div.

174. Chicano Culture (4) II. Alarcón
Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: course 24 or 33. An interdisciplinary survey of Chicano culture. Topics include literature, art, folklore, oral tradition, music, politics, as well as everyday cultural manifestations. Conducted in Spanish. (Former course 124.) GE credit: ArtHum, Div.

176. Literature in Spanish Written in the United States (4) III. Alarcón
Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Survey of the literary and cultural contributions of the main Spanish-speaking populations present in the U.S.: Chicanos, Puerto Ricans, Cuban-Americans, Central Americans, and other Latinos. GE credit: ArtHum, Div.

192I. Internship in Spanish (1-12) I, II, III. The Staff (Chairperson in charge)
Independent study—3-36 hours. Prerequisite: course 23; junior standing; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting). May be repeated for credit for a total of 8 units. Units will not count toward the Spanish major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff
Independent study—3-15 hours. Prerequisite: open only to majors with senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Spanish literature, civilization, or language studies. (P/NP grading only.)

197T. Tutoring in Spanish (1-4) I, II, III. The Staff
Tutorial—1-4 hours. Prerequisite: upper division standing and permission of the chair. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Tutoring in the Community (2-4) I, II, III. The Staff
Tutorial—2-4 hours. Prerequisite: upper division standing and permission of the chair. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I,II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

201. Literary Theory I (4) II. Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Basic theories and practical approaches to modern and contemporary Hispanic literature. Emphasis on formalism, poststructuralism, socio-cultural discourses, and ideologies.

202. Literary Theory II (4) III. Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major contemporary critical theories including recent, innovative approaches to Hispanic literature and culture. Readings from Semiotics and Deconstructionism to Psychological and Socio-ideological approaches. Emphasis on Postmodern and Neo-colonial discourse.

205. Spanish Phonology (4) II. Torreblanca
Seminar—3 hours; term paper. Prerequisite: some knowledge of phonetics is required and consent of instructor; Linguistics 109 and 139 highly recommended. Analyzes the sound patterns of Spanish from both linear and non-linear perspectives. Students will develop a clear understanding of what phonology is and the nature of Spanish phonology, as defined by modern linguistic analysis.

206. Spanish Syntax (4) I. Blake, Ojeda
Seminar—3 hours; term paper. Prerequisite: Linguistics 140 and 165. An examination of Spanish word order within the framework of general linguistic theory. The student will investigate how to write a grammar of Spanish with particular attention to the structure of noun and verb clauses.

207. History of the Spanish Language (4) I, III. Blake, Torreblanca
Seminar—3 hours; term paper. Prerequisite: Latin 1. (Former course 220A.)

208. Old Spanish Texts (4) II. Torreblanca, Blake
Seminar—3 hours; term paper. Prerequisite: course 207. An in-depth linguistic examination of Old Spanish texts from the 12th to the 15th centuries, with particular attention to the significance of orthographic changes.

211. Hispanic Dialectology (4) III. Torreblanca
Seminar—3 hours; term paper. Prerequisite: course 220 or consent of instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects. (Former course 221.)

212. Applied Linguistics (4) II. Colombi, Blake
Seminar—3 hours; term paper. Prerequisite: graduate standing and courses 215 and 216 recommended. Focuses on the relevant linguistic aspects of teaching Spanish. Designed for graduate students who have an interest in second-language learning and teaching.

215. Special Topics in Hispanic Linguistics (4) III. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor; courses 205, 206 recommended. Specialized topics in Hispanic linguistics (e.g., pragmatics, sociolinguistics, topics in syntax, semantics, or diachronic studies). May be repeated for credit when topic differs.

222. Critical Approaches to Spanish Literature I: Prose and Essay (4) II. Altisent, Armistead, Scari
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. A review of the main critical approaches to Spanish narrative and the essay.

223. Critical Approaches to Spanish Literature II: Poetry and Drama (4) II. Altisent, Armistead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. A review of the main critical approaches to Spanish poetry and drama.

224. Studies of a Major Writer, Period, or Genre in Spanish Literature (4) III. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Spanish writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor.

252. Medieval Spanish Literature: Prose (4) I. Armistead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of the major genres of Medieval Spanish prose from its origins to 1450.

253. Medieval Spanish Literature: Epic (4) II. Armistead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Medieval Spanish epic narratives. Major theoretical perspectives on the genesis, diffusion, and character of the Medieval epic. Relationship of epic to ballad literature.

254. Medieval Hispanic Lyric (4) II. Armistead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis of the most representative lyric poetry in the various Peninsular languages and in provencal, troubadour poetry, kharjas, villancicos, cantigas de amigo, and courtly lyric.

255. Spanish Literature of the Early Renaissance (4) I. Armistead, Martín
Seminar—3 hours; term paper. Spanish Literature, 1450-1550, with emphasis on *La Celestina.* (Former course 229.)

256. Spanish Literature of the Renaissance and Golden Age: Poetry (4) I. Martín
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive critical study of the main currents of Renaissance and Baroque Spanish poetry through its language structures, styles ("Culteranismo-Conceptismo"), rhetorical devices, myths, and themes (love, death, time).

257. Spanish Literature of the Renaissance and Golden Age: Drama (4) I. Martín
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of major 16th and17th century literary and cultural developments through the study of selected dramas.

258. Spanish Literature of the Renaissance and Golden Age: Prose (4) I. Martín
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The origins and development of the Spanish novel during the Renaissance and the Spanish Golden Age.

259. Cervantes and the Novel (4) I. Martín, Armistead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The narrative works of Miguel de Cervantes with special emphasis on *Don Quijote.*

260. Modern Spanish Literature (4) I. Scari, Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920.

261. Contemporary Spanish Literature: Poetry (4) I. Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical analysis of modern Spanish poetry from a wide spectrum of poetic currents.

262. Contemporary Spanish Literature: Narrative (4) I. Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the 20th-century novel and short story, with emphasis on the avant-garde, existentialism, social realism, and post-modern trends.

263. Contemporary Spanish Literature: Drama (4) I. Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years.

264. Contemporary Spanish Literature: Essay (4) III. Scari
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major thinkers from Ganivet to Unamuno and Ortega y Gassett. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in alternate years.

265. Women Writers of Spain (4) I. Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Introduction to the development of a feminine consciousness in the Spanish contemporary literary scene. Selected texts represent particularly innovative typologies of feminine discourse in the realm of the historical, psychoanalytical, and metafictional, erotic, and allegorical fiction.

272. Critical Approaches to Spanish-American Literature: Narrative (4) I. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. Extensive critical study of the development of Spanish-American literary periods and currents in narrative (novel, short story, and essay), from early Colonial times to the present.

273. Critical Approaches to Spanish-American Literature: Poetry and Drama (4) I. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. Extensive critical study of the development of Spanish-American literary periods and currents in poetry and drama, from early Colonial times to the present.

274. Studies of a Major Writer, Period, or Genre in Spanish-American Literature (4) I. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Spanish-American writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor.

275. Colonial Literature (4) I. Egan
Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. An examination of pre-Hispanic and Colonial narrative, poetry and theatre. Emphasis on historical, anthropological, and ethnographic approaches to Colonial discourse.

276. Twentieth-Century Spanish-American Drama (4) III. The Staff
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sánchez to the present. Offered in alternate years. (Former course 240.)

277. Spanish-American Novel, 1900-1950 (4) I. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Spanish America in the first half of the 20th century. Offered in alternate years. (Former course 241A.)

278. New Trends in Spanish-American Fiction (4) II. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent developments in Spanish-American narrative. Emphasis on innovative language and structure. Offered in alternate years. (Former course 241B.)

279. Mexican Narrative (4) III. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the evolution of Mexican narrative. Emphasis on the narrative of the Revolution and significant contemporary works. Offered in alternate years.

280. Spanish-American Short Story (4) III. Egan, Verani
Seminar—3 hours; term paper. Works by major writers with emphasis on 20th-century authors such as Quiroga, Borges, García Márquez, Cortázar, and Rulfo. (Former course 243.)

281. Spanish-American Women Writers (4) I. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of feminist critical theories, gender construction, and self-representation within the history of socio-cultural changes in Latin America.

282. Darío and Modernism (4) I. Egan, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1880-1916). Offered in alternate years. (Former course 245.)

283. New Directions in Spanish-American Poetry (4) III. Egan, Verani
Seminar—3 hours; term paper. Offered in alternate years. (Former course 247.)

284. The Spanish-American Essay (4) II. Egan, Verani
Seminar—3 hours; term paper. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in alternate years. (Former course 248.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: graduate standing and consent of instructor. May be repeated for credit. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

300. The Teaching of Spanish (3) III. The Staff
Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in Spanish.

390. Problems in Teaching Spanish at the College Level (4) III. The Staff
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.

Speech

See Rhetoric and Communication

Statistics

(Intercollege Division)

George G. Roussas, Ph.D., Chairperson of the Division and Associate Dean of Statistics

Division Office, 380 Kerr Hall (916-752-2361)

Faculty

Prabir Burman, Ph.D., Professor
Christiana Drake, Ph.D., Associate Professor
Alan P. Fenech, Ph.D., Associate Professor
Wesley O. Johnson, Ph.D., Professor
Richard A. Levine, Ph.D., Assistant Professor
Yue-Pok (Ed) Mack, Ph.D., Professor
Hans-Georg Mueller, Ph.D., Professor
George G. Roussas, Ph.D., Professor
Francisco J. Samaniego, Ph.D., Professor
Robert H. Shumway, Ph.D., Professor
Jessica M. Utts, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Jane-Ling Wang, Ph.D., Professor
Samuel P. Wong, Ph.D., Assistant Professor

Emeriti Faculty

P.K. Bhattacharya, Ph.D., Professor Emeritus
Alvin D. Wiggins, Ph.D., Professor Emeritus

Affiliated Faculty

Rahman Azari, Ph.D., Lecturer

The Major Program

Statistics enables us to make inferences about entire populations, based on samples extracted from those populations. Statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, social, engineering, and medical sciences.

The Program. Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree. The A.B. degree is very flexible, facilitating a double major or extensive elective course work in a field in which statistics is applied. The B.S. degree program has two options: one emphasizes mathematics and is especially recommended as preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied course work and underscore the strong interdependence of statistical theory and the applications of statistics.

Preparatory Requirements. Before applying for either the A.B. or B.S. major in Statistics, students must ordinarily complete the following courses with at least C grades:
Mathematics 21A, 21B, 21C
Mathematics 22A, 22B
Computer Science Engineering 30 or Engineering 5
Statistics 32

In addition, due to space limitation in the B.S. major, students admitted to this major will normally be chosen from those having at least a 3.0 grade point average in the above courses. For further information, please contact a Statistics adviser.

Career Alternatives. Probability models and statistical methods are used in a great many fields, including the biological and social sciences, business and engineering. The wide applicability of statistics has created in both the public and private sectors a strong demand for graduates with statistical training. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial series within an insurance company or in the data management unit in a health science facility), and teaching positions.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24-25
Calculus, Mathematics 21A, 21B, 21C 12

Linear algebra, differential equations, Mathematics 22A, 22B.....6
Computer science, Computer Science Engineering 30 or Engineering 5 (or the equivalent).....3-4
Statistics through computers, Statistics 32....3

Depth Subject Matter.....38-39
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent 8
Probability and mathematical statistics, Statistics 131A, 131B, 131C.....12
Three Statistics courses with Statistics 131B as a prerequisite 9-10
Related elective courses.....9
Three upper division courses approved by major adviser. They may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major.....62–64

B.S. Major Requirements:

UNITS

Preparatory Subject Matter.....24-31
Calculus, Mathematics 21A, 21B, 21C 12
Linear algebra; differential equations, Mathematics 22A, 22B.....6
Computer science:
General option: Computer Science Engineering 30 or Engineering 5 (or the equivalent) 3-4
Computer Science option: Computer Science Engineering 30 and 40 and Electrical and Computer Science Engineering 70.....10
Statistics through computers, Statistics 32.....3

Depth Subject Matter
Complete one of the two options below.

Statistics—General option.....51-54
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent 8
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C or the equivalent.....12
Four Statistics courses having Statistics 131B as a prerequisite 12-13
Linear algebra, Mathematics 167 3
Three upper division Mathematics courses selected from 108, 127A-127B-127C, 128A-128B-128C, 168 (Mathematics 127 strongly recommended for students considering graduate work in Mathematics or Statistics.) 10-12
Related elective courses.....6
Two upper division courses approved by major adviser. These may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major.....75-85
(General option)

Statistics—Computer Science option.....49-53
Analysis of variance, multiple regression, Statistics 106, 108 (or the equivalent).....8
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C.....12
Two courses having Statistics 131B as a prerequisite 6-7
Statistical computing, Statistics 141 3
Operating systems and System programming, Computer Science Engineering 150 4
Data structures, Computer Science Engineering 110 4
Data base systems, Computer Science Engineering 165 or Mathematics 160.....3-4
Mathematics, two courses from Mathematics 128A, 128B, 132A, 132B, 167, 168 ...6-8
Computer Science Engineering 122, or Computer Science Engineering 175 3

Total Units for the Major.....73-84
(Computer Science option)

Major Adviser. J.M. Utts.

Students are encouraged to meet with an adviser to plan a program as early as possible. Sometime before or during the first quarter of the junior year students planning to major in Statistics should consult with a faculty adviser to plan the remainder of their undergraduate programs.

Minor Program Requirements:

The Division offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

UNITS

Statistics.....19-20
Statistics 106, 108, and 130A-130B or 131A-131B.....16
One course in Statistics having Statistics 130B or 131B as a prerequisite 3-4
Preparation: Statistics 13 or 32.

Graduate Study. The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Division of Statistics.

Graduate Adviser. W.O. Johnson.

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-6096).

Courses in Statistics (STA)

Lower Division Courses

10. Statistical Thinking (3) III. Utts
Lecture—3 hours. Prerequisite: two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies, etc.; understanding probability, risk and odds. GE credit: SciEng or SocSci, Wrt.

***12. Introduction to Discrete Probability** (3) I. The Staff
Lecture—3 hours. Prerequisite: two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. Offered in alternate years. GE credit: SciEng.

13. Elementary Statistics (4) I, II, III. The Staff
Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. (Students who have had courses 130A or 131A may not receive credit for Statistics 13.) GE credit: SciEng.

***13AT. Self-Paced Modular Instruction in Elementary Statistics** (4) I, II. Wiggins
Autotutorial—4 hours. Prerequisite: two years of high school algebra, no prior knowledge of computers assumed. Computer tutorial. Corresponds to course 13. Students working at computer solve randomly chosen problems until they qualify to take examinations. Computer-timed examinations present a fixed number of problems for solution. Exams may be repeated.

32. Basic Statistical Analysis Through Computers (3) II, III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical inference. Problem solution through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming. GE credit: SciEng.

90X. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Prerequisite: high school algebra and consent of instructor. Examination of a special topic in a small group setting.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Applied Statistics for Biological Sciences (4) I, II, III. The Staff
Lecture—4 hours. Prerequisite: Mathematics 16B or the equivalent. Introduction to probability computation and modeling, estimation, hypothesis testing, contingency, tables, ANOVA, regression, and to implementation of statistical methods using a computer package. Students who have taken course 13 may receive only 2 units credit. GE credit: SciEng.

102. Introduction to Probability Modeling and Statistical Inference (4) I, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Topics include: probability models—binomial, Poisson, geometric; normal and sampling distributions; graphics; exploratory data analysis; parametric and nonparametric estimation and testing; analysis of variance; regression; computing with Minitab package. Students who have taken course 13 or 32 may receive only 2 units of credit; students who have taken course 100 will receive no unit credit. GE credit: SciEng.

103. Applied Statistics for Business and Economics (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102; and Mathematics 16A, 16B. Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package. GE credit: SciEng.

104. Applied Statistical Methods: Nonparametric Statistics (3) II. The Staff
Lecture—3 hours. Prerequisite: course 13, 32, or 102. Sign and Wilcoxon tests, Walsh averages. Two-sample procedures. Inferences concerning scale. Kruskal-Wallis test. Measures of association. Chi square and Kolmogorov-Smirnov tests. Offered in alternate years. GE credit: SciEng.

106. Applied Statistical Methods: Analysis of Variance (4) I, II. The Staff
Lecture—4 hours. Prerequisite: course 13, 32, or 102. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design, Latin squares. Multiple comparisons procedures. One-way random effects model. GE credit: SciEng.

108. Applied Statistical Methods: Regression Analysis (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32 or 102. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages. GE credit: SciEng.

120. Probability and Random Variables for Engineers (4) I, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Basic concepts of probability theory with applications to electrical engineering, discrete and continuous random variables, conditional probability, combinatorics, bivariate distributions, transformation of random variables, law of large numbers, central limit theorem, and approximations. No credit for students who have taken course 131A or Civil and Environmental Engineering 114. GE credit: SciEng.

130A. Mathematical Statistics: Brief Course (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics16B. Basic probability, densities and distributions, mean, variance, covariance, Chebyshev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, computing sample sizes. Students who have taken course 131A will receive only 2 units of credit.

130B. Mathematical Statistics: Brief Course (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Transformed random variables, large sample properties of estimates. Basic ideas of hypotheses testing, likelihood ratio tests, goodness-of-fit tests. General linear model, least squares estimates, Gauss-Markov theorem. Analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics.

131A. Introduction to Probability Theory (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Not open for credit to students who have taken Mathematics 131.

131B-131C. Introduction to Mathematical Statistics (4-4) II-III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A, or Mathematics 22A and 131. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory, and nonparametric inference.

133. Mathematical Statistics for Economists (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103 and Mathematics 16B, or the equivalents; no credit will be given to students majoring in Statistics. Probability, basic properties; discrete and continuous random variables (binomial, normal, *t*, chi-square); expectation and variance of a random variable; bivariate random variables (bivariate normal); sampling distributions; central limit theorem; estimation, maximum likelihood priniciple; basics of hypotheses testing (one-sample).

135. Multivariate Data Analysis (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B, and preferably course 131B. Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and covariance matrix; Hotelling's T^2; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets.

137. Applied Time Series Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B or the equivalent. Auto- and cross-correlation, spectral analysis, coherence, transfer relations, linear filters, seasonal adjustment, mean square regression, autoregressive moving average models, forecasting, Box-Jenkins methods, spectral analysis of variance, and signal detection and discrimination methods.

138. Analysis of Categorical Data (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B, or courses 106 and 108. Varieties of categorical data, cross-classifications, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness-of-fit. Logit models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data. GE credit: SciEng.

140. Introduction to Biostatistics I (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B or 133. Randomized studies, observational studies; logistic regression, Poisson regression, survival analyis, censoring, proportional hazards, exponential and Weibull models, log-linear models, statistical genetics. Not open for credit to students who have taken course 140B.

141. Statistical Computing (3) II. The Staff
Lecture—3 hours. Prerequisite: course 130A or 131A, and one of courses 13, 32, 100, 102, or the equivalent, and experience in computer programming; course 130B or 131B recommended. Use of computers in statistics. Numerical foundations of statistical procedures. Computation of probabilities and quantiles. Random numbers. Monte Carlo method and bootstrap. Methods for parametric statistical models. Graphical methods and exploratory data analysis.

***142. Reliability** (3) III. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B or consent of instructor. Stochastic modeling and inference for reliability systems. Topics include: coherent systems, statistical failure models, notions of aging, maintenance policies and their optimization. Offered in alternate years.

144. Sampling Theory of Surveys (3) I. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with applications in the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in alternate years. GE credit: SciEng.

145. Bayesian Statistical Inference (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 130A-130B or 131A-131B-131C or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, decision theory, estimation, testing, prediction, empirical Bayes methods, Bayesian robustness, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, hierarchical Bayesian analysis, applications. Offered in alternate years.

190X. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Prerequisite: one of courses 13, 32, 100, 102, or 103. In-depth examination of a special topic in a small group setting.

192. Internship in Statistics (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (P/NP grading only.)

194HA-194HB. Special Studies for Honors Students (4-4) I-II. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

205. Statistical Methods for Research (3) III. The Staff
Lecture—3 hours. Prerequisite: course 106 or Agricultural Science and Management 150, or the equivalent. Topics in experimental design include: Latin squares, Youden squares, balanced and partially balanced incomplete block designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, optimal designs based on various criteria, analysis of covariance.

222. Biostatistics: Survival Analysis (4) III. The Staff
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor. Incomplete data; life tables; nonparametric methods; parametric models; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. Offered in alternate years.

***223. Biostatistics: Generalized Linear Models** (4) II. The Staff
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor. Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response relations; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. Offered in alternate years.

***224. Biostatistics: Clinical Trials and Advanced Topics** (4) III. The Staff
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 223 or consent of instructor. Clinical trials; sequential design; covariate adjustment; meta-analysis; applications of generalized linear models; longitudinal studies; random effects models; advanced topics. Offered in alternate years.

228. Statistical Quality Control and Productivity Improvement (3) II. The Staff
Lecture—3 hours. Prerequisite: Management 210A, 210B or Statistics 106. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector. Methods covered include statistical quality control techniques such as control charts and acceptance sampling, reliability and graphical tools. (Same course as Management 228.)

231A-231B-231C. Mathematical Statistics (4-4-4) I-II-III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C and Mathematics 127A-127B or the equivalent. Distribution theory, decision theoretic methods, estimation and hypotheses testing, multivariate techniques, large sample theory.

232A-232B. Linear Model Theory (4-4) I-II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

***233. Design of Experiments** (3) II. The Staff
Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Offered in alternate years.

235A-235B-235C. Probability Theory (3-3-3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 127C and courses 131A-131B or the equivalent. Measure theoretic foundations, abstract integration, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Mathematics 235A-235B-235C.)

237A. Time Series Analysis: Foundations (3) I. The Staff
Lecture—3 hours. Prerequisite: course 131A or Mathematics 131 or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in alternate years.

237B. Time Series Analysis: Statistical Inference (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 131B-131C and 237A. Multivariate normal processes, spectral estimation, tests of hypotheses, regression, discrimination filtering, spectral analysis of variance, ARIMA

processes, state space models, and maximum likelihood estimation. Offered in alternate years.

***238. Theory of Multivariate Analysis** (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 135 and 231C. Random vectors and matrices, characteristic functions; multivariate normal; multiple and canonical correlation; Cochran's Theorem; multivariate GLM; growth curves; Wishart distribution; likelihood ratio and union-intersection tests; simultaneous inference; spatial linear models; projection pursuit; Bayesian multivariate methods; Stein and shrinkage estimators. Offered in alternate years.

***240A-*240B. Nonparametric Inference** (3-3) II-III. The Staff
Lecture—3 hours. Prerequisite: course 231C; courses 235A-235B-235C recommended. Comprehensive two-quarter sequence on nonparametric statistical inference, including the most basic materials from: classical nonparametrics, robustness, nonparametric estimation of a distribution function from incomplete data, curve estimation, and theory of resampling methodology. Offered in alternate years.

241. Asymptotic Theory of Statistics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 231C; courses 235A, 235B, 235C recommended. Topics in asymptotic theory of statistics chosen from: weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Offered in alternate years.

***250. Advanced Data Analysis** (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 141, 232A and either course 230 or 231A. Resampling methods and one to three additional topics selected from nonparametric and semi-parametric methods, incomplete data analysis, diagnostics, nonstandard multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis. Offered in alternate years.

***251. Topics in Advanced Theory of Statistics** (3) II. The Staff
Lecture—3 hours. Prerequisite: course 231C. Bayesian, regression, sequential and survival analysis; bootstrap and reliability theory; change-point problems; empirical and spatial processes; asymptotic inference under dependence; asymptotic theory in linear, parametric and semiparametric models. Offered in alternate years.

280. Orientation to Statistical Research (2) III. The Staff
Seminar—2 hours. Prerequisite: consent of instructor. Guided orientation to original statistical research papers, and oral presentations in class of such papers by students under the supervision of a faculty member. (S/U grading only.)

290. Seminar in Statistics (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)

292. Graduate Group in Statistics Seminar (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: graduate standing. Advanced study in various fields of statistics with emphasis in applied topics; presented by members of the Graduate Group in Statistics and other guest speakers. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (S/U grading only.)

Professional Course

390. Methods of Teaching Statistics (2) I. The Staff (Chairperson in charge)
Lecture/discussion—2 hours; workshop—1 hour. Prerequisite: graduate standing. Training in teaching methodology at the undergraduate level. Emphasis is on practical training exercises which are used to evaluate skills and improve these skills. Lecture exercises will be videotaped and critiqued. (S/U grading only.)

Professional Course

401. Methods in Statistical Consulting (3) I, III. The Staff
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: graduate standing in Statistics. Introduction to consulting; in-class consulting as a group; individual or team consulting under supervision. May be repeated for credit. (S/U grading only.)

Statistics (A Graduate Group)

George G. Roussas, Ph.D., Chairperson of the Group

Group Office, 380 Kerr Hall (916-752-2362)

Faculty. The Group has 41 faculty members from almost all colleges, schools, and divisions, including 16 from the Intercollege Division of Statistics.

Graduate Study. The Graduate Group in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. The M.S. gives students a strong foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Facility in computer programming is essential for some of the course work. The supervised statistical consulting required of all M.S. students has proven to be a valuable educational experience. The Ph.D. program combines advanced course work in statistics and probability with the opportunity for in-depth concurrent study in an applied field. A Ph.D. program with an emphasis in biostatistics is also offered and overseen by the Biostatistics Affinity Group, a subgroup of the Graduate Group in Statistics. For detailed information contact the Chairperson of the Group or the Graduate Adviser.

Preparation. For admission to the Ph.D. program, course work requirements for the master's degree, and at least one semester/two quarters of advanced calculus must be completed.

Graduate Adviser. W.O. Johnson.

Subject A

See University Requirements (Undergraduate Education chapter)

Surgery

See Surgery (Medicine, School of); and Surgical and Radiological Sciences (Veterinary Medicine), below

Surgical and Radiological Sciences

(School of Veterinary Medicine)

Timothy R. O'Brien, D.V.M., Ph.D., Chairperson of the Department

Department Office, 2112 Tupper Hall (916-752-3599)

Faculty

Cleta S. Bailey, D.V.M., Ph.D., Professor
Eugene M. Breznock, D.V.M., Ph.D., Professor
Nedim C. Buyukmihci, V.M.D., Professor
Larry D. Galuppo, D.V.M., Assistant Professor
Clare R. Gregory, D.V.M., Professor
Steve C. Haskins, D.V.M., M.S., Professor
Susan V. Hildebrand, D.V.M., Professor
William J. Hornof, D.V.M., M.S., Professor
Janet E. Ilkiw, B.V.Sc., Ph.D., Associate Professor
James H. Jones, D.V.M., Ph.D., Professor
Philip D. Koblik, D.V.M., M.S., Professor
Richard A. Le Couteur, B.V.Sc., Ph.D., Professor
Melinda H. MacDonald, D.V.M., Ph.D., Assistant Professor
Bruce R. Madewell, V.M.D., M.S., Professor
Thomas G. Nyland, D.V.M., Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
John R. Pascoe, B.V.Sc., Ph.D., Professor
Peter J. Pascoe, B.V.Sc., Associate Professor
Jack R. Snyder, D.V.M., Ph.D., Associate Professor
Eugene P. Steffey, V.M.D., Ph.D., Professor
Alain P. Théon, Dr. Med. Vet., Ph.D., Associate Professor
Philip B. Vasseur, D.V.M., Professor
Frank J. M. Verstraete, Dr. Med. Vet., B.V.Sc., M.Med. Vet., Assistant Professor

Emeriti Faculty

Roy W. Bellhorn, D.V.M., M.S., Professor Emeritus
Robert M. Cello, D.V.M., Professor Emeritus
Marvin Goldman, Ph.D., Professor Emeritus
Ira M. Gourley, D.V.M., Ph.D., Professor Emeritus
Terrell A. Holliday, D.V.M., Ph.D., Professor Emeritus
Robert L. Leighton, V.M.D., Professor Emeritus
Dennis M. Meagher, D.V.M., Ph.D., Professor Emeritus
Joe P. Morgan, D.V.M., Vet. med. dr., Professor Emeritus
Harold R. Parker, D.V.M., Ph.D., Professor Emeritus
Gordon H. Theilen, D.V.M., Professor Emeritus
John D. Wheat, D.V.M., Professor Emeritus
Alida P. Wind, M.V.D., Lecturer Emeritus

Affiliated Faculty

David D. Canton, D.V.M., Assistant Clinical Profesor
Dennis V. Hacker, D.V.M., Assistant Clinical Professor
Steven R. Hollingsworth, D.V.M., Lecturer
Susan A. Kraegel, D.V.M., Lecturer
Michael L. Magne, D.V.M., M.S., Assistant Clinical Professor
Kyle G. Mathews, D.V.M., M.S., Lecturer
George M. Peavy, D.V.M., Assistant Clinical Professor
Randall H. Scagliotti, D.V.M., Associate Clinical Professor
Sam Silverman, D.V.M., Ph.D., Clinical Professor
James Ticer, D.V.M., Ph.D., Associate Clinical Professor
Melinda K. Van Vechten, D.V.M., Assistant Clinical Professor
Leigh West-Hyde, D.V.M., Associate Clinical Professor

Courses in Surgical and Radiological Sciences (VSR)

Lower Division Course

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

230. Principles of Anesthesia and Surgery (2) II. Steffey
Lecture—2 hours. Prerequisite: graduate or professional student or consent of instructor. Presentation and integration of principles and techniques of anesthesia and surgery for laboratory animals. Course is not restricted to student numbers. Offered in alternate years.

230L. Principles of Anesthesia and Surgery (2) II. Steffey
Laboratory—4 hours. Prerequisite: course 230 concurrently. Laboratory to complement course 230. Limited enrollment. Offered in alternate years. (S/U grading only.)

***265A. Principles and Practice of Veterinary Radiation Oncology - A** (1.5) I. Theon
Lecture—1 hour; laboratory—3 hours total. Prerequisite: open only to graduate students and residents. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465A.) (S/U grading only.)

***265B. Principles and Practice of Veterinary Radiation Oncology - B** (1.5) II. Theon
Lecture—1 hour. Prerequisite: course 265A. Principles and practice of veterinary radiation therapy. The topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465B.) (S/U grading only.)

280. Structure and Function of the Mammalian Respiratory System (4) II. Jones
Lecture—3 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B, Mathematics 16A, 16B and 16C, Physics 5A and 5B. Advanced study of respiratory physiology and morphometry with emphasis on principles of allometry, ventilation and perfusion, gas distribution, exchange, transport, and delivery at rest, during exercise, and at high altitude. Offered in alternate years.

290. Clinical Neurology/Neuropathology Conference (1) I, II, III. Cardinet, Higgins, Bailey
Seminar—1.5 hours. Prerequisite: third- or fourth-year standing in the School of Veterinary Medicine, Veterinary Medicine Teaching Hospital, or UCDMC resident or graduate student in appropriate discipline. Discussion and review of neural and muscular pathology of selected cases from the Veterinary Medicine Teaching Hospital. (S/U grading only.)

291. Anesthesia/Critical Care Basic Science Conference (1) I, II, III. The Staff (P. Pascoe in charge)
Discussion—1 hour. Prerequisite: postdoctoral, medical, or graduate student; consent of instructor. Advanced course in scientific foundations of animal anesthesia and critical care. Format is directed by discussion following reading of assigned material emphasizing foundations in pharmacology and physiology. (S/U grading only.)

292. Advanced Veterinary Neurology/ Neurosurgery (2) I, II, III, IV. Bailey
Seminar—4 hours; weekly reading assignments; regular examinations. Prerequisite: House Officer in VMTH, UCDMC House Officers, graduate students in the School of Veterinary Medicine or School of Medicine, and 4th-year veterinary students with consent of instructor. Lectures/discussions/literature reviews of diagnosis and medical/surgical treatment of neurological diseases of animals. Relevant neurologic and neurosurgical topics from human medicine will be addressed. (S/U grading only.)

293. Anesthesia/Critical Care Case Management Conference (1) I, II, III. The Staff (P. Pascoe in charge)
Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Discussion of Veterinary Medical Teaching Hospital case material to illustrate specific medical problems and their preventive and corrective management. (S/U grading only.)

***294. Seminars in Veterinary Surgery** (1) I, II, III. Komtebedde
Seminar—1.5 hours every other week. Prerequisite: D.V.M. or equivalent degree and resident in specialty training or graduate student in related discipline. Discussion of selected topics pertaining to clinical academic veterinary surgery. Review of current principles and treatment modalities of veterinary surgery in large and small animals. (S/U grading only.)

295. Veterinary Cancer Biology (1) III. Madewell
Seminar—10 sessions. Prerequisite: graduate students in Comparative Pathology and House Officers in the Veterinary Medicine Teaching Hospital. The biology of cancer, with specific reference to etiology and pathogenesis of tumors in domestic animals. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Steffey in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff
(S/U grading only.)

Professional Course

397T. Tutoring in Veterinary Surgical and Radiological Science (1-5) I, II, III. The Staff
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

Professional Courses

404A. Small Animal Radiology (1.9) II-III. Nyland
Lecture—15 hours; laboratory—4 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to interpretation of alternate imaging procedures and therapeutic radiology of small animals. (Deferred grading only, pending completion of sequence.)

408. Special Procedures Rounds (2) I, II, III. The Staff
Discussion—6 hours. Prerequisite: a DVM degree and consent of instructor. Approved for graduate degree credit. Review of selected radiology cases from previous day. Specific radiographic changes and differential diagnosis are discussed, with participants leading the discussions. Special procedures such as angiography; nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (S/U grading only.)

409. Known Case Conference (1.5) I, II, III. The Staff
Discussion/demonstration—1.5 hours. Prerequisite: DVM degree and consent of instructor. Approved for graduate degree credit. Film review of current VM Teaching Hospital proven cases. Intended for radiology residents and others with background in diagnostic radiology. May be repeated for credit. (S/U grading only.)

410. Current Topics in Radiological Sciences (1.5) I, II, III, IV. The Staff
Lecture—1.5 hours. Prerequisite: DVM degree or consent of instructor. Fundamentals of radiological sciences for radiology residents. Topics will include series of in-depth lectures covering the broad spectrum of veterinary radiology/radiological sciences and related alternate imaging modalities. Clinically oriented but also including relevant research material. (S/U grading only.)

411. Small Animal Surgery (1.5 per week) I, II, III. The Staff (Vasseur in charge)
Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of pet animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (S/U grading only.)

412. Large Animal Surgery (1.5 per week) I, II, III. The Staff (Pascoe in charge)
Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of farm animal surgical patients in the hospital and outpatient clinic including physical examinations, presurgical work-up, assistance at operations, surgery, post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (S/U grading only.)

413A. Basic Small Animal Dentistry (1) I. Verstraete
Lecture—10 sessions. Prerequisite: third-year veterinary students. Introductory course in small animal dentistry. Covers the principles of oral examination, pathophysiology and treatment of periodontitis, exodontics, basic oral soft tissue surgery and dental emergencies. (S/U grading only.)

413B. Advanced Small Animal Dentistry (1) I. Verstraete
Lecture—10 sessions. Prerequisite: course 413A. Advanced course in small animal dentistry. Covers the principles of orthodontics, developmental and regressive dental conditions, endodontics, prosthodontics, advanced periodontal therapy, oral medicine and advanced oral surgery. (S/U grading only.)

414. Veterinary Anesthesiology (1.5 per week) I, II, III. The Staff (Steffey in charge)
Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for anesthetic care of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (S/U grading only.)

415. Lameness in Dogs (1.3) III. Vasseur
Lecture—13 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Discussion of lameness examination will be followed by detailed descriptions of the disorders that cause lameness in dogs and cats and methods to diagnose and treat them effectively. An important goal will be to distinguish those disorders that can be managed by the general practitioner from those that require referral to a specialist.

415L. Lameness in Dogs (0.5) III. Vasseur
Laboratory—2 three-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and course 415 concurrently. Hands-on experience in surgical manipulation and exposure of joints. (S/U grading only.)

420. Small Animal Neurosurgery (1) II. Bailey
Lecture—4 hours; laboratory—16 hours. Prerequisite: VMTH Neurology/Neurosurgery resident, VMTH Surgery resident or consent of instructor. Indications and techniques of selected small animal neurosurgical procedures. (S/U grading only.)

422. Veterinary Ophthalmology (0.75–1.5 per week) I, II, III. Buyukmihci
Laboratory—25-50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for the care of animals in the hospital and out-patient clinic including history taking, ophthalmologic examinations, special diagnostic techniques, assistance at ophthalmologic surgery and medical and post surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (S/U grading only.)

423. Small Animal Ophthalmology (2) III. Hollingsworth
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnosis and treatment of commonly encountered eye diseases of small animals and nondomestic animals.

423L. Small Companion Animal Ophthalmology Laboratory (0.3) III. Hollingsworth
Laboratory—2 four-hour sessions. Prerequisite: course 422 or the equivalent and concurrent enrollment in course 423. Approved for graduate degree credit. Ocular surgical laboratory. Several surgical procedures involving the lids and conjunctiva, as well as enucleation, will be performed at each session. (S/U grading only.)

424. Case Studies in Veterinary Oncology (1) II. Madewell
Lecture—five 2-hour sessions. Prerequisite: second-year student of Veterinary Medicine elective course offering. By use of clinical case material, the student will be introduced to the Internal Medicine Subspecialty of Oncology. Course will highlight clinical considerations, but will also serve to introduce basic tenets of tumor biology. (S/U grading only.)

460. Emergency and Critical Patient Care (2) III. Haskins
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.

461. Small Animal Orthopedic Surgery (1.6) II. Vasseur
Lecture—16 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Management of common fractures, luxations and other injuries in dogs.

461L. Small Animal Orthopedic Surgery (0.5) II. Vasseur
Laboratory—3 three-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and course 461 concurrently. Hands-on experience in application of external coaptation and basic principles of application of different types of fixation for fractures. (S/U grading only.)

462. Radiographic and Ultrasonographic Diagnosis: Small Animal (1.1) III. Hornof
Lecture/discussion—1 hour. Prerequisite: third-year standing in the School of Veterinary Medicine and course 404A. Small radiographic and ultrasonigraphic case studies discussed in small group setting. Limited enrollment. (S/U grading only.)

463. Soft Tissue Surgical Diseases (2) III. Gregory
Lecture—2 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Pathophysiology and surgical treatment of selected soft tissue diseases.

463L. Soft Tissue Surgical Diseases Laboratory (0.9) III. Gregory
Laboratory—9 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 463 concurrently. Priority given to Small Animal Track students. Laboratory course complementing course 463. Three laboratories in applied surgical anatomy and physiology and six in operative surgical exercises which cover common emergency surgical procedures. (S/U grading only.)

465A. Principles and Practice of Veterinary Radiation Oncology - A (1.5) II. Theon
Lecture—1 hour; laboratory—3 hours total. Prerequisite: open only to graduate students and residents. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265A.) (S/U grading only.)

465B. Principles and Practice of Veterinary Radiation Oncology - B (1.5) III. Theon
Lecture—1 hour. Prerequisite: course 465A. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265B.) (S/U grading only.)

466. Mixed-Large Animal Anesthesiology (1.5) II. Hildebrand
Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Applied clinical anesthesiology for junior veterinary students. Special techniques and consideration for anesthetizing a variety of species including horses, swine, ruminants, large non-domestic species, cats and dogs. (S/U grading only.)

467. Small Animal Anesthesiology (1.5) II. Ilkiw
Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Presentation of material which is basic to safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, and methods of use of common anesthetic drugs and techniques will be discussed.

468. Equine Lameness and Radiology (4) III. O'Brien
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiologic diagnosis of conditions that cause lameness in the equine will be emphasized. Methods used in large-animal radiography will be illustrated and latest technique for treating equine lameness will be discussed. Anatomy and pathology of some areas of the musculoskeletal system will also be presented.

468L. Equine Lameness and Radiology (1) III. O'Brien
Laboratory—10 three-hour sessions. Prerequisite: course 468 (concurrently). Priority enrollment for students in equine track; others with consent of instructor. Limited enrollment.

469. Equine Surgery (3) III. Pascoe
Lecture—30 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Provides junior veterinary students with an understanding of those diseases of the soft tissues of the horse that can be managed surgically.

469L. Equine Surgery Laboratory (1) II. Pascoe
Laboratory—10 three-hour sessions. Prerequisite: course 469 (concurrently). Specific surgical procedures of the horse are demonstrated and performed by students. Participants in the course work in groups of three on rotating basis. Limited enrollment.

492. Large Animal Grand Rounds (0.5) I, II, III. The Staff (Pascoe in charge)
Discussion—1 hour. Prerequisite: professional standing; House Officer in Veterinary Medical Teaching Hospital or consent of instructor. House Officers take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. (S/U grading only.)

Textile Arts and Costume Design

See Design

Textile Science

See Fiber and Polymer Science

Textiles (A Graduate Group)

You-Lo Hsieh, Ph.D., Chairperson of the Group
Group Office, 129 Everson Hall (916-752-6650)

Faculty. The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. Students in the program can emphasize either the physical or behavioral science aspects of textiles. Research areas include chemical, physical, biochemical, and mechanical properties of fibers and polymers as well as fibrous assemblies, including composites, paper, and nonwovens; and psychological and sociological factors relating to perception and consumption of textiles and apparel. Extensive specialized fiber, polymer, and textiles research facilities are available. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Adviser. Y.-L. Hsieh (Textiles and Clothing).

Textiles and Clothing

(College of Agricultural and Environmental Sciences)
Margaret H. Rucker, Ph.D., Chairperson of the Division
Division Office, 129 Everson Hall (916-752-6650)

Faculty

You-Lo Hsieh, Ph.D., Professor
Susan B. Kaiser, Ph.D., Professor
Ning Pan, Ph.D., Associate Professor
Margaret H. Rucker, Ph.D., Professor
Gang Sun, Ph.D., Assistant Professor

Emeriti Faculty

Mary Ann Morris, Ph.D., Professor Emeritus
Howard L. Needles, Ph.D., Professor Emeritus
S. Haig Zeronian, Ph.D., D.Sc., Professor Emeritus

Affiliated Faculty

Ken Alger, M.S., Lecturer
Joan Chandler, M.S., Lecturer

The Major Program

The textiles and clothing major emphasizes the connections among *(a)* the physical characteristics of textile products, *(b)* human perceptions of and behavior toward these products, and *(c)* global economic trends affecting the textile/apparel marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production, distribution, and consumer use of textiles and apparel. (See also Fiber and Polymer Science.)

The Program. The textiles and clothing major offers two options: textile science and marketing/economics. The *Textile Science* option provides students with a broad knowledge base in both the social and physical sciences. This base includes production, end-use applications and care of textiles and apparel, physical and chemical properties of textiles, and social-psychological and economic aspects of textiles and clothing.The *Marketing/Economics* option emphasizes social science and business course work, while also providing students with an awareness of the physical nature of textile products.

Internships and Career Alternatives. Textiles and clothing majors can pursue internships and careers in apparel production and merchandising, retail management, international marketing, textile testing and conservation, and textiles journalism. The majority of textiles and clothing graduates accept entry-level

*Course not offered this academic year.

management and technical positions within the textile and apparel industry or in related fields, (e.g., merchandising and marketing, production, research and development, technical service and design). Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selections of restricted elective course work.

B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.)*

UNITS

English Composition Requirement 4-12
See College Requirement 0-8
Rhetoric 1 4

Preparatory Subject Matter 39-41
Computer science (Agricultural Systems and Environment 21, Computer Science Engineering 15 or 30) 3-4
Economic principles (Economics 1A-1B) ...10
Art history, cultural anthropology or science and society (Anthropology 2, Science and Society 1, Art History 1A, 1B, 1C, or 1D) 4
Physics (Physics 10 or Physics 1A) 3-4
Psychology (Psychology 1) 4
Sociology (Sociology 2) 4
Statistics (Statistics 13) 4
Textiles and Clothing (Textiles and Clothing 6, 7, 8) 11

Breadth/General Education 6-24
Satisfaction of General Education requirement

Select one of the following two options:

Marketing/Economics Option

Option-Specific Preparatory Subject Matter ...18
Accounting (Management 11A-11B) 8
Chemistry (Chemistry 10) 4
Mathematics (Mathematics 16A-16B) 6

Depth Subject Matter 57-58
Agricultural economics (Agricultural and Resource Economics 100A-100B, 106, 136) 16
Statistics (Statistics 103) 4
Psychology or Consumer Science (Psychology 145 or 183, or Consumer Science 100) 3-4
Textiles and clothing (Fiber and Polymer Science 110, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174) 31

Restricted Electives 12
Courses selected from the following: Agricultural and Resource Economics 18, 112, 141M, 142, 155, 157, 171A, 171B, Anthropology 122, 126, Consumer Science 100, Design 77A, 77B, 143, Economics 101, 121A, 121B, 134, 162, and other relevant course work, Foreign language units may be used to satisfy any or all of the required 12 units, Mathematics 16C, Psychology 145, 183, Sociology 123, 126, 140, 141, 145, Textiles and Clothing 180A, 180B, 230, 293, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

Unrestricted Electives 15-44

Textile Science Option

Option-Specific Preparatory Subject Matter ...16
Chemistry (Chemistry 2A, 2B, 8A, 8B) 16

Depth Subject Matter 52-53
Agricultural economics (Agricultural and Resource Economics 112, 113) 8
Design (Design 143) 4
Psychology or Consumer Science (Psychology 145 or 183, or Consumer Science 100) 3-4
Textiles and clothing (Fiber and Polymer Science 100, 161, 161L, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174) 34

Restricted Electives 16
Courses selected from the following: Agricultural and Resource Economics 18, 141, 141M, 142, 155, 171A, 171B, Agricultural Systems and Environment 120, Chemistry 1C, 128A, 128B, 128C, Community and Regional Development 162, Consumer Science 100, Design 77A, 77B, 142A, 142B, 160A, 160B, 160C, 170A, 170B, 170C, Economics 11A, 11B, 100, 101, 121A, 121B, 134, Fiber and Polymer Science 110, Foreign Language units may be used to satisfy any or all of the required 16 units, Mathematics 16A, 16B, 16C, Psychology 145, 183, Rhetoric and Communication 42, 130, 136, 140, Sociology 25, 123, 126, 140, 148, 159, 175, Statistics 106, 108; Textiles and Clothing 180A, 180B, 230, 293, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

Unrestricted Electives 17-46

Total Units for the Degree.....180
(Marketing/Economics or Textile Science Option)

Major Adviser. N. Pan.

Advising Center for the major is located in 129 Everson Hall (916-752-4417).

Minor Program Requirements:

The Division of Textiles and Clothing offers a minor program for non-majors interested in satisfying secondary career objectives. For acceptance into the program see the staff adviser in 129 Everson Hall.

UNITS

Textiles and Clothing 18
Textiles and Clothing 6, 7, or 8 4
Courses selected from Fiber and Polymer Science 100, 110, 161, 161L, Textiles and Clothing 107, 162-162L, 163-163L, 164, 165, 171, 173, 174 14

Minor Adviser. N. Pan.

Courses in Textiles and Clothing (TXC)

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing. See also courses in Fiber and Polymer Science.

Lower Division Courses

6. Introduction to Textiles (4) I. Sun
Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. GE credit: SciEng.

7. Style and Cultural Studies (3) II. Kaiser
Lecture/discussion—3 hours. The multiple and overlapping influences of gender, sexuality, ethnicity, and class on constructions of identity and community are explored through the study of style in popular culture and everyday life. Continuity and change in clothing and appearance styles are interpreted. GE credit: SocSci, Div, Wrt.

8. The Textile and Apparel Industries (4) I. Rucker
Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods. GE credit: SocSci, Div.

92. Internship in Textiles and Clothing (1-12) I, II, III. The Staff (Rucker in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Rucker in charge) (P/NP grading only.)

Upper Division Courses

107. Social and Psychological Aspects of Clothing (4) I. Kaiser
Lecture—3 hours; discussion—1 hour. Prerequisite: Sociology 2. Social and cognitive factors influencing management and perception of personal appearance in everyday life. Concepts and methods appropriate to the study of meaning of clothes in social and cultural contexts. GE credit: SocSci, Div, Wrt.

162. Textile Fabrics (3) II. Pan
Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance. GE credit: SciEng.

162L. Textile Fabrics Laboratory (1) II. Pan
Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

163. Textile Coloration and Finishing (3) III. Sun
Lecture—3 hours. Prerequisite: course 6, Fiber and Polymer Science 110, or Chemistry 8B. Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles.

163L. Textile Coloration and Finishing Laboratory (1) III. Sun
Laboratory—3 hours. Prerequisite: course 163 (may be taken concurrently). Demonstrates various aspects of dyeing, printing, and finishing of textile substrates including the effect of fiber and finish type, and physical and chemical variables on dyeing and finishing processes and on the properties of the resultant textile.

164. Principles of Apparel Production (3) III. The Staff
Lecture—3 hours. Prerequisite: course 6 or 8. Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering.

***165. Textile Processes** (3) I. Pan
Lecture/discussion—3 hours. Prerequisite: course 6. Physical processes involved in the production of textiles from the individual fiber to the finished fabric. Includes spinning, texturing, yarn formation, weaving preparation, weaving and knitting, tufting and fabric finishing.

***171. Clothing Materials Science** (4) I. Hsieh, Pan
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 6, 8, and senior standing. The properties, characterization, and performance evaluation of clothing materials and structures for specific functional applications. Principles and methods related to wetting and transport properties, fabric hand and aesthetic properties, clothing comfort, and material and assembly technology.

***173. Principles of Fashion Marketing** (3) II. Rucker
Lecture—3 hours. Prerequisite: course 8, Economics 1A, Agricultural and Resource Economics 113 or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization, merchandising, pricing, promotion and personnel. Offered in alternate years.

174. Introduction to World Trade in Textiles and Clothing (2) II. Rucker
Lecture—2 hours. Prerequisite: course 8. Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic, and technological factors that are changing these industries and their markets. Offered in alternate years. GE credit: SocSci, Div.

180A-180B. Introduction to Research in Textiles (2-2) I, II, III. The Staff (Rucker in charge)
Laboratory—6 hours. Prerequisite: senior standing with textile-related major, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.)

192. Internship in Textiles and Clothing (1-12) I, II, III. The Staff (Rucker in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

197T. Tutoring in Textiles and Clothing (1-5) I, II, III. The Staff (Rucker in charge)
Discussion/laboratory—3-15 hours. Prerequisite: upper division textiles-related major and consent of instructor. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Rucker in charge)
(P/NP grading only.)

Graduate Courses

230. Behavioral Science Concepts in Textiles (3) I. Kaiser
Lecture—3 hours. Prerequisite: course 107, upper division or graduate course in statistics (e.g., Agricultural Systems and Environment 120) and one in a behavioral science (e.g., Psychology 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables. Offered in alternate years.

250A-F. Special Topics in Polymer and Fiber Science (3) I, II, III. Hsieh/Pan
Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250A-F.)

290. Seminar (1) I, II. The Staff
Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.)

290C. Research Conference (1) I, II, III. The Staff (Rucker in charge)
Discussion—1 hour. Prerequisite: graduate standing; consent of instructor. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (S/U grading only.)

293. Recent Advances in Textiles (3) II. The Staff
Lecture—3 hours. Prerequisite: two upper division courses in Textiles and Clothing or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. Multidisciplinary aspects of the topics selected will be stressed. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Rucker in charge)

299. Research (1-12) I, II, III. The Staff (Rucker in charge)
(S/U grading only.)

Transportation Technology and Policy (A Graduate Group)

Patricia L. Mokhtarian, Ph.D., Chairperson of the Group

Group Office, 2028 Academic Surge (916-752-6548)

Faculty. The Group includes faculty from 10 academic departments and programs and the Institute of Transportation Studies.

Graduate Study. The Graduate Group in Transportation Technology and Policy offers the M.S. (Plan I—thesis; and Plan II—exam), and Ph.D. degrees in two areas of specialization: *Transportation Technology;* and *Transportation Planning and Policy.* The technology track is for students trained in engineering and the physical sciences and interested in systems-level planning, analysis, management and design of advanced technologies (emphasizing vehicle propulsion and "intelligent transportation system" technologies) focusing on energy and environmental issues. The planning and policy track is aimed at students from a wider range of disciplines interested in the broader public policy issues concerning transportation systems. The curriculum for both tracks includes courses in civil, mechanical, and environmental engineering, economics, policy sciences, statistics, travel behavior, management, technology assessment and environmental studies.

Preparation. Applicants will normally be expected to have completed two courses in calculus and one course each in statistics and microeconomics. Additionally, students entering the technology track will need either to have an appropriate technical background or make up a relatively large number of prerequisite courses in order to be able to take the approved courses in that track.

Program of Study. Students will have the option of following either a technology or policy/management track. The core courses (15 units) are required of all students in both degrees and both tracks. Master's degrees students are required to take 21 units of additional course work (for a total of 36 units), at least 12 of which must be from the approved course list of their chosen track. M.S. Plan I students may replace up to 6 units of regular course work with research (course 299) units. Ph.D. students are required to take 54 units; they should include the 15 units of core courses, at least 27 units from the approved course list of their chosen track, and at least 9 units from the approved course list of the other track. At least two thirds of all credits must be at the graduate level.

Graduate Adviser: Professor Patricia L. Mokhtarian

Curriculum

Core Courses. All students are required to take five core courses shown below (15 units). In addition, students are expected to register for Civil and Environmental Engineering 298 (or the approved equivalent in another department), a one-unit seminar course, each quarter it is offered. Civil and Environmental Engineering 298 or the equivalent units will not count toward the required totals. Ph.D. students are also required to take Civil and Environmental Engineering 252.

Management 250 or 251
Civil and Environmental Engineering 251, 256, and 259; and either 263 or 268

Planning and Policy Courses. Approved courses in this area include the following (additional courses may be added upon approval by the Chairperson):

Agricultural and Resource Economics 176
Civil and Environmental Engineering 153, 160, 252, 253, 254, 255, 258, 262
Civil and Environmental Engineering/Environmental Studies 163
Ecology 290
Environmental Studies 168A, 168B, 212A, 212B
Management 203B, 216, 249, 283, 285
Statistics 205

Technology Courses. Approved courses in this area include the following (additional courses may be added upon approval by the Chairperson):

Atmospheric Science 116
Civil and Environmental Engineering 149, 161, 162, 242, 289
Computer Science Engineering 272
Management 252
Mechanical Engineering 134, 161, 163, 188, 217, 226, 234, 236

UC Davis Washington Center

Bruce W. Jentleson, Director and Professor

UC Davis Washington Center,
2301 M Street, NW, 5th Floor,
Washington, D.C. 20037
(202-296-8221)

Information:
UC Davis Washington Center On-Campus Office
Internship and Career Center
South Hall, 2nd Floor, 916-752-7260

The UC Davis Washington Center began operations in the 1990-91 academic year. It provides students and faculty new and expanded opportunities in the nation's capital to enrich their education and research. Its principal activities are an undergraduate academic internship program, fellowships and internships for graduate and professional school students, fellowships and research grants for faculty, and satellite interactive "tele-courses."

Undergraduate Academic Internship Program

The UC Davis Washington Center undergraduate program is open to students from all majors at UC Davis who have completed 84 units towards graduation. Students earn 12-16 units of academic credit, continue to be registered as full-time students, and fulfill university residency requirements. A GPA of approximately 3.0 is recommended for admission. Applicants also are evaluated based on a written statement, letters of recommendation and personal interviews.

The **Undergraduate Program** runs fall and spring quarters, on a 12-13 week "extended quarter" basis. It has two principal components:

- **Internships/Research Projects (8 units):** Students work three to four days per week as interns in Congress, federal agencies, interest groups, trade associations, research institutions, the media, museums or in other organizations related to policy, politics, science and culture and geared to the interests and objectives of individual students. Drawing on the internship experience, each student develops an independent research project, under the supervision of a member of the faculty.
- **Policy-Process Seminar (4 units):** Each student also enrolls in one upper division seminar course taught at the Washington Center. Most of these courses focus on a particular area of policy (e.g., foreign policy, science policy, social policy, economic policy, agricultural policy) and the key issues, the politics, the principal institutions, and the dynamics of the process within that policy area. Some are of more general interest, designed to draw on some of the unique historical, scientific, cultural and artistic resources of Washington. In addition to regular instruction, seminars often include guest speakers, observations of congressional committees and federal agencies, and other relevant Washington experiences.

*Course not offered this academic year.

Courses are taught by UC Davis faculty in residence, faculty from the UCLA, UC Santa Barbara, UC Santa Cruz and UC Berkeley Washington programs, or visiting faculty from the Washington area.

Financial aid eligibility is maintained, and the aid package can be adjusted to reflect the additional costs of the Program. Some additional financial awards also are offered directly by the Washington Center, including the University of California President's Washington Scholarship Program, and the Joyce and Norman Weil Scholarships.

Students live in university-arranged housing, convenient to public transportation. Arrangements also are made to cover health services and other aspects of student life. The program also includes many educational, cultural and historical activities in the Washington area.

Students also may participate in a **Summer Program**. The Summer Program is non-credit. It includes internships and many of the same educational, cultural, historical and social activities but no courses or research projects. The program fee is $200. Some financial assistance is provided but more limited than for the academic year programs.

The Washington Center also has two positions during the academic year for graduate students as **Graduate Fellows** (combination of a predoctoral research fellowship and a teaching assistantship) and **Graduate Summer Internships.**

In partnership with faculty on campus, the Washington Center also conducts satellite interactive "telecourses" in which students on the Davis campus participate in interviews and seminars with federal government officials and other experts from the nation's capital.

The Washington Center also houses one of the computer laboratories that, along with the main one on campus in the Political Science Department, comprise the **UC Davis Sun Technology and Research Excellence Center (Sun TREC)**. Made possible through a major grant from Sun Microsystems Computer Company, Sun TREC UC Davis is developing innovative technology-based projects involving faculty, students, the private sector and policy makers at the federal, state, and local levels on key public policy issues.

Urban Planning

See Community and Regional Development; Engineering: Civil and Environmental; Environmental Horticulture and Urban Forestry; Environmental Policy Analysis and Planning; and Environmental Studies

Urology

See Medicine, School of

Vegetable Crops

(College of Agricultural and Environmental Sciences)

Kent J. Bradford, Ph.D., Chairperson of the Department

Department Office, 148 Asmundson Hall (916-752-0516)

Faculty

Steffen Abel, Ph.D., Assistant Professor
Lars W. Anderson, Ph.D., Lecturer
David E. Bayer, Ph.D., Professor
Alan B. Bennett, Ph.D., Professor
Arnold J. Bloom, Ph.D., Professor
Kent J. Bradford, Ph.D., Professor
Marita Cantwell, Ph.D., Lecturer
Roger T. Chetelat, Ph.D., Lecturer
Joseph M. DiTomaso, Ph.D., Lecturer
Clyde L. Elmore, Ph.D., Lecturer
Timothy K. Hartz, Ph.D., Lecturer
Louise E. Jackson, Ph.D., Associate Professor
Richard A. Jones, Ph.D., Professor
W. Thomas Lanini, Ph.D., Lecturer
Muhammad Marrush, Ph.D., Lecturer
Jeffrey P. Mitchell, Ph.D., Lecturer
Richard W. Michelmore, Ph.D., Professor
Donald J. Nevins, Ph.D., Professor
Robert F. Norris, Ph.D., Associate Professor
Carlos F. Quiros, Ph.D., Professor
Dina St. Clair, Ph.D., Associate Professor
Mikal E. Saltveit, Ph.D., Professor
Carol Shennan, Ph.D., Associate Professor
David F. Spencer, Ph.D., Lecturer
Trevor V. Suslow, Ph.D., Lecturer
Ronald E. Voss, Ph.D., Lecturer
John I. Yoder, Ph.D., Professor

Emeriti Faculty

James F. Harrington, Ph.D., Professor Emeritus
Robert F. Kasmire, Ph.D., Lecturer Emeritus
James M. Lyons, Ph.D., Professor Emeritus
Jim W. B. McHenry, Ph.D., Lecturer Emeritus
Lawrence W. Mitich, Ph.D., Lecturer Emeritus
Leonard L. Morris, Ph.D., Professor Emeritus
Harlan K. Pratt, Ph.D., Professor Emeritus
Lawrence Rappaport, Ph.D., Professor Emeritus
Charles M. Rick, Ph.D., Professor Emeritus
Vincent Rubatzky, Ph.D., Lecturer Emeritus
William L. Sims, Ph.D., Lecturer Emeritus
Paul G. Smith, Ph.D., Professor Emeritus
Arthur R. Spurr, Ph.D., Professor Emeritus
Herman Timm, Ph.D., Lecturer Emeritus
James E. Welch, Ph.D., Lecturer Emeritus
Masatoshi Yamaguchi, Ph.D., Professor Emeritus
Shang Fa Yang, Ph.D., Professor Emeritus

Graduate Study. A program of study is offered leading to the M.S. degree in Vegetable Crops (Horticulture). Information can be obtained from the graduate adviser. Also see the Graduate Studies section in this catalog.

Graduate Adviser. H. Timm.

Related Courses. Vegetable Crops faculty also teach the following courses that contribute to majors and graduate programs in Agricultural Systems and Environment, Biological Sciences, Genetics, and Plant Biology:

Agricultural Systems and Environment 2, 110C, 118, 195, Biological Sciences 1C, 101, Genetics 201D, 207L, 296, Plant Biology 1, 12, 154, 161A, 172, 172L, 176, 177, 188, 196, Plant Biology Graduate Group 201, 212, 214, 217, 218A, 223, 228, 293.

Courses in Vegetable Crops (VCR)

Questions pertaining to the following courses should be directed to the instructor or to the Vegetable Crops Office, 148 Asmundson Hall.

Lower Division Course

92. Internship in Vegetable Crops (1-6) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92–192 series. (P/NP grading only.)

Upper Division Courses

192. Internship in Vegetable Crops (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (P/NP grading only.)

197T. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)
Laboratory/discussion—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

***212. Postharvest Physiology of Vegetables** (4) III. Saltveit
Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 112 or 172. Comparative physiology of harvested vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Laboratories stress concepts and research procedures. Offered in alternate years.

216. Ecology and Agriculture (3) I. Jackson
Lecture/discussion—3 hours. Prerequisite: Plant Biology 142 or consent of instructor. Ecological principles and relationships as applied to agriculture. Integration of ecological approaches into agricultural research to develop environmentally sound management practices. Topics include crop autecology, biotic interactions among crops and pests, and crops systems ecology. (Same course as Ecology 216.)

220. Biotechnology and Genetics of Crop Improvement (3) II. Michelmore
Lecture—3 hours. Prerequisite: Biological Sciences 101 or Plant Biology 152; Plant Biology 154 or consent of instructor. Integration of modern biotechnology and classical plant breeding including molecular markers, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms, male sterility, hybrid production, disease resistance, and novel plant products.

220L. Biotechnology and Genetics of Crop Improvement Laboratory (1) II. Michelmore
Laboratory—3 hours. Prerequisite: course 220 concurrently. Projects in plant genetics and biotechnology: identification and analysis of molecular markers, generation and characterization of transgenic plants.

221. Genetics and Cytogenetics of Vegetable Crops (3) III. Quiros
Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytogenetics of the principal vegetables on a crop by crop basis. Current advances on the cytogenetic technology, sources of germplasm and applications to practical breeding problems.

228. Plant Molecular Biology Laboratory (5) II. Bennett, Harada (Botany)
Lecture—2 hours; laboratory—10 hours. Prerequisite: Molecular and Cellular Biology 120L, a course in molecular genetics, and consent of instructors. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Plant Biology 228.)

290. Seminar (1) I, II. The Staff
Discussion—1 hour. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Professional Course

300. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)
Tutoring—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience, but who are not teaching assistants. Students under supervision may give lectures, prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (S/U grading only.)

Veterinary Medicine, School of

Bennie I. Osburn, D.V.M., Ph.D., Dean of the School

John R. Pascoe, B.V.Sc., Ph.D., Executive Associate Dean—Academic Programs

Dallas M. Hyde, Ph.D., Acting Associate Dean—Research and Graduate Education Programs

Robert J. Hansen, Ph.D., Associate Dean—Student Programs

Bradford P. Smith, D.V.M., Associate Dean—Clinical Programs; Director, Veterinary Medical Teaching Hospital

Donald J. Klingborg, D.V.M., Assistant Dean—Public Programs; Director, Veterinary Extension

Ian Gardner, D.V.M., M.P.V.M., Ph.D., Director, Master's of Preventive Veterinary Medicine Program

School Office, Rooms 101–142 Surge IV (916-752-1360)

Courses in Veterinary Medicine (VMD)

Lower Division Course

92. Internship in Veterinary Science (1-12) I, II, III, IV. Pascoe
Discussion/laboratory—1-4 hours; clinical experience—3-36 hours. Prerequisite: approval of project by faculty sponsor prior to period of internship. Students in this program will be under the supervision of faculty in the School of Veterinary Medicine whose expertise is appropriate for the proposed project. (P/NP grading only.)

Upper Division Courses

170. Ethics of Animal Use (4) III. Dundon
Lecture—3 hours; discussion—1 hour. Prerequisite: any basic course in composition or speech. Study of applied ethical methodology, tightly organized writing of critiques and policy statements in ethical use of animals. Learning respect for divergent views in professional and public treatment of animals through case histories and by discussion of consensus policies to protect animals and human values. GE credit: SocSci, Wrt.

192. Internship in Veterinary Science (1-12) I, II, III, IV. Pascoe
Discussion/laboratory and clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in veterinary medicine. (P/NP grading only.)

Graduate Courses

298. Group Study (1-5) I, II, III. The Staff
(S/U grading only.)

299. Directed Independent Study (1-12) I, II, III. The Staff
(S/U grading only.)

Professional Courses

400. Informatics (1) I. Pascoe
Discussion—2 hours; laboratory—eight 3-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Acquisition of elementary skills and proficiency in the use of microcomputing will be achieved through the "real time" use of microcomputers within the science laboratories of instruction. (S/U grading only.)

401A. Normal Anatomy of the Canine Locomotor System (2.8) I. Hyde
Lecture—10 sessions; laboratory—18 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Normal canine anatomy with comparison to other species of bones, joints, muscles, ligaments, tendons, nerves, and vessels of the vertebral column and limbs.

401B. Normal Anatomy of the Canine Head (1.4) II. Cummings
Lecture—6 sessions; laboratory—8 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Normal canine anatomy of bones, joints, muscles, ligaments, tendons, nerves and vessels of the head, including the eye and ear, with comparison to other species.

402. Structure and Function of the Cardiorespiratory System (4.2) II. Jones
Lecture—29 hours; laboratory—13 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Residents in Specialty Training or graduate students with consent of instructor. Integrated view of cardiovascular anatomy and physiology.

402D. Structure and Function of the Urinary System and Body Fluids (2.2) III. Bruss
Lecture—15 sessions; laboratory—7 sessions. Prerequisite: first-year standing in veterinary curriculum or consent of instructor. Basic understanding of the structure and function of the urinary system plus physiology of body fluids and acid-base balance. Structure and function are correlated.

403A-403B. Physiological Chemistry (3.6-2.8) I-II.
Lecture—54 sessions; laboratory—12 sessions; discussion—12 sessions (total). Prerequisite: first-year standing in the School of Veterinary Medicine. Biochemical concepts used to analyze problems and evaluate metabolic relationships important in animal health and disease. Integrative approach, emphasizing the interrelationships among metabolic pathways and the signal transduction cascades that regulate them.

405. Veterinary Parasitology (3.6) III. Conrad, Boyce
Lecture—26 hours; laboratory—10 three-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides an understanding of the important biological and clinical aspects of parasites and the disease they cause in animals.

406. Principles of Behavior (0.7) I. Hart
Lecture—7 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Overview of animal behavior with relevance to veterinary medicine.

407. Principles and Techniques of Operative Surgery and Anesthesia (2.4) I. Gregory
Lecture—24 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 426. Introduction to operative and anesthetic skills and foundation in the importance of regional anatomy in the planning and conduct of surgical practice.

407L. Principles and Techniques of Operative Surgery Laboratory (1.4) I-II. Gregory
Laboratory—14 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 426. Introduction to surgical anatomy, operative and anesthetic skills. (S/U grading only; deferred grading only pending completion of course.)

408. Nutrition and Nutritional Diseases in Animals (2.9) II. Morris
Lecture—27 hours; laboratory—2 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Principles of nutrition and their application to the solution of nutritional disorders of animals.

409. Epidemiology (1.7) III. Hird
Lecture—11 hours; discussion—6 hours. Prerequisite: first-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Introduction to epidemiology and its applications in veterinary medicine.

410. Musculoskeletal Radiology (1) II. Wisner
Lecture—6 sessions; discussion—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to radiographic interpretation as it relates to diagnosis and management of musculoskeletal system disorders in small and large animals. Lectures stress radiographic pattern recognition and include detailed descriptions of representative orthopaedic lesions. Discussions are case-based exercises where students apply knowledge gained in lectures.

412. Fundamentals of Zoonoses (1.1) III. Chomel
Lecture—11 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. Major zoonotic infections transmitted mainly by farm animals and pets. For each animal species and each infection, a short review of symptoms, diagnostic tests, epidemiology and control are presented. Specific lectures on regulatory medicine of major zoonoses: e.g., rabies, tuberculosis.

413. Veterinary Food Safety (1.3) III. Cliver
Lecture—10 sessions; discussion—3 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. The food system and diseases transmitted by food. Topics include sources of contaminants, the function of processing in food safety, and the role of veterinarians in pre-harvest food safety and in food protection in general.

414A. Principles of Veterinary Pharmacology and Toxicology (2.4) I. Vulliet
Lecture—23 hours; laboratory—1 three-hour session. Prerequisite: second-year standing in the School of Veterinary Medicine. Provides a basic foundation for understanding of pharmacology and toxicology. Introduces principles of pharmacology and begins a consideration of drugs by pharmacological class.

414B. Veterinary Pharmacology (1.8) II. Giri
Lecture—17 hours; laboratory—1 three-hour session. Prerequisite: second-year standing in the School of Veterinary Medicine. Presents discussion of the pharmacology of several classes of drugs which are of major importance in veterinary medicine.

414C. Veterinary Toxicology (2.1) III. Segall
Lecture—21 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. General principles of toxicology, mechanisms of carcinogens, teratogens, and genetic and immunotoxicants. Course also discusses the biological effects of toxic substances of biological and industrial origins in animals.

419. Virology (2.7) I. Zee, Yilma
Lecture—19 hours; laboratory—8 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the classification, morphology, and the strategy of replication of animal viruses, covering the molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases of domestic animals.

420. Immunology (3.0) III. Gershwin
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Concepts of immunology. Emphasis is on the principles of vaccination, responses to pathogenic agents, and the development of hypersensitivity and autoimmune reactions.

421. Principles of Neurosciences (2.7) I. Gietzen
Lecture—22 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. An integrated study of normal neurobiology, neuroanatomy, and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.

*Course not offered this academic year.

422. Veterinary Ophthalmology (1.4) II. Buyukmihci
Lecture—13 sessions; laboratory—1 session. Prerequisite: third-year standing in the School of Veterinary Medicine. Basic information on how the eye is examined, how it interacts with the rest of the body and what can go wrong with the eye. Discussion of selected ocular diseases of various species.

426. Principles of Veterinary Anesthesiology and Critical Patient Care (1.7) III. Steffey
Lecture—15 hours; laboratory—2 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Offers basic principles of veterinary anesthesiology including techniques of monitoring and management of animals under anesthesia.

427. Cell and Tissue Structure and Function (3.3) I. Tablin
Lecture—24 sessions; laboratory—9 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Relationship between structure and function of animal tissues, emphasizing the molecular and cellular processes which integrate normal physiological activity. Mechanisms of cell division, differentiation and locomotion. Microscopic anatomy and organization of cells and extracellular molecules to form specialized differentiated tissues.

430. Principles of Radiology and Radiographic Anatomy (3.3) I-II-III. Koblik
Lecture—25 sessions, laboratory—6 sessions, discussion—2 sessions (total for series). Prerequisite: first year standing in the School of Veterinary medicine. Physical principles of x-ray production and x-ray matter interactions as they pertain to diagnostic medical imaging and radiation safety. Practical aspects of veterinary radiographic techniques. Normal radiographic anatomy of the skeleton, head, thorax and abdomen. (Deferred grading only, pending completion of three-quarter sequence.)

431. Endocrinology and Metabolism (2.3) III. Hansen
Lecture—22 sessions; laboratory—1 session. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic understanding of structure and normal physiological function of the endocrine glands, their hormones, and other factors that affect the regulation of metabolic processes.

432. Structure and Function of the Gastrointestinal and Mammary Systems (3) II. Tablin
Lecture—20 sessions; laboratory—10 sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Basic understanding and correlation of the structure and function of the gastrointestinal and mammary systems. Multiple species' differences examined.

433. Veterinary Oncology (1.2) II. Madewell
Lecture—12 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides veterinary students with a background to define the relationships between pathology, hematology, cytology, immunology, and the clinical manifestations of neoplastic diseases in animals.

435A-435B. Clinical Hematology and Biochemistry (3.7-2.5) I-II. Zinkl, Christopher
Lecture—23 sessions/16 sessions (435A/435B); laboratory—11 sessions/5 sessions; discussion—3 sessions/4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Knowledge and understanding of normal form and function of the hemolymphatic, exfoliative cytologic, and clinical biochemical systems provide critical information which aids veterinarians in assessing physical status and in understanding the etiopathogenesis of disease.

437A. Issues in Veterinary Medicine: Ethics, Animal Use, Professional Standards, and Communications (0.8) I. Pascoe
Discussion—8 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the important responsibilities of veterinarians to society through their role as health care providers. (S/U grading only.)

437B. Ethics and Issues in Veterinary Medicine (0.8) II. Pascoe
Discussion—8 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Continued introduction to the important responsibilities of veterinarians to society through their role as health care providers. (S/U grading only.)

438. Introduction to Methods of Animal Handling, Restraint, Examination, and Therapy (1) III. East
Laboratory—8 three-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Introduction and practice of methods of animal handling and restraint and selected techniques of diagnostic examination and therapy, as well as recognition of animal breeds, breed characteristics and purpose in animal species of veterinary importance. (S/U grading only.)

440. Veterinary Neurology (2.7) I. Bailey
Lecture—21 hours; laboratory—6 three-hour sessions. Prerequisite: third year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Integrated study of the relationship between neuroanatomy, neurophysiology, neuropathology, and the clinical manifestations of the diagnosis of neurological diseases and the use of the various neurodiagnostic aids.

444. Clinical Endocrinology (1.5) II. Feldman
Lecture—12 sessions; discussion—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. A correlated review of common endocrinology disorders affecting the dog and cat.

446. Reproduction (4.2) II. BonDurant
Lecture—32 hours; laboratory—10 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Structure, function, pathologic, and clinical aspects of reproduction in animals (normal and abnormal).

447. Basic Medicine of Domestic Animals (4.7) III. Cowgill
Lecture—45 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches common to medical diseases of domestic animals. Preparation for advanced course work in medical diagnosis and therapeutics with specific species focus and orientation.

451. Veterinary Bacteriology and Mycology (4.9) I. Hirsh
Lecture—34 hours; laboratory—15 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the bacterial and fungal agents of animal diseases. Specifically, each microorganism will be discussed with respect to overall significance to animal disease; structural and functional aspects including morphology, cellular composition, and products of medical interest.

452. General Pathology (3.1) I. Wilson
Lecture—18 hours; laboratory—13 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic principles of disease and in particular the fundamental mechanisms responsible for creating a disease situation. Illustrations of how the application of general pathological principles is used to determine disease pathogenesis and prognosis.

456. Law and Ethics of the Veterinary Profession (1.6) III. Wilson
Lecture—16 sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities. (S/U grading only.)

459. Systemic Pathology (5.8) II. MacLachlan
Lecture—42 sessions; laboratory—16 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic understanding of the pathobiology of major organ systems relevant to a variety of animal species. Emphasis on mechanisms of injury, patterns of response to injury and on balance between damage and repair.

460. Fundamentals of Clinical Orthopedics (1) II. Vasseur
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Fundamental concepts of veterinary orthopedics, including mechanisms of bone healing, types of fractures, and principles of stabilization.

470A-470B-470C. Hospital Practices (1-1-1) I-II-III. The Staff
Laboratory—30 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical training in veterinary medicine. Assignments in laboratory sessions to learn clinical techniques and in the medical and surgical services and clinical diagnostic facilities of the VMTH. (S/U grading only; Deferred grading only, pending completion of sequence.)

471. Mixed Animal Practice Clinics (3-15) I-II-III. Smith
Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on services relating to mixed animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the summer-fall sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

472. Small Animal Practice Clinics (3-15) I-II-III. Smith
Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on services relating to small animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Session I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

473. Large Animal Practice Clinics (2.5-15) I-II-III. Smith
Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to large animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

474. Equine Practice Clinics (2.5-15) I-II-III. Smith
Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to equine veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Session I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

475. Food Animal Practice Clinics (2.5-15) I-II-III. Smith
Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic

laboratories of VM Teaching Hospital with emphasis on those services relating to food animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

476. Zoological Practice Clinics (2.5-15) I-II-III. Smith
Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to zoological veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

477. Small Animal/Equine Practice Clinics (3-15) I, II, III. Smith
Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in the medical and surgical services and clinical diagnostic laboratories of the VM Teaching Hospital with emphasis on small and equine species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

478. Small Animal/Food Animal Practice Clinic (2.5-15) I, II, III. Smith
Veterinary clinical practices—7.5-45 hours per week. Prerequisite: fourth year standing in the School of Veterinary Medicine. Clinical training in veterinary medicine. Students will have assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital with emphasis on small and food animal species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of sequence.)

490A. Hospital Practices for Veterinary Students (2) I, II, III. Ling
Laboratory—60 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to procedures and knowledge integral to working in a veterinary clinical practice and the VMTH. (S/U grading only; deferred grading only, pending completion of sequence.)

490B. Hospital Practices for Veterinary Students (2) I, II, III. Smith, Ling
Laboratory—60 hours. Prerequisite: course 490A and first-year standing in the School of Veterinary Medicine. Introduction to procedures and knowledge integral to working in a veterinary clinical practice and the VMTH. (S/U grading only; deferred grading only, pending completion of sequence.)

490C. Core Hospital Practices (2) I, II, III. Smith
Laboratory—13 sessions (60 hours). Prerequisite: third-year standing in the School of Veterinary Medicine and course 490B. Continuation of 490B. (S/U grading only; deferred grading only, pending completion of sequence.)

Viticulture and Enology

(College of Agricultural and Environmental Sciences)

James A. Wolpert, Ph.D., Chairperson of the Department

Department Office, 1023 Wickson Hall (916-752-0380)

Faculty

Douglas O. Adams, Ph.D., Associate Professor
Linda F. Bisson, Ph.D., Professor
David E. Block, Ph.D., Assistant Professor *(Viticulture and Enology, Chemical Engineering)*
Roger B. Boulton, Ph.D., Professor *(Viticulture and Enology, Chemical Engineering)*
Susan E. Ebeler, Ph.D., Assistant Professor
Mark A. Matthews, Ph.D., Associate Professor
Carole P. Meredith, Ph.D., Professor
Ann C. Noble, Ph.D., Professor
M. Andrew Walker, Ph.D., Associate Professor
Andrew L. Waterhouse, Ph.D., Assistant Professor
Larry E. Williams, Ph.D., Professor

Emeriti Faculty

Maynard A. Amerine, Ph.D., Professor Emeritus
James A. Cook, Ph.D., Professor Emeritus
Richard E. Kepner, Ph.D., Professor Emeritus
W. Mark Kliewer, Ph.D., Professor Emeritus
Ralph E. Kunkee, Ph.D., Professor Emeritus
Lloyd A. Lider, Ph.D., Professor Emeritus
Harold P. Olmo, Ph.D., Professor Emeritus
Cornelius S. Ough, D.Sc., Professor Emeritus
Vernon L. Singleton, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
A. Dinsmoor Webb, Ph.D., Professor Emeritus

Affiliated Faculty

Christian E. Butzke, Ph.D., Assistant Cooperative Extension Specialist
L. Peter Christensen, M.S., Cooperative Extension Specialist
Nick K. Dokoozlian, Ph.D., Lecturer, Assistant Cooperative Extension Specialist
James A. Wolpert, Ph.D., Associate Cooperative Extension Specialist

Programs of Study. In addition to the Viticulture and Enology major, enology is a specialization under the Fermentation Science major, and viticulture is a specialization under the Agricultural Systems and Environment major.

Graduate Study. Several graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. or Ph.D. degree see Agricultural and Environmental Chemistry, Chemical Engineering, Ecology, Food Science, Genetics, Horticulture, Microbiology, Plant Biology, Plant Pathology, and Soil Science.

The Major Program

The Viticulture and Enology major provides an interdisciplinary education in the biological and physical principles underlying grape and wine production as well as practical knowledge of grape growing (viticulture) and wine making (enology). This program provides the knowledge base for problem-solving and decision-making in commercial grape and wine production.

The Program. The curriculum builds upon a foundation of biology, chemistry, biochemistry and mathematics with specialized courses related to grape and wine production. To complete the program, students can choose to place particular emphasis on viticulture, enology or economics. Credit may also be earned for foreign language study and internships.

Career Alternatives. Graduates are qualified for a variety of vineyard and winery positions, including production management, quality control and research. Additionally they may work in related fields such as pest management, nursery production and analytical services. Successful completion of this major can also provide the basis for preparation for graduate study in such areas as food science, microbiology, agricultural chemistry and plant biology.

B.S. Major Requirements

(For convenience in program planning, the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNITS

English Composition Requirement.....0-8
See College requirement 0-8

Breadth/General Education.....24
See General Education requirement

Preparatory Subject Matter.....41-51
Biology (Biological Sciences 1A, 1C) 10
Chemistry (Chemistry 2A, 2B, 2C or 2AH, 2BH, 2CH).....15
Computer Science (Agricultural Systems and Environment 21 or equivalent and advisor approval).....0-3
Mathematics (Mathematics 16A, 16B or 21A, 21B) 6-8
Organic Chemistry (Chemistry 8A, 8B).....6
Physics (Physics 7A).....4
Viticulture and Enology (Viticulture and Enology 2, 3 or equivalent and advisor approval) 0-5

Depth Subject Matter.....50-51
Biochemistry (Biological Sciences 102, 103) 6
Microbiology (Microbiology 102, 102L).....6
Statistics (Agricultural Systems and Environment 120 or Statistics 106) 4
Viticulture (Viticulture and Enology 101A, 101B, 101C, 110, 118 and, in consultation with the advisor , choose one of Viticulture and Enology 115, 116. If both are taken, one will count as a restricted elective in Area A.).....14-15
Enology (Viticulture and Enology 123, 124, 125, 126, 128, 135) 20

Restricted Electives 28
In consultation with advisor, choose 28 units from three of the following five areas. At least 12 units must be from one of the following areas: *(A)* Plant Science, *(B)* Food Science and Microbiology, or *(C)* Economics and Business.

A. Plant Science Area
The following lower division courses NOT listed among the prerequisites for the major are required or recommended for one or more of the Restrictive electives in this area: Agricultural Systems and Environment 2, Biological Sciences 1B, Food Science and Technology 2, Geology 50, Plant Biology 10A.

Biological Sciences 101, Entomology 110, Hydrologic Science 110, 113, 117, 124, Molecular and Cellular Biology 126, Nematology 100, Plant Biology 111, 112, 142, 143, 154, 157, 158, 160, 171, 172, 172L , 176, Plant Pathology 120, 125, Soil Science 100, 102, 109, Viticulture and Enology 111, 111L, one of 115, 116 (whichever was not used for depth)

B. Food Science and Microbiology Area
The following lower division courses NOT listed among the prerequisites for the major are required or recommended for one or more of the Restrictive Electives in this area: Biological Sciences 1B, Physics 7B, 7C.

Biological Sciences 101, Food Science and Technology 102A, 102B, 104, 104L, 108, 109, 110A, 110B, Microbiology 130A, 130B, 130L, Viticulture and Enology 140, 190X. Viticulture and Enology 190X may be taken a maximum of twice for restrictive elective credit.

C. Economics and Business Area
Agricultural and Resource Economics 100A, 112, 113, 118A, 118B, 130, 140, 150, Economics 1A, 1B, Management 11A, 11B, Viticulture and Enology 111, 111L,130

D. Language Area
Maximum 12 units, not counting Course 1, of one of the following languages: French, German, Italian, Portugese or Spanish. At least one course must be

*Course not offered this academic year.

Intermediate or Conversational (qualifying Intermediate or Conversational courses are listed below:)

French 8, 21, 22, 23, 38, , German 6, 11, 20, 21, 22, 51, Italian 4, 5, 8A, 8B, Spanish 8, 21, 22, 28, 31, 32, 33,

Courses taught in English will not count as restricted electives in this major. Italian 8A may not be repeated for restricted elective credit.

E. Internship Area

A maximum of 8 units of Viticulture and Enology 190, 192, 198, 199, 290 or 298 may be counted as restricted electives by prior arrangement with advisor. May be increased to 12 units in exceptional circumstances.

Unrestricted Electives 18-35

Total Units for the Degree.....180

Master Advisor. C. Meredith

Courses in Viticulture and Enology (VEN)

Lower Division Courses

2. Introduction to Viticulture (2) I. Williams
Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture.

3. Introduction to Winemaking (3) I. Waterhouse; II. Meredith; III. Adams
Lecture—3 hours. Overview of the history of wine, viticulture, fermentation, winery operations, the physiology of wine consumption, wines produced in California and other major wine-producing regions and the sensory evaluation of wine. GE credit: SciEng or SocSci.

3W. Introduction to Winemaking: Writing Experience (1) I. Waterhouse; II. Meredith; III. Adams
Term paper/discussion—1 hour. Prerequisite: course 3 (concurrent enrollment recommended). Preparation of a term paper on a subject covered in course 3. Introduction to searching the wine and grape literature in Shields Library. Papers graded on research quality, composition and critical thinking. GE credit with concurrent enrollment in course 3: Wrt.

90X. Lower Division Seminar (2) II. Ebeler, Bisson, Waterhouse
Seminar—1 hour; term paper (required)/discussion—1 hour. Prerequisite: lower division standing and consent of instructor. Introduction to current issues surrounding wine and health as they relate to diet, nutrition, and toxicology. May not be repeated for credit.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

101A. Viticultural Practices (2) I. Walker
Discussion/laboratory—4 hours. Prerequisite: course 2. Provides the information required to identify the major wine, raisin, and table cultivars grown in California and elsewhere. Also provides experience in vineyard sampling techniques and vine disease identification.

101B. Viticultural Practices (2) II. Walker
Discussion/laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including pruning, propagation, weed identification and control, frost protection, and physical examination of soil profiles and root distribution patterns.

101C. Viticultural Practices (2) III. Walker
Discussion/laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality.

110. Grapevine Growth and Physiology (3) II. Matthews
Lecture—3 hours. Prerequisite: course 2. Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered.

***111. World Viticulture** (3) III. Meredith
Lecture—3 hours. Prerequisite: upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California.

***111L. Critical Evaluation of Wines of the World** (1) III. Meredith
Laboratory/discussion—3 hours. Prerequisite: course 111 (must be taken concurrently), course 125 with a grade of C or better. Critical analysis of wines produced in different parts of the world with emphasis on the relationship between sensory properties of the wines and factors associated with their place of origin. Not open for credit to students who have received credit for course 145. (P/NP grading only.)

115. Raisin and Table Grape Production (2) I. Williams
Lecture—2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed. Offered in alternate years.

116. Winegrape Production (3) III. Matthews
Lecture—3 hours. Prerequisite: course 2. Covers principles underlying cultural practices associated with winegrape production, including establishing and planting, training, summer and winter pruning, canopy management, irrigation, mineral nutrition, weed control, frost protection, crop regulation, and harvesting.

118. Grapevine Pests, Diseases and Disorders (3) I. Williams
Lecture—3 hours. Prerequisite: course 2. Describes the various pests and diseases of vineyards throughout California. Pest/disease identification and control methods (to include sampling techniques) also will be discussed. Integrated management approach to pest control methods will be emphasized. Offered in alternate years.

123. Analysis of Musts and Wines (3) I. Ebeler
Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 2A, 2B, 2C, 8A, and 8B. Open to undergraduate students in Fermentation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles of grape juice and wine analysis, and the reasons for use of each analysis. Analyses of a practical and useful nature are chosen for the laboratory exercises demonstrating various chemical, physical, and biochemical methods. GE credit: Wrt.

124. Wine Production (4) I. Bisson
Lecture—2 hours; laboratory—3 hours; independent study—3 hours. Prerequisite: course 3 and Biological Sciences 102; course 123 (may be taken concurrently). Open to undergraduate students in Fermentation Science, Microbiology, Molecular and Cellular Biology, and Plant Science; and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the method of vinification required for each. GE credit: Wrt.

125. Wine Types and Sensory Evaluation (4) II. Noble
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 124, Agricultural Systems and Environment 120, and consent of instructor. Restricted to juniors and seniors in Fermentation Science major; others by consent of instructor only. Principles of sensory evaluation are introduced and applied to wines. To investigate factors influencing wine flavor, data from sensory analysis of model solutions and wines are analyzed and interpreted in extensive weekly lab reports. GE credit: Wrt.

126. Wine Processing (4) II. Boulton
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 124. Principles of equilibria and rates of various physical and chemical reactions in wines; treatment of unstable components in wines by adsorption, ion exchange, refrigeration, filtration, and membrane processes. GE credit: Wrt.

128. Wine Microbiology (4) III. Bisson
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 123, 124; courses 125, 126, Microbiology 102, 102L recommended. Nature development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wines.

129. Instrumental Analysis of Must and Wine (4) III. Waterhouse, Ebeler, Boulton
Lecture—2 hours; laboratory/discussion—1 hour; laboratory—3 hours. Prerequisite: course 123 or Food Science and Technology 103 or consent of instructor. Theory and practice for analysis of musts and wine. Primary focus will be on capillary electrophoresis and high performance liquid chromatography with some attention to gas chromatography.

130. Management, Marketing, and Economics of the California Wine Industry (9) Summer. The Staff (Chairperson in charge)
Lecture—24 hours; lecture/discussion—4 hours; fieldwork—8 hours. Prerequisite: course 124. Introduction to management, marketing and economics of wine in the United States with particular emphasis on California. Reviews market segmentation and explores alternative strategies for grape acquisition, production, brand development, distribution, and social policy formation. GE credit: Wrt.

135. Wine Processing Equipment (1) II. Boulton
Lecture—1 hour; field trip. Prerequisite: courses 124, 126; Food Science and Technology 110A, 110B recommended. A course for undergraduates which provides a systematic description of unit operations and processing equipment used in modern commercial winemaking. Emphasis is given to the principles and techniques of operation and to the performance of this equipment with grapes, juices, and wines.

140. Distilled Beverage Technology (3) III. Boulton
Lecture—3 hours. Prerequisite: Chemistry 8B; Food Science and Technology 110A. Distillation principles and practices; production technology of brandy, whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. Offered in alternate years.

186. Fermentation Science (3) III. Block
Lecture—3 hours. Prerequisite: Microbiology 102, Biological Sciences 101. Basic principles of fermentation science and biotechnology with emphasis on industrial fermentation processes that generate useful products including fermented food and beverages, pharmaceuticals, fine chemicals, and other gene products. Offered in alternate years.

190X. Winemaking Seminar (1) III. The Staff
Seminar—1 hour; discussion—1 hour; research paper. Prerequisite: course 3. Weekly seminar presented by outside speakers on a specific winemaking topic chosen for the quarter. Discussion follows with the speaker hosted by the faculty member in charge. May be repeated twice for credit. GE credit: Wrt.

192. Internship (1-12) I, II, III, summer. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

210. Grape Development and Composition (4) III. Adams, Polito
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102, 103. The anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Offered in alternate years.

216. Vineyard Establishment and Development (4) I. Dokoozlian
Lecture/discussion—3 hours; fieldwork—3 hours; term paper. Prerequisite: courses 101A, 101B, 101C, and one of courses 115 or 116, and course 118 or consent of instructor; course 110, Soil Science 100, Atmospheric Science 133 and Agricultural and Resource Economics 140 recommended. Application of plant, meterological, soil, water, and economic sciences to vineyard establishment and development. Preparation of a comprehensive study to determine the viticultural and economic feasibility of a given site for raisin, table, or wine grape production.

***219. Natural Products of Wine** (3) II. Waterhouse
Lecture—3 hours. Prerequisite: courses 123 and 124, or natural products background and consent of instructor. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents.

225. Advanced Sensory Analysis of Wines (3) III. Noble
Lecture/discussion—2 hours; laboratory—4 hours. Prerequisite: courses 124 and 125 (or Food Science and Technology 107) and Agricultural Systems and Environment 120 or the equivalent. Sensory descriptive analysis experiments will be designed and conducted using standard sensory science methods. Data will be analyzed by analyses of variance, principal component analyses and generalized Procrustes analysis to evaluate the judge's performance and interpret the significance of the results. Offered in alternate years.

***235. Winery Design and Economics** (5) II. Boulton
Lecture—2 hours; discussion—1 hour; studio—6 hours. Prerequisite: courses 124, 135; Food Science and Technology 110A recommended. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting. Project scheduling, capital costs and ten-year cash flow analysis for the winery. Grading based on design project. Offered in alternate years.

270. Critical Evaluation of Scientific Literature (1) I, II, III. Bisson
Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological sciences. Students choose, present and lead discussion of recent research articles in a special topic area chosen by instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.)

290. Seminar (1) II, III. Ebeler
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

290C. Advanced Research Conference (1) I, II, III. Research Faculty
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. (S/U grading only.)

291. Advances in Viticulture (1) II. Matthews
Seminar—1 hour. Prerequisite: consent of instructor. Experts in various fields of viticulture will lead discussions on recent advances in their fields of expertise. Emphasis and topics will vary from year to year and course may be repeated for credit. (S/U grading only.)

292. Advances in Enology (1) III. Waterhouse
Discussion—1.5 hours (7-10 weeks). Prerequisite: courses 123, 124, 125, and 126. Discussions of previously assigned reading material, usually in the form of two to three reprints. Discussions led by faculty to acquaint students with their current research interests. May be repeated for credit. (S/U grading only.)

297T. Tutoring in Viticulture and Enology (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact primarily in laboratory or discussion sections, and under direction of a faculty member. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

War–Peace Studies

(College of Letters and Science)

The interdisciplinary minor in War-Peace Studies examines the causes and dynamics of intra- and international wars and efforts to prevent and settle such conflicts.

Students in the minor are encouraged to participate in the educational activities of the Davis Program of the UC Institute on Global Conflict and Cooperation (IGCC).

The minor is sponsored by the International Relations Program.

Minor Program Requirements:

	UNITS
War-Peace Studies	**20**

One or two courses from each of the following areas:

Approaches
Anthropology 123B, 131, Comparative Literature 157, Philosophy 115, 118, Physics137/Applied Science Engineering 137, Political Science 121, 123, 124,132, 176, Sociology 119, 157, Women's Studies 102

Northern and Western Regions
Geography 124, History 134A, 138C, 142, 143, 144, 145, 170B, 171B, 174B, Native American Studies 130B, Political Science 130, 131, 136

Southern and Eastern Regions
Anthropology 142, 143, 144, Economics 170, History 165, 191F, 194C, Native American Studies 120, Political Science 126, 134, 145, 149, 178

Restriction: No more than two courses from a single department may be offered in satisfaction of the minor requirements.

Advising. International Relations Program, 916-752-3063.

Water Science

See Hydrologic Sciences; and Hydrology

Wildlife, Fish and Conservation Biology

(College of Agricultural and Environmental Sciences)

Joseph J. Cech, Jr., Ph.D., Chairperson of the Department

Department Office, 1088 Academic Surge (916-752-6586)

Faculty

Daniel W. Anderson, Ph.D., Professor
Louis W. Botsford, Ph.D., Professor
Tim Caro, Ph.D., Professor
Joseph J. Cech, Jr., Ph.D., Professor
Ronald E. Cole, B.S., Lecturer
Chris Dewees, Ph.D., Lecturer
John M. Eadie, Ph.D., Assistant Professor
Don C. Erman, Ph.D., Professor
Nancy A. Erman, M.S., Lecturer
Deborah L. Elliott-Fisk, Ph.D., Professor
Nadine K. Jacobsen, Ph.D., Associate Professor
Douglas A. Kelt, Ph.D., Assistant Professor
Peter B. Moyle, Ph.D., Professor
Dirk Van Vuren, Ph.D., Associate Professor

Emeriti Faculty

Walter E. Howard, Ph.D., Professor Emeritus
Dale F. Lott, Ph.D., Professor Emeritus
Rex E. Marsh, A.B., Lecturer Emeritus

The Major Program

The wildlife, fish and conservation biology major deals with the relationships between the needs of people and the requirements of wildlife. Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies for future generations.

The Program. Because of the diversity of problems in the field, emphasis in the major is placed on broad training in biological and physical sciences, with specialization in one of seven areas. The major is primarily for students interested in eventually becoming professionals in wildlife, fish and conservation biology, but its breadth of course requirements, when combined with suitable electives, also make it suitable as a preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as The Wildlife Society, American Fisheries Society, or the Ecological Society of America or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty adviser.

Career Alternatives. Positions now held by graduates in this major include wildlife, fisheries, management of problem vertebrates, and resource biologists and managers with local, state and federal agencies. Some graduates are biologists or consultants with private industries such as commercial fishing businesses, electrical utilities, sportsman's clubs, aquaculture operations, and environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions.

B.S. Major Requirements:

	UNITS
Written/Oral Expression	**4-8**
English 1	4
Rhetoric and Communication 1	4
Preparatory Subject Matter	**50-56**
Biological sciences (Biological Sciences 1A, 1B, 1C)	15
Chemistry (Chemistry 2A, 2B, 8A, 8B)	16
Computer science (Agricultural Systems and Environment 21)	3
Mathematics (Mathematics 16A, 16B)	6
Physics (Physics 1A, 1B or 7A, 7B, 7C)	6-12
Statistics (Statistics 100, 102 or Agricultural Systems and Environment 120)	4

*Course not offered this academic year.

Breadth/General Education.....6-24
Satisfaction of General Education requirement

Depth Subject Matter.....49-61
Ecology (Environmental Studies 100 or Evolution and Ecology 101).....4
Evolution (Evolution and Ecology 100).....4
Genetics (Biological Sciences 101).....4
Physiology (Neurobiology, Physiology and Behavior 101).....5
Vertebrate anatomy (Anatomy, Physiology and Cell Biology 100 or Evolution and Ecology 170).....3-4
Organismal core: Choose three lecture courses and two (laboratory) courses. [Wildlife, Fish, and Conservation Biology 110, (110L), 111, (111L), 120, (120L), or Evolution and Ecology 134, (134L)].....12-13
Disciplinary core (Wildlife, Fish, and Conservation Biology 122, 140 or 141, and either 121 or 130).....11-12
Statistics: Choose one course (two recommended) from Statistics 104, 106, 108 or 110.....3-8
Research methods (Wildlife, Fish, and Conservation Biology 100, or 101 and 101L, or 102 and 102L, or three laboratory courses from 110L, 111L, 120L, 123, 156, Evolution and Ecology 134L).....3-7

Restricted Electives.....9-34
Choose one from the seven Areas of Specialization shown below.

Areas of Specialization

1. *Behavioral ecology:* Choose one course from each group:
   a. Neurobiology, Physiology and Behavior 102 or Psychology 134;
   b. Entomology 104, Environmental Studies 101 or Anthropology 154A-154B;
   c. Environmental Studies 128, Statistics 110, Wildlife, Fish, and Conservation Biology 151 or Range Science 135.
2. *Conservation biology:* Complete Wildlife, Fish, and Conservation Biology 154 and Evolution and Ecology 102. Choose one course from each group:
   a. Entomology 147, Geography 173, Evolution and Ecology 117, 138, 144 or 147;
   b. Economics 123, Environmental Studies 161, 166 or Geography 161.
3. *Ecotoxicology and disease ecology:* Complete Wildlife, Fish, and Conservation Biology 153, Biological Sciences 102, 103. Choose two courses from *a* and one from *b,* or one from *a* and two from *b:*
   a. Environmental Toxicology 101, 112A (112B recommended), 132, 138 or Hydrologic Science 21; and
   b. Pathology, Microbiology and Immunology 101, Medical Microbiology 115 or 116.
4. *Fisheries biology:* Complete Wildlife, Fish, and Conservation Biology 102, 102L, 120, 120L, 121, Biological Sciences 102, 103, and:
   a. One course from Wildlife, Fish, and Conservation Biology 123, Entomology 116 or Evolution and Ecology 112-112L; and
   b. Two courses from Environmental Studies 116 (or 150C), 151 or Hydrologic Science 122.
5. *Physiological ecology:* Complete Wildlife, Fish, and Conservation Biology 121 and 130, Biological Sciences 102, 103. Choose two courses from Environmental Studies 129-129L or Neurobiology, Physiology and Behavior 126, 127, 128, 129, 140 or 141.
6. *Wildlife damage management:* Complete Wildlife, Fish, and Conservation Biology 152, Agricultural Systems and Environment 105 and 110A, and choose one course from Entomology 153 or 156.
7. *Wildlife biology:* Complete Wildlife, Fish, and Conservation Biology 100, 110-110L, 111-111L, 130, 151 and:
   a. Choose two courses from Plant Biology 102 (or 108), 117, 121, Evolution and Ecology 121, 144, Environmental Studies 155.
   b. Choose one course from Wildlife, Fish, and Conservation Biology 131, 136 or Agricultural Systems and Environment 135.

Unrestricted Electives 0-62
Total Units for the Degree (minimum) 180

Major Adviser. N. Jacobsen.

Students transferring to Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Master Adviser so that their program can be evaluated and a faculty adviser assigned. See receptionist in 1088 Academic Surge Building or telephone 752-6586.

Graduate Study. See the Graduate Studies section in this catalog.

Courses in Wildlife, Fish and Conservation Biology (WFC)

Lower Division Courses

10. Wildlife Ecology and Conservation (4) I. Moyle, Kelt
Lecture—3 hours; discussion—1 hour. Introduction to the ecology and conservation of vertebrates. Complexity and severity of world problems in conserving biological diversity. GE credit: SciEng, Div, Wrt.

92. Internship (1-6) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Field Methods in Wildlife, Fish and Conservation Biology (4) III. Elliott-Fisk
Lecture—1 hour; laboratory—3 hours; fieldwork—30 hours total (requires 3 of 6 weekend field trips); term paper. Prerequisite: Evolution and Ecology 100 or 101 and consent of instructor; additional course work in systematics of groups of organisms recommended. Introduction to field methods for research on the ecology and conservation of vertebrates, invertebrates, and plants, and to the scientific method, experimental design, and data presentation. Requires preparation of a term project.

***102. Field Studies in Fish Biology** (1) III. Moyle, Cech
Lecture/discussion—1 hour. Prerequisite: upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Emphasis on theory of quantitative fish capture methods and design of individual research projects on ecology, behavior, physiology or population biology of fishes. Offered in alternate years.

***102L. Field Studies in Fish Biology: Laboratory** (6) III. Moyle, Cech
Fieldwork—15 hours; laboratory—12 hours; discussion/laboratory—3 hours. Prerequisite: course 102, upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Field investigations of fish biology are emphasized including quantitative capture methods and individual research projects on ecology, behavior, physiology or population biology of fishes at the field site in relation to their habitats. Offered in alternate years. (Deferred grading only, pending completion of projects.) GE credit: SciEng, Wrt.

110. Biology and Conservation of Wild Mammals (3) III. Kelt
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; course in ecology recommended. Biology and conservation of wild mammals. Natural history, taxonomy, geographical-ecological distribution; anatomical-physiological-behavioral adaptations of mammals to their environment; and research/management techniques are emphasized.

110L. Laboratory in Biology and Conservation of Wild Mammals (2) III. Kelt
Laboratory—6 hours. Prerequisite: course 110 (may be taken concurrently) and consent of instructor. Laboratory exercises in the morphology, systematics, species identification, anatomy, and adaptations of wild mammals to different habitats. Limited enrollment.

111. Biology and Conservation of Wild Birds (3) I. Anderson, Eadie
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and Evolution and Ecology 101. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, management, and conservation.

111L. Laboratory in Biology and Conservation of Wild Birds (2) I. Anderson, Eadie
Laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in bird species identification, anatomy, molts, age and sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Limited enrollment.

120. Biology and Conservation of Fishes (3) I. Moyle
Lecture—3 hours. Prerequisite: Biological Sciences 1B. Evolution, ecology, and conservation of marine and freshwater fishes.

120L. Laboratory in Biology and Conservation of Fishes (1) I. Moyle
Laboratory—3 hours. Prerequisite: course 120 (may be taken concurrently). Morphology, taxonomy, conservation, and identification of marine and freshwater fishes with emphasis on California species. Limited enrollment.

121. Physiology of Fishes (4) II. Cech
Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division courses in nutrition and physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes. GE credit: SciEng, Wrt.

122. Population Dynamics and Estimation (4) III. Botsford
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B; Statistics 13 or the equivalent; an upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-in-ratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment); case histories.

123. Freshwater Invertebrate Ecology (4) III. N. Erman
Lecture/discussion—2 hours; laboratory—3 hours; fieldwork—3 hours; one all-day Saturday field trip required. Prerequisite: Biological Sciences 1A and 1B or the equivalent. Ecology and classification of freshwater invertebrates with emphasis on life history, habitat, diversity, and behavior. Invertebrate monitoring to assess environmental impacts and classification based on morphology as a tool for understanding ecology and biology of aquatic organisms. GE credit: SciEng, Wrt.

130. Physiological Ecology of Wildlife (4) II. Jacobsen
Lecture—4 hours. Prerequisite: course 110, 111, or 120; Neurobiology, Physiology and Behavior 101; and Evolution and Ecology 101. Animal functions, adaptations, and ecological energetics of wildlife. Nutrition, metabolism, and productivity are emphasized as a pattern of relationships for understanding the distribution and abundance of wild ectotherms and endotherms in time and space.

***131. Biology and Management of Cervidae** (3) III. Jacobsen
Lecture—2 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101 and Evolution and Ecology 101, or the equivalent; course 110 recommended. Evolution, biology, and management of cervids. Topics include differences in nutritive ecology, bioenergetics, reproduction and growth, use of habitats, and research methodologies. Emphasis on North American species of caribou, elk, moose, and deer. Offered in alternate years.

136. Ecology of Waterfowl and Game Birds (3) II. Eadie
Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: courses 111 and 111L or the equivalent. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in alternate years.

140. Ecology and Evolution of Vertebrate Social Organization (4) II. Lott
Lecture—4 hours. Prerequisite: Biological Sciences 1B or upper division ecology course (Evolution and Ecology 101 or the equivalent). Spacing competition, cooperation, and grouping of wild vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal consideration is given to humans and other primates. Offered in alternate years. GE credit: SciEng, Wrt.

141. Behavioral Ecology (3) II. Caro
Lecture—3 hours. Prerequisite: Evolution and Ecology 101. Basic theories underlying the functional and evolutionary significance of behavior, and the role of ecological constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. Offered in alternate years. GE credit: SciEng, Wrt.

151. Wildlife Ecology (3) I. Van Vuren
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, and 1C, or the equivalent. Population ecology of wild vertebrates, particularly habitat selection, demography, competition, predation, population growth, and regulation set in the context of human-caused degradation of environments in North America.

***152. Ecological Management of Problem Wildlife** (3) II. Van Vuren
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, and 1C, or the equivalent. Ecological approaches to managing wild vertebrates that cause problems for agriculture, public health, or conservation of biodiversity. Offered in alternate years.

***153. Wildlife Ecotoxicology** (4) II. Anderson
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory courses in organic chemistry, ecology, and physiology, or consent of instructor; Environmental Toxicology 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotoxicology, examples/case histories, philosophical/management considerations. Offered in alternate years. GE credit: SciEng, Wrt.

157. Coastal Ecosystems (4) II Elliott-Fisk
Lecture—3 hours; laboratory/fieldwork—3 hours. Prerequisite: Environmental Studies 100 or Evolution and Ecology 101; course work in organismal biology, physical geography, and geology recommended. Overview of costal ecosystems, physical and biological elements and processes, and coastal zone dynamics, including sandy, rocky and muddy shorelines, estuaries, dunes and coastal watersheds. Discussion of the role of historical factors and conservation, restoration, and management approaches. Offered in alternate years.

154. Conservation Biology (4) III. Caro
Lecture—3 hours; term paper (will be one or more book reviews). Prerequisite: Evolution and Ecology 101 or Environmental Studies 100 or the equivalent. An introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats.

190. Proseminar in Wildlife and Fisheries Biology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: upper division standing in biological sciences or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated twice for credit. (P/NP grading only.)

190C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fisheries biology. May be repeated for credit. (P/NP grading only.)

***191. Museum Science** (2) II. Cole
Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing and consent of instructor. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. Offered in alternate years. (P/NP grading only.)

192. Internship (1-12) I, II, III, summer. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

195. Field and Laboratory Research (3) I, II, III. The Staff (Chairperson in charge)
Laboratory—6 hours; discussion—1 hour. Prerequisite: course 110L, 111L, or 120L; 121 or 130; Evolution and Ecology 101 or the equivalent; and consent of instructor. Critique and practice of research methods applied to field and/or laboratory environments of wild vertebrates. Students work independently or in small groups to design experimental protocol, analyze data, and report their findings. May be repeated twice for credit.

197T. Tutoring in Wildlife and Fisheries (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: major in Wildlife, Fish, and Conservation Biology and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

222. Advanced Population Dynamics (3) II. Botsford
Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., course 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research.

290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topic selected for a quarter will vary depending on interests of instructor and students. (S/U grading only)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. (S/U grading only.)

291. Seminar in Aquatic Ecology (2) III. Moyle
Seminar—2 hours. Prerequisite: graduate standing in biology. Presentation and analysis of assigned topics in aquatic ecology emphasizing fish, fisheries and aquatic conservation. Offered in alternate years. (S/U grading only.)

***292. Physiology of Fishes Seminar** (1) I. Cech
Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology; consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated twice for credit. (S/U grading only.)

293. Seminar in Wildlife Disease Ecology (2) II. Theis (Medical Microbiology) in charge, Jacobsen
Seminar—2 hours. Prerequisite: graduate standing or advanced undergraduate in biology. Presentation and analysis of assigned research papers on disease ecology of wild vertebrates related to considerations of habitat quality, population regulation, wildlife management, and/or implications for human or domestic animal health. (S/U grading only.)

***294. Seminar in Behavioral Ecology of Predators and Prey** (3) II. Caro
Seminar—2 hours; term paper. Prerequisite: graduate standing in biology. Presentation and analysis of research papers on social and foraging behavior of predatory animals, anti-predator strategies of prey species, co-evolution of predators and prey, and ecology of predator-prey interactions. May be repeated twice for credit. Offered in alternate years.

***295. Seminar in Wildlife Ecotoxicology** (3) II. Anderson
Seminar—2 hours; term paper. Prerequisite: graduate standing in biology. Presentation and analysis of assigned and searched research papers on transport, exposure, and effects of environmental contaminants on wildlife-associated ecosystem components, especially at individual/population levels. Specific subjects vary each offering. Offered in alternate years. (S/U grading only.)

297T. Supervised Teaching in Wildlife and Fisheries Biology (1–3) I, II, III. The Staff (Chairperson in charge)
Tutorial—3–9 hours. Prerequisite: meet qualifications for teaching assistant; graduate standing; and consent of instructor. Tutoring and teaching students in undergraduate courses in Wildlife, Fish, and Conservation Biology. Weekly conferences with instructor; evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated for a total of 6 units when a different course is tutored. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

*Course not offered this academic year.

Wine Production

See Fermentation Science; Food Science and Technology; Microbiology; Viticulture and Enology

Women's Studies

(College of Letters and Science)

Suad Joseph, Ph.D. Program Director

Program Office, 2201 Hart Hall (916-752-4686)

Committee in Charge

Angie Chabram-Dernersesian, Ph.D. *(Chicana/o Studies)*
Rosa Linda Fregoso, Ph.D. *(Women's Studies)*
Wendy Ho, Ph.D. *(Asian American Studies, Women's Studies)*
Carole Joffe, Ph.D. *(Sociology, Women's Studies)*
Suad Joseph, Ph.D. *(Anthropology, Women's Studies)*

Susan Kaiser, Ph.D. *(Textiles and Clothing)*
Lata Mani, Ph.D. *(Women's Studies)*
Linda A. Morris, Ph.D. *(English)*
Judith Newton, Ph.D. *(Women's Studies)*
Sarah Projansky, Ph.D. *(Women's Studies)*
Belinda Robnett, Ph.D. *(Sociology, Women's Studies)*
Judith Stacey, Ph.D. *(Sociology, Women's Studies)*

Faculty

Charlayne Allan, Lecturer *(Classics)*
Cynthia L. Brantley, Ph.D., Associate Professor *(History)*
JoAnn Cannon, Ph.D., Professor *(French and Italian)*
Angie Chabram-Dernersesian, Ph.D., Associate Professor *(Chicana/o Studies)*
Elizabeth Constable, Ph.D., Assistant Professor *(French and Italian)*
Joanne Diehl, Ph.D., Professor *(English)*
Karen P. Ericksen, Ph.D., Professor *(Psychology)*
Diane Felmlee, Ph.D., Associate Professor *(Sociology)*
Gail Finney, Ph.D., Professor *(Comparative LIterature, German)*
Yvette Flores-Ortiz, Ph.D., Associate Professor *(Chicana/o Studies)*
Ruth Frankenberg, Ph.D., Associate Professor *(American Studies)*
Rosa Linda Fregoso, Ph.D., Associate Professor *(Women's Studies)*
Sandra Gilbert, Ph.D., Professor *(English)*
Karen Halttunen, Ph.D., Professor *(History)*
Inés Hernández-Ávila, Ph.D., Associate Professor *(Native American Studies)*
Lynn Hershman, M.F.A., Professor *(Art)*
Wendy Ho, Ph.D., Assistant Professor *(Asian American Studies, Women's Studies)*
Mary Jackman, Ph.D., Professor *(Sociology)*
Carole Joffe, Ph.D., Professor *(Sociology, Women's Studies)*
Alessa Johns, Ph.D., Assistant Professor *(English)*
Suad Joseph, Ph.D., Professor *(Anthropology)*
Susan Kaiser, Ph.D., Associate Professor *(Textiles and Clothing)*
Cathy Kudlick, Ph.D., Associate Professor *(History)*
Anna K. Kuhn, Ph.D., Professor *(German)*
Kari Lokke, Ph.D., Associate Professor *(Comparative Literature)*
Dianne Sachko Macleod, Ph.D., Associate Professor *(Art History)*
Martha Macri, Ph.D., Associate Professor *(Anthropology, Native American Studies)*
Lata Mani, Ph.D., Assistant Professor *(Women's Studies)*
Susan Mann, Ph.D., Professor *(History)*
Sandra J. McPherson, B.A., Professor *(English)*
Jay Mechling, Ph.D., Professor *(American Studies)*
Janet Momsen, Ph.D., Professor *(Geography)*
Patricia Moran, Ph.D., Assistant Professor *(English)*
Linda Morris, Ph.D., Professor *(English)*
Harriet Murav, Ph.D., Associate Professor *(Russian)*
Judith Newton, Ph.D., Professor *(Women's Studies)*
Beatriz M. Pesquera, Ph.D., Associate Professor *(Chicana/o Studies)*
Michele Praeger, Ph.D., Associate Professor *(French and Italian)*
Sarah Projansky, Ph.D., Assistant Professor *(Women's Studies)*
Donna Reed, Ph.D., Lecturer *(Comparative Literature)*
Janelle Reinelt, Ph.D., Professor *(Dramatic Art)*
Ada Riddell, Ph.D., Senior Lecturer *(Chicana/o Studies)*
Belinda Robnett, Assistant Professor *(Sociology, Women's Studies)*
Irit Rogoff, Ph.D., Associate Professor *(Art Studio)*
Ruth E. Rosen, Ph.D., Professor *(History)*
Luana Ross, Ph.D., Assistant Professor, *(Native American Studies)*
Seth Schein, Ph.D., Professor *(Comparative Literature)*
Juliana Schiesari, Ph.D., Professor *(French and Italian)*
Carol Smith, Ph.D., Professor *(Anthropology)*
Barbara Sommer, Ph.D., Lecturer *(Psychology)*
Judith Stacey, Ph.D., Professor *(Sociology, Women's Studies)*
Margit Stange, Ph.D., Assistant Professor *(English)*
Lenora A. Timm, Ph.D., Professor *(Linguistics)*
Patricia Turner, Ph.D., Associate Professor *(African American Studies, American Studies)*
David Van Leer, Ph.D., Professor *(English)*
Martha West, J.D., Professor *(Law)*
Diane Wolf, Ph.D., Associate Professor *(Sociology)*

The Major Program

Women's Studies is an interdisciplinary major founded on the premise that gender is a historically variable construction that centrally shapes the historical experience and everyday lives of women as well as men. Women's Studies also assumes that gender, race, class, and sexual and national identities are constructed in relation to each other. The intersections of these categories of experience as well as the history of debate over what these categories mean is an important strand of the Women's Studies curriculum. Women's Studies at UC Davis is particularly rich in faculty doing comparative, cross-cultural work on women and gender. Among the faculty offering courses for the major are scholars working on women and gender in Africa, the Caribbean, the Americas, China, Europe, Japan, India, various countries of the MIddle East, Southeast Asia, and the United States.

The Program. Students majoring in this field may take courses in African American and African studies, American studies, anthropology, comparative literature, English, history, linguistics, Chicana/o studies, political science, psychology, sociology, Asian American studies, Native American studies, French, German, Italian, Spanish, textiles and clothing, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an adviser.

Career Alternatives. Women's Studies prepares undergraduates for a variety of careers. The B.A. degree in Women's Studies, for example, provides excellent grounding for undergraduates with career aspirations in law, medicine, public administration, and social services. Students wishing to pursue doctoral work will also find that interdisciplinary training in Women's Studies equips them with theoretical and methodological strengths in most disciplines and applied research fields. Increasingly, too, specialists in Women's Studies are being used as consultants in industry, higher education, insurance companies and personnel firms. State and federal government agencies require people who have special training in understanding gender relations. Finally, educational institutions need specialists to develop and administer women's studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20

Two courses from Women's Studies 20, 50, 70 8

Three courses selected from the following: African American and African Studies 10, 15, American Studies 1E, 1F, Anthropology 2, Art History 15, Asian American Studies 1, 2, Chicana/o Studies 10, 20, Classics 15, Comparative Literature 12, English 30A or 30B, 45, 46A or 46B or 46C, History 72A, 72B, Native American Studies 1, 10, Psychology 1, Sociology 1, 2, 3, Women's Studies 80.....12

Depth Subject Matter 44

Women's Studies 103, 104, 190 and one additional upper division Women's Studies course.....16

Cross-Cultural Requirement.....16

Choose four courses (at least one from each category). Courses used to meet this requirement may not duplicate those used to meet the requirement for Gender-based Courses. The list that follows represents a partial list of options; other courses may be included with the consent of the Women's Studies Adviser.

Ethnic Studies: Women of Color in the United States
African American and African Studies 123, 133, Anthropology 139, Asian American Studies 112, Chicana/o Studies 102, 122, Native American Studies 180, Sociology 134, Women's Studies 160, 180.

Cultures Outside the United States
Anthropology 131, 133, Comparative Literature 135, 138, 159C, English 185A, 185B, French 133, German 129, History 102G, 102H, 148A, 148B, Italian 141, Sociology 145B, Women's Studies 102, 182, 184.

Historical Material Prior to 1900
Asian American Studies 112, English 185A, History 102G, 102H, 148A, 148B, Italian 141, Native American Studies 180.

Gender-based Courses.....12

Choose one of two tracks: *Disciplinary* or *Thematic.*

Disciplinary track
Choose three courses from one of the following focus groups:

Anthropology focus:
Anthropology 130, 131, 134, 139, 148B, 158.

History focus:
History 102H, 102G, 148A, 148B.

Literature and Language focus:
Comparative Literature 135, 138, 159C, English 181, 185A, 185B, French 133, German 129, Italian 141, Linguistics 113.

Sociology and Psychology focus:
Chicana/o Studies 122, Psychology 114, 149, Sociology 131, 132, 133, 134, 145B, 172.

Thematic track
Choose three courses that form a thematic cluster (for example, Gender and Race in the United States; The Cultural Representations of Gender; Gender and Public Policy; Gender and Global Issues; Gender and Autobiography; The Body, Theory and Representation). Other clusters may be developed in consultation with a Women's Studies adviser.

Total units for the major 64

Major Adviser. All Women's Studies majors and minors must consult with a faculty adviser, individually, at least once each academic year.

Minor Program Requirements:

UNITS

Women's Studies 24

Women's Studies 20, 50, 70 or 80.....4

Ethnic studies/Women of color in the U.S., choose one from: African American and African Studies 123, Asian American Studies 112, Chicano Studies 102, Native American Studies 180, Sociology 134, Women's Studies 195.....4

Culture outside the U.S., chose one from: Anthropology 130, 131, Classics 15, Comparative Literature 135, East Asian Studies 113, English 185A, 185B, German 129, History 102H, 102O, 148A, 148B, Sociology 145B, Women's Studies 102, 182, 184 4

Additional Electives from approved list of upper division cross-listed and Women's Studies courses 12

Note: With prior consultation with an adviser, other upper division courses may be accepted toward the minor program.

Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

Minor Adviser. All Women's Studies majors and minors must consult with a faculty adviser, individually, at least once each academic year.

Graduate Study. The Women's Studies Program offers a Designated Emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of twelve other affiliated departments. Please see catalog listing "Feminist Theory and Research."

Courses in Women's Studies (WMS)

Lower Division Courses

20. Cultural Representations of Gender (4) III. Newton
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Interdisciplinary investigation of how specific cultures represent gender difference. Examine a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions. GE credit: ArtHum, Div, Wrt.

50. Introduction to Women's Studies (4) I, II, III. Projansky, Ho, Fregoso
Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Interdisciplinary introduction which will survey and integrate literary, anthropological, psychological, historical, sociological and biological perspectives on the study of sex roles. GE credit: ArtHum or SocSci, Div, Wrt.

***60. Feminist Perspectives on Western Social Thought** (4) I. Fregoso
Lecture/discussion—4 hours. A critical introduction to major traditions of social thinking in the West from a feminist perspective. GE credit: ArtHum or SocSci, Div.

***70. Theory and History of Sexualities** (4) I. The Staff
Lecture/discussion—4 hours. Key issues in the social construction, organization, and reproduction of sexualities such as the intersection of sexual identity with gender, race, ethnicity, and class, and the relation between movements for sexual liberation and the regulation of the body. GE credit: ArtHum or SocSci, Div.

***80. Special Topics in Women's Studies** (4) II. The Staff
Lecture/discussion—4 hours. In-depth examination of a women's studies topic related to the research interest of the instructor. May be repeated for credit when topic differs. Limited enrollment.

90X. Lower Division Seminar (2) II. West
Seminar—2 hours. Examination of a special topic in Women's Studies through shared readings, discussions, and written assignments. Offered in alternate years.

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

***102. Colonialism, Nationalism, and Women** (4) II. Joseph
Lecture/discussion—4 hours. Prerequisite: one course specified for Women's Studies major. Explores key dimensions of women's relationship to colonialism and nationalism in one or more societies. GE credit: SocSci, Div.

103. Introduction to Feminist Theory (4) I. Robnett
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Introduction to the emergence of feminist theory and to key concepts in feminist theorizing. Examination of past and current debates over sexuality, race, identity politics, and the social construction of women's experience.

104. Feminist Approaches to Inquiry (4) II. Projansky
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Feminist applications and transformations of traditional disciplinary practices; current issues and methodologies in feminist interdisciplinary work.

***130. Feminism and the Politics of Family Change** (4) III. Stacey
Lecture/discussion—4 hours. Prerequisite: any Women's Studies course or Sociology 131 or 132. An examination of contemporary conflicts over family values and the changing family from a feminist perspective. Offered in alternate years. GE credit: ArtHum or SocSci, Div.

***140. Gender and Law** (4) I. West
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies. Exploration of women's legal rights in historical and contemporary context, discussing a variety of legal issues and applicable feminist theories. Topics include constitutional equal protection, discrimination in employment and education, sexual orientation discrimination, and the regulation of abortion. GE credit: SocSci, Div.

***158. Contemporary Masculinities** (4) III. Newton
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. A multicultural study of contemporary trends in masculinity and the economic, social and political forces that have shaped them. Topics may include men's movements, ethnic nationalist masculinities, and images of masculinity in popular culture. GE credit: ArtHum or SocSci, Div.

***160. Representations of Women of Color in Cinema** (4) I. Fregoso
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 20 or another film course. The representations of women of color in commercial and independent films from a feminist perspective. GE credit: ArtHum, Div.

***162. Feminist Film Theory and Criticism** (4) I. Projansky
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Contemporary issues in feminist film theory including representation, spectatorship, and cultural production. Film stars, women filmmakers and the intersection of gender, race, sexuality and class in films and their audiences. GE credit: ArtHum, Div.

***164. Topics in Gender and Cinematic Representation** (4) I, II, III. Fregoso
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Examines a specific topic within the broader rubric of "gender and cinema." Topics vary with instructor. May be repeated twice for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div.

180. Women of Color Writing in the United States (4) III. Ho
Lecture/discussion—4 hours. Prerequisite: course 20 or 50. Literature, especially novels, written by contemporary women of color in the United States, understood in their socio-economic, cultural and historical contexts. GE credit: ArtHum, Div.

182. Globalization, Gender and Identity (4) II. Joseph
Lecture/discussion—4 hours. Prerequisite: course 50. Feminist theories on affects of gender on self and identity and cross cultural study as it intersects gender with race, class, ethnicity. Impact of globalization processes on gender and identity. Offered in alternate years. GE credit: SocSci, Div, Wrt.

***184. Gender in the Arab World** (4) III. Joseph
Lecture/discussion—4 hours. Examination of the history, culture, and social/political/economic dynamics of gender relations and gendering in the Arab world. GE credit: SocSci, Div, Wrt.

***187. Gender and Social Policy** (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and a course in Women's Studies. The role of gender in the creation of social policies, especially with respect to issues brought into the policy arena by contemporary feminism. Offered in alternate years. GE credit: SocSci, Div.

190. Senior Seminar (4) II. Robnett
Seminar—4 hours. Prerequisite: senior standing in Women's Studies. Capstone course for senior Women's Studies majors, which focuses on current issues on feminism as they impact theory, public policy, and practice.

192. Internship in Women's Studies (1-12) I, II, III. The Staff (Director in charge)
Internship—3-36 hours; written report. Prerequisite: completion of a minimum of 84 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions/institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.)

195. Thematic Seminar in Women's Studies (4) I, II. Morris, Joffe
Seminar—4 hours. Prerequisite: two courses specified for women's studies major. Group study of a topic, issue or area in feminist theory and research involving intensive reading and writing. May be repeated for credit when topic differs. Limited enrollment. GE credit: ArtHum or SocSci, Div.

197T. Tutoring in Women's Studies (1-4) I, II, III. The Staff (Director in charge)
Tutoring—3-12 hours. Prerequisite: upper division standing and consent of director. Leading small, voluntary discussion groups affiliated with a Women's Studies course. May be repeated for credit for a total of 8 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Current Issues in Feminist Theory (4) I. Fregoso
Seminar—4 hours. Current issues in feminist theory; techniques employed to build feminist theory in various fields.

200B. Problems in Feminist Research (4) II. Projansky
Seminar—4 hours. Prerequisite: course 200A with a grade of B+ or better. Application of feminist theoretical perspectives to the interdisciplinary investigation of a problem or question chosen by the instructor(s). May be repeated for credit when subject area differs.

201. Special Topics in Feminist Theory and Research (4) II, III. The Staff
Lecture/discussion—4 hours. Explores in depth a topic in feminist theory and research related to the research interests of the instructor. May be repeated for credit when topic differs. Limited enrollment.

299. Special Study for Graduate Students (1-12) I, II, III. The Staff
(S/U grading only.)

Zoology

See Biological Sciences— Evolution and Ecology

*Course not offered this academic year.

APPENDIX

RESIDENCE FOR TUITION INFORMATION

Tuition Fee for Nonresident Students

If you have not been living in California with intent to make it your permanent home for more than one year immediately before 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.

Law 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).

Who is a Resident?

If you are an adult student (at least 18 years of age) you may establish residence for tuition purposes in California if : (1) you are a U.S. citizen; (2) you are a permanent resident or other immigrant; or (3) you are a nonimmigrant who is not precluded from establishing a domicile in the U.S. Nonimmigrants who are not precluded from establishing a domicile in the U.S. include those who hold visas of the following types: A, E, G, H-1,H-4, I, K, L, O-1, O-3, or R. To establish residence you must be physically present in California for more than one year and you must have 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 residence, regardless of the length of your 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. Evidence of intent must be dated one year before the term for which you seek resident classification. 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. Effective Fall 1993, if your parents are not residents of California or you were not previously enrolled as a UC student, you will be required to be financially independent in order to be a resident for tuition purposes.

Requirement for Financial Independence

You will be 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 for which you are requesting residence 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; (5) you are married, or a graduate student or a professional student, and you were not claimed as an income tax deduction by your parents or any other individual for the tax year immediately preceding the term for which you are requesting resident classification; or (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 are requesting resident classification, and you can demonstrate self-sufficiency for those years and the current year. (Note: Financial independence will not be a factor in residence status for graduate student instructors, graduate student teaching assistants, research assistants, junior specialists, post-graduate researchers, graduate student researchers, and teaching associates who are employed 49% or more of full time or who have funding equivalent to employment that is

49% or more of full time for the term for which classification is sought.)

Establishing Intent to Become a California Resident

Indications of your intent to make California your permanent residence 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 California residence in which 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 residence can also serve as an indication of your intent. Documentary evidence is required and all relevant indications will be considered 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 have a parent living, you cannot change your residence by your own act, by the appointment of a legal guardian, or by the relinquishment of your parent's right of control. If you lived 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 your 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 residence requirement.

Specific Rules Applying to Minors

1. Divorced/Separated Parents
You may be able to derive California resident status from a California resident parent if you move to California to live with that parent on or before your 18th birthday. If you begin residing with your California parent after your 18th birthday, you will be treated like any other adult student coming to California to establish residence.

2. Parent of Minor Moves From California
You may be entitled to resident status if you are a minor U.S. citizen or eligible alien whose parent(s) was a resident of California who left that state within one year of the residence determination date if: 1) you remained in California after your parent(s) departed; 2) you enroll in a California public postsecondary institution within one year of the time your parent(s) depart and establish residence elsewhere; and 3) once enrolled, you maintain continuous attendance in that institution. Financial independence will not be required in this case.

3. Self-Support
You may be entitled to resident status if you are a U.S. citizen or eligible alien and either a minor or age 18 and can prove the following: 1) you lived in California for the entire year immediately preceding the residence determination date; 2) you have been self-supporting for that year; and 3) 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 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.

Exemptions from Nonresident Tuition

1. Member of the Military
If you are a member of the U.S. military stationed in California on active duty, unless you are assigned for educational purposes to a state-supported institution of higher education, you may be exempt from the nonresident tuition fee until you have lived in California long enough to become a resident. You must provide the residence deputy on campus with a statement from your commanding officer or personnel officer stating that your assignment to active duty in California is not for educational purposes. The letter must include the dates of your assignment to the state.

2. Spouse or Other Dependents of Military Personnel
You are exempt from payment of the nonresident tuition fee if you are a spouse or a natural or adopted child or stepchild who is a dependent of a member of the U.S. military stationed in California on active duty. The exemption is available until you have lived in California long enough to become a resident. If you are enrolled in an educational institution and the member of the military is transferred on military orders to a place outside California where he or she continues to serve in the armed forces, or the member of the military retires from active duty immediately after having served in California on active duty, you may retain this exemption under the conditions listed above.

3. Child or Spouse of Faculty Member
To the extent funds are available, if you are an unmarried dependent child under age 21 or the spouse of a member of the University faculty who is a member of the Academic Senate, you may be eligible for a waiver of the nonresident tuition fee. Confirmation of the faculty member's membership on the Academic Senate must be secured each term this waiver is granted.

4. Child or Spouse of University Employee
You may be entitled to resident classification if you are the unmarried dependent child or the spouse of a full-time University employee whose assignment is outside of California (e.g., Los Alamos Scientific Laboratory). Your parent's or spouse's employment status with the University must be ascertained each term.

5. Child of Deceased Public Law Enforcement or Fire Suppression Employee
You may be entitled to a waiver of the nonresident tuition fee if you are the child of a deceased public law enforcement or fire-suppression employee who was a California resident at the time of his or her death and who was killed in the course of fire suppression or law enforcement duties.

6. Dependent of a California Resident
A student who has not been an adult resident of California for more than one year and who is the dependent child of a California resident who has been a resident for more than one year immediately prior to the residence determination date may be entitled to resident classification until the student has resided in California for the minimum time necessary to become a resident so long as continuous attendance is maintained at an institution.

7. Native American Graduate of BIA School
A student who is a graduate of a California school operated by the Federal Bureau of Indian Affairs (BIA), i.e., Sherman Indian High School, and who enrolls at the University of California may be eligible for an exemption of the nonresident fee.

Temporary Absence

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 non-instructional 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. **(A student who is in the state solely for educational purposes will NOT be classified as a resident for tuition purposes regardless of the length of his or her stay.)** If you are a student who has been classified as a resident for tuition purposes and you leave the state tem-

porarily, your absence could result in the loss of your California residence. The burden will be on you (or 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. Satisfy California resident income tax obligations. (Note: If you are claiming California residence, you are liable for payment of income taxes on your total income from the date you establish California residence. This includes 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 and/or vehicle registration while you are temporarily residing in another state, you must change them back to California within the time prescribed by law.

Classification to Resident Status

All changes of status must be initiated prior to the payment deadline for the term which you intend to be reclassified.

Incorrect Classification

If you were incorrectly classified as a resident, you are subject to reclassification and to payment of all nonresident tuition fees 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

Inquiries regarding residence requirements, determination and/or recognized exceptions should be directed to the Residence Deputy, Office of the Registrar, 12 Mrak Hall, Davis, California 95616, (916) 752-0879. **NO OTHER UNIVERSITY PERSONNEL ARE AUTHORIZED TO SUPPLY INFORMATION RELATIVE TO RESIDENCE REQUIREMENTS FOR TUITION PURPOSES.** You are cautioned that this summary is **not** a complete explanation of the law regarding residence. *Please note that changes may be made in the residence requirement between the publication 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 legal analyst (Legal Analyst—Residence Matters, 300 Lakeside Dr., 7th Floor, Oakland, CA 94612-3565) within 45 days of notification of the residence deputy's final decision.

UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS, AND PRIVACY

Nondiscrimination. The University of California, in accordance with applicable Federal and State laws and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a Vietnam-era veteran or special disabled veteran. The University also prohibits sexual harassment. This nondiscrimination policy covers admission, access, and treatment in University programs and activities.

Inquiries regarding the University's student-related nondiscrimination policies may be directed to Student Judicial Affairs Director Jeanne Wilson, Room 308, North Hall, 916-752-1128.

Sexual Harassment. Sexual harassment of all persons who participate in University programs and activities is prohibited by law and by University regulation (Policy 380-12). Sexual harassment is unacceptable and will not be condoned on the UC Davis campus. The Sexual Harassment Education Program (752-2255) provides information and assists in resolving complaints of sexual harassment informally. Formal grievance procedures for student complaints charging legally impermissible discrimination (Policy 280-05) are available in the Office of Student Judicial Affairs and may be used to bring complaints of sexual harassment or other discrimination. Students may receive informal counseling and formal assistance by contacting any of the following offices: Vice Chancellors, Deans of the Schools and Colleges, the Office of Student Judicial Affairs, or the Sexual Harassment Education Program. In addition, the ASUCD Student Grievance Center, Counseling Center, and the Women's Resources and Research Center are available to provide referral service.

Disclosures from Student Records. In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the Davis campus of the University have the right:

- To inspect and review their own student records within 45 days of the date the University receives a written request for access.

  Students should submit their requests in writing to the Registrar, Dean, Department Chair, or other appropriate campus official for the office having custody of the requested records. The request must identify the record(s) they wish to inspect and review. The campus official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the official receiving the request, that official shall advise the student of the correct official and redirect the request.

- The right to request the amendment of their own student records if a student believes the records are inaccurate or misleading.

  Students should submit a written request to amend a record that they believe is inaccurate or misleading to the campus official responsible for the record, clearly identifying the portion of the record they want changed, and specifying why it is believed to be inaccurate or misleading. If the University determines that the record should not be amended as requested by the student, the University will notify the student of the decision and advise him/her of the right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

- The right to consent to disclosures of personally identifiable information contained in their student records, except to the extent that law and policy authorize disclosure without consent.

  One exception permitting disclosure without consent is disclosure to campus officials having a legitimate educational interest in the records. A campus official is any individual designated by the campus to perform an assigned function on behalf of the campus. Legitimate educational interest means a demonstrated need to know by officials who act in a student's educational interest. A campus official has a "legitimate educational interest" in a record if the official is performing a task (1) specified in his or her job description; (2) specifically related to the official's participation in the student's education; (3) specifically related to the discipline of a student; or (4) specifically related to providing a service or benefit associated with a student or student's family, such as health care, counseling, job placement, or financial aid.

Another exception permitting disclosure without consent is Public Information, defined as information contained in a student record that would not generally be considered harmful or an invasion of privacy if disclosed, unless the student has notified the Registrar that such information is to be treated as confidential with respect to him/herself. UC Davis has designated as public the following categories of information regarding students: the student's name, address(es) and telephone number(s)(local and/or permanent addresses, including e-mail addresses); date and place of birth; major field of study; dates of attendance; number of course units in which enrolled; degrees and honors received; most recent previous educational institution attended; participation in officially recognized activities, including intercollegiate athletics, and the name, weight, and height of participants on intercollegiate athletic teams.

Parental/guardian Information is confidential. It is used by the University only for notification of events, ceremonies, awards, and development or in case of an emergency involving the student.

- The right to file a complaint with the U.S. Department of Education concerning alleged failures by UC Davis to comply with the requirements of the Federal Educational Rights and Privacy Act, addressed to the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW., Washington, DC. 20202-4605

These rights are implemented on the Davis campus by UCD Policy and Procedure Manual, Section 320-21, "Disclosure of Information from Student Records."

Questions about these rights should be referred to Jeanne Wilson, Office of Student Judicial Affairs, 916-752-1128.

Students may request in writing by the tenth day of instruction that their addresses, including e-mail address, and telephone listings or all personally identifiable information from their records not be regarded as public information. Students who desire to withhold their addresses and telephone listings may so indicate on the Student Address Form included with registration materials. Students who wish to keep their e-mail addresses confidential should connect to mothra.ucdavis.edu and type "services" at the login prompt, and follow the instructions provided for changing "whois" directory information. **If a student does not indicate that he or she wishes to keep his or her address and telephone number confidential, then the information may be released as a matter of public record and will be included in a campus *Student Directory.*** The decision to withhold address and phone number or all information can be reversed by filing a form with the Office of the Registrar.

Students who desire to withhold all information from the category of public information must file a form in the Office of the Registrar. Students availing themselves of this right should understand what the consequences of such action may be. For example, if all information is designated non-public information, the campus cannot make public any Honors received by the student (e.g., the award of a Regents' Scholarship or election to Phi Beta Kappa) and cannot include the student's name and degree earned in the campus commencement program without the student's written consent. Similarly, the student's status as a student or any degrees earned cannot be verified for potential employers without the student's written consent.

Privacy Act. A student's Social Security number is used to verify personal identity in the UCD Student Records System. In accordance with the Federal Privacy Act of 1974, students are hereby notified that disclosure of their social security number is mandatory. This recordkeeping system was established prior to January 1, 1975 pursuant to the authority of The Regents of the University of California under Art. IX, Sec. 9, of the California Constitution.

ACCREDITATION

The University of California, Davis is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges, P.O. Box 9990, Mills College, Oakland, CA 94613, (510) 632-5000, an institutional accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education.

UC Davis is also accredited by the Association of American Law Schools, American Bar Association, American Dietetic Association, Association of American Medical Colleges, American Association for Accreditation of Laboratory Animal Care, Accreditation Council for Graduate Medical Education, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, American Chemical Society, American Assembly of Collegiate Schools of Business, American Society of Landscape Architects, the Commission on Teacher Credentialing, and the Joint Commission on Accreditation of Hospitals. Students interested in reviewing the accreditation documents may do so by scheduling an appointment with the Office of the Provost, Mrak Hall.

THE BOARD OF REGENTS

Governance of the university is entrusted to a corporation called The Board of Regents. Of the individuals composing the board, 19 are prominent California citizens appointed by the Governor; and seven, including the president of the university and the governor of California, serve ex officio. A student regent is selected each year from a list of names submitted to the board by the Student Body Presidents' Council.

The regents have delegated authority in academic matters to the Academic Senate of the faculty, which determines academic policy and supervises the instructional activities of the entire university. All of the permanent faculty, as well as key administrators, are members of the Senate.

The regents have delegated authority for the organization of the university to the president. Richard C. Atkinson is president and head of the universitywide administration. Authority for the administration of each campus has been delegated to a chancellor.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

Regents Ex Officio

Pete Wilson
Governor of California and President of The Regents

Gray Davis
Lieutenant Governor of California

Cruz Bustamante
Speaker of the Assembly

Delaine Eastin
State Superintendent of Public Instruction

Judith Levin
President of the Alumni Associations of the University of California

Charles J. Soderquist
Vice President of the Alumni Associations of the University of California

Richard C. Atkinson
President of the University

Appointed Regents

(Current term expires on March 1 of year indicated)

William T. Bagley	(2002)
Roy T. Brophy	(1998)
Frank W. Clark, Jr.	(2000)

Ward Connerly	(2005)
John G. Davies	(2004)
Tirso del Junco, M.D.	(2000)
Alice J. Gonzales	(1998)
S. Sue Johnson	(2002)
Meredith J. Khachigian	(2001)
Howard H. Leach	(2001)
David S. Lee	(2006)
Velma Montoya	(2005)
S. Stephen Nakashima	(2004)
Tom Sayles	(2006)

Student Regent

Kathryn T. McClymond (UCSB)	(June 30, 1998)

Faculty Representatives

Duncan Mellichamp	(August 31, 1997)

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James E. Holst
General Counsel and Vice President—Legal Affairs

Patricia A. Small
Treasurer

Patricia L. Trivette
Secretary

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President of the University

C. Judson King
Provost and Senior Vice President—Academic Affairs

V. Wayne Kennedy
Senior Vice President—Business and Finance

Bruce B. Darling
Vice President—University and External Relations

Cornelius L. Hopper, M.D.
Vice President—Health Affairs

William H. Gurtner
Vice President—Clinical Services and Development

W.R. (Reg) Gomes
Vice President—Agriculture and Natural Resources

James E. Holst
General Counsel and Vice President—Legal Affairs

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Larry N. Vanderhoef
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Chancellor at Santa Barbara

M.R.C. Greenwood
Chancellor at Santa Cruz

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Chancellor Emeritus

James H. Meyer, Ph.D.

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Robert D. Grey, Ph.D.
Provost and Executive Vice Chancellor

Janet C. Hamilton, B.S.
Vice Chancellor—Administration

Richard E. Matheny, Ed.D.
Vice Chancellor—University Relations

Mohammed S. Ghausi, Ph.D.
Interim Vice Chancellor—Research

Carolyn F. Wall, Ph.D.
Vice Chancellor—Student Affairs

Vice Provosts

Peter Dale, Ph.D.
Vice Provost—Undergraduate Studies

Mohammed S. Ghausi, Ph.D.
Interim Vice Provost—University Outreach

Harvey S. Himelfarb, M.A.
Vice Provost—Academic Planning and Personnel

Assistant Chancellor

Sally P. Springer, Ph.D.

Associate/Assistant Vice Chancellors

Carole A. Barone, Ph.D.
Associate Vice Chancellor—Information Technology

Trevor L. Chandler, Ph.D.
Assistant Vice Chancellor—Campus Diversity

Anthony B. Flores, M.P.A.
Associate Vice Chancellor—Finance, Accounting Officer

Robert G. Franks, Ph.D., J.D.
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Janet C. Gong, Ed.D
Assistant Vice Chancellor—Student Affairs (Student Relations)

Virginia Kelsch, B.A.
Associate Vice Chancellor—University Relations

Yvonne L. Marsh, M.S.
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Richard J. Meisinger, Jr., Ph.D.
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Dennis W. Shimek, B.S.
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Director of Cowell Student Health Center

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Director of University Cultural Programs

Daniel L. Wick, Ph.D.
Director of Summer Sessions

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André Lauchli, Ph.D., *Executive Associate Dean*

Alan Bennett, Ph.D., *Divisional Associate Dean—Plant Sciences*

David S. Reid, Ph.D., *Divisional Associate Dean—Human Health and Development*

Annie King, Ph.D., *Associate Dean—Undergraduate Academic Programs*

Gary Moberg, Ph.D., *Divisional Associate Dean—Animal Biology*

Michael S. Reid, Ph.D., *Divisional Associate Dean—Environmental and Resource Sciences and Policy*

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Benjamin J. McCoy, Ph.D., *Associate Dean—Research*

Zuhair A. Munir, Ph.D., *Associate Dean—Graduate Studies*

James F. Shackelford, Ph.D., *Associate Dean—Undergraduate Studies*

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JoAnn Cannon, Ph.D., *Dean—Division of Humanities, Arts, and Cultural Studies*

Barbara D. Metcalf, Ph.D., *Dean—Division of Social Sciences*

Peter A. Rock, Ph.D., *Dean—Division of Mathematical and Physical Sciences*

George G. Roussas, Ph.D., *Associate Dean—Division of Statistics*

Fred E. Wood, Ph.D., *Associate Dean—Undergraduate Education*

Division of Biological Sciences (Intercollege)

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Michael W. Maher, Ph.D., *Associate Dean—Academic Affairs*

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Mohammed S. Ghausi, Ph.D., *Interim Dean*

Jeffery C. Gibeling, Ph.D., *Executive Associate Dean*

Rosemarie H. Kraft, Ph.D., *Associate Dean*

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Bruce A. Wolk, J.D., *Dean*

Rex R. Perschbacher, J.D., *Associate Dean—Academic Affairs*

Antonia Bernhard, J.D., *Assistant Dean—Student Affairs*

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Fitz-Roy E. Curry, Ph.D., *Associate Dean—Research and the Basic Sciences*

Ernest L. Lewis, M.D., *Associate Dean—Student Affairs/ Admissions*

Frank J. Loge, M.B.A., *Associate Dean—Hospitals and Clinics*

Doreen Franke, M.B.A., *Acting Associate Dean—Administration*

Allan Siefkin, M.D., *Associate Dean—Clinical Affairs*

Margaret S. Steward, Ph.D., *Associate Dean—Faculty Development*

Donal A. Walsh, Ph.D., *Associate Dean—Curricular Affairs*

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Bennie I. Osburn, D.V.M., Ph.D., *Dean*

John R. Pascoe, B.V.Sc., Ph.D., *Executive Associate Dean*

Robert J. Hansen, Ph.D., *Associate Dean—Student Programs*

Dallas M. Hyde, Ph.D., *Interim Associate Dean—Research and Graduate Education*

Bradford P. Smith, D.V.M., *Associate Dean—Clinical Programs* and *Director—VMTH*

University Extension

Charles A. Lacy, Ph.D., *Dean*

PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE[1]

The percent of alumni whose full-time job is in the field of their choice is shown by field of study. Figures do not include the 13 percent of graduates who had not decided on a career field at the time of the survey.

Field of Study[2], Percentage finding work in field of choice

Animal Sciences, 79
Applied Economics, 68
Behavioral Sciences, 66
Computer Science, 100
Food/Consumer Sciences, 89
Biological Sciences, 61
Resource Sciences, 71
Engineering, 81
Fine Arts, 81
Letters, 50
Physical Sciences, 80
Social Sciences, 58

Total, 64

[1]Source: A 1994 survey of June 1993 graduates conducted by Student Affairs Research and Information, UC Davis.
[2]Fields of Study are groups of related undergraduate majors; for example, "Animal Sciences" would include such majors at UC Davis as Animal Science, Avian Sciences, and Wildlife, Fish and Conservation Biology.

RETENTION DATA[1] AND GRADUATION RATES AT UC DAVIS

Freshmen

(Retention and graduation rates through Spring 1996 for all undergraduates entering UC Davis from high school.)

Fall Quarter of Initial Enrollment:	Number of Students	Percent Enrolled 4 Quarters	*Percent Graduating in 12 Quarters	*Percent Graduating in 15 Quarters
1986	2,467	93%	28%	72%
1987	3,333	93%	29%	73%
1988	3,416	93%	31%	74%
1989	3,118	94%	35%	73%
1990	3,165	94%	38%	72%
1991	2,327	93%	35%	67%

Transfer Students

(Retention and graduation rates through Spring 1996 for all undergraduates transferring to UC Davis as juniors.)

Fall Quarter of Initial Enrollment:	Number of Students	Percent Enrolled 4 Quarters	*Percent Graduating in 6 Quarters	*Percent Graduating in 9 Quarters
1987	520	92%	31%	77%
1988	569	91%	31%	76%
1989	623	92%	32%	74%
1990	844	93%	35%	77%
1991	658	93%	42%	78%
1992	862	93%	43%	77%
1993	863	93%	37%	72%

*These are not necessarily quarters of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies. (There are three quarters in each academic year.)

[1]Source: Student Affairs Research and Information, UC Davis (January 1997).

AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR'S, MASTER'S, AND DOCTORATE DEGREES[1]

Field of Study:	Average Monthly Salary		
	Bachelor's	Master's	Doctorate
Engineering	$2975	$3435	$47171
Humanities/Social Sciences	$1963	$2373	$3091
Health Sciences/Life Sciences	$2659	$2965	$3934
Physical Sciences	$2486	$2993	$4297

[1]Source: 1996 National Salary Survey data provided by the College Placement Council.

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