ADDRESS DIRECTORY

University of California
Davis, California 95616
916-752-1011 (main campus number)

Office of the Chancellor
Mak Hall
916-752-2065

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

College of Engineering
1050 Engineering II
916-752-0533

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

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

Graduate Studies
252 Mak 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
1018 Haring Hall
916-752-1360

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

University Extension
1333 Research Park Drive
916-757-8777

Admissions
Undergraduate: Undergraduate Admissions and Outreach Services
175 Mak Hall
916-752-2971

EOF Office of Admissions
175 Mak Hall
916-752-2973

Graduate: Graduate Studies Admissions
252 Mak Hall
916-752-0653

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
1044 Haring Hall
916-752-1383

Office of the Registrar
124 Mak Hall
916-752-2973
(for registration information, transcripts, the General Catalog)

Financial Aid Office
207 Third Street, Suite B
916-757-3353

Scholarship Office
University of California
Davis, CA 95616-6900
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Studies
252 Mak 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
Orchard Park/Solano Park
916-752-4000

ASUCD (Associated Students UCD)
3rd floor, Memorial Union
916-752-1990

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

Memorial Union Information Desk
916-752-2222

News Service
334 Mak 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

Information Services Office
Buecher Alumni and Visitors Center
916-752-8131
(campus tours, maps and information)
### Academic Calendar

<table>
<thead>
<tr>
<th><strong>FALL 1995</strong></th>
<th><strong>WINTER 1996</strong></th>
<th><strong>SPRING 1996</strong></th>
<th><strong>FALL 1996</strong></th>
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<tr>
<td>May 22</td>
<td>Oct. 30, 1995</td>
<td>February 5</td>
<td>May 20</td>
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<td>May 24-26</td>
<td>Oct. 30-31</td>
<td>February 7-9</td>
<td>May 20-21</td>
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<td>May 25-26</td>
<td>November 2-3</td>
<td>February 8-9</td>
<td>May 23-24</td>
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<td>May 30-Sept. 3</td>
<td>November 6-17</td>
<td>February 12-23</td>
<td>May 28-Sept. 1</td>
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<td>September 5-21</td>
<td>Nov. 27-Dec. 8</td>
<td>March 4-15</td>
<td>September 3-20</td>
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<td>September 8</td>
<td>December 8</td>
<td>March 8</td>
<td>September 10</td>
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<td>September 8</td>
<td>December 8</td>
<td>March 8</td>
<td>September 10</td>
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</tbody>
</table>

### Quarter begins

- **Orientation**
- **Instruction begins**
  - Final day
    - *of late fee payment
    - *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
  - Final day
    - *to add courses via RSVP**
  - Final day
    - *to opt to take courses on a P/NP basis
    - *to file to take courses on a S/U basis
  - Monday classes meet

### Instruction ends

- **Final examinations**

### Quarter ends

- **Commencement**

### Academic and Administrative Holidays

- **Summer Sessions I and II, 1996**
  - June 24–August 2, 1996, and August 3–September 13, 1996

### 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 1–Oct. 11
  - Nov. 9–Dec. 22, 1995
  - Feb. 7–Mar. 22
  - June 1–Oct. 11

### Filing for Minor Program

- Deadline for students who plan to complete a minor program to file with the Dean’s Office ‡
  - Oct. 11
  - Jan. 22
  - April 12
  - Oct. 9

- Agricultural and Environmental Sciences
  - College of Letters and Science
  - Dec. 8
  - March 15
  - June 7
  - Dec. 6

### Admission/Readmission Deadlines

- Deadline for undergraduates to file admission applications for 1995-96
  - Nov. 30, 1994
  - July 31, 1995
  - Oct. 31, 1995
  - Nov. 30, 1995

- Deadline for filing applications with the Registrar for readmission to undergraduate status
  - July 31, 1995
  - Nov. 9, 1995
  - Feb. 1, 1996
  - July 29, 1996

### Financial Aid Deadlines

- Filing period for grants, loans, work-study and California Student Aid awards for 1996-97: January 1-March 2, 1996

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* 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 1996, the filing period is May 24-July 5.
‡ For students graduating September 1996, the deadline to file a minor program with Dean’s Office is July 5.
## Degrees Offered by UC Davis

Undergraduate majors and professional studies are administered by the colleges and schools listed. All graduate programs are administered by Graduate Studies.

<table>
<thead>
<tr>
<th>Major or Discipline</th>
<th>Degree*</th>
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<td>Administration</td>
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<td>African American and African Studies</td>
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<td>Agricultural and Environmental Chemistry</td>
<td>M.S., Ph.D.</td>
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<td>Animal Science</td>
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<td>Environmental Horticulture and Urban Forestry</td>
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<td>Environmental Policy Analysis and Planning</td>
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<td>Environmental Toxicology</td>
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<td>Epidemiology</td>
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<td>Evolution and Ecology</td>
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<td>Fermentation Science</td>
<td>B.S.</td>
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<tr>
<td>Fiber and Polymer Science</td>
<td>B.S.</td>
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</table>

### Administering School or College

- **Graduate School of Management**
  - College of Engineering
  - College of Letters & Science
- **College of Agricultural & Environmental Sciences**
  - College of Agricultural & Environmental Sciences
  - College of Agricultural & Environmental Sciences
  - College of Letters & Science
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  - College of Letters & Science
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<th>Field</th>
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<td>Food Biochemistry</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Food Engineering</td>
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<td>Food Science</td>
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<td>College of Letters &amp; Science</td>
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<td>Geography</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Greek</td>
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<td>College of Letters &amp; Science</td>
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<td>History</td>
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<td>College of Letters &amp; Science</td>
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<td>College of Letters &amp; Science</td>
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<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Human Development</td>
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<td>Individual Major</td>
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<td>College of Letters &amp; Science</td>
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<td>International Relations</td>
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<td>Colleges of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
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<td>Philosophy</td>
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<td>Colleges of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
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<td>College of Letters &amp; Science</td>
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<td>College of Letters &amp; Science</td>
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<td>College of Letters &amp; Science</td>
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<td>Range and Wildlands Science</td>
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<td>Vegetable Crops</td>
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<td>Veterinary Medicine</td>
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<tr>
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<tr>
<td>Women's Studies</td>
<td>A.B.</td>
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Joint program between UCD and CSU, Fresno.
## MINOR PROGRAMS OFFERED BY UC DAVIS

Minor programs are offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. The College of Engineering does not offer any minors.

<table>
<thead>
<tr>
<th>Minor Program</th>
<th>Offering Department</th>
<th>Administering College</th>
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<tbody>
<tr>
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UC DAVIS

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 nearly 6,000 acres, UC Davis is the largest of the nine campuses in area, second largest in budget and third largest in enrollment. It’s also one of the nation’s top 20 universities in research funding and has 24 undergraduate programs rated among the country’s top 10, including its nationally first-ranked botany department. The university’s reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. Creative teaching and academic innovation are encouraged by several programs, including the $25,000 Prize for Teaching and Scholarly Achievement, believed to be the largest award of its kind in the country.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering and Letters and Science. Undergraduate enrollment is more than 17,200 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 5,200 students are engaged in graduate or professional study. The campus supports numerous laboratories, 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 mountains, 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 the symphony, 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 person 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. On some summer days, the thermometer can exceed 100 degrees, but overnight temperatures generally drop back into the fifties. 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 nearly half of the city’s population of 50,000, 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, Comic Opera Company, 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 23 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 ambiance.

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 the opposite page).

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
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.*
Introduction

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.

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, and the university moved into its new home. 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 162,000 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.

Visiting the Campus

You may want to arrange a visit to UC Davis sometime before you apply. If you have specific questions about application procedures or entrance requirements, it is a good idea to write or visit Undergraduate Admissions and Outreach Services. For individual or group weekday tours of the campus, contact the Information Services Office at least four or five days 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.

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

Undergraduate Academic Programs

The College of Agricultural and Environmental Sciences

The College of Agricultural and Environmental Sciences offers a unique combination of diverse programs that have grown from a shared commitment to improve 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 serving 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. Yet its sense of shared commitment has led it to expand the scope of its educational offerings to encompass a wider range of 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 post-graduate 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.

Information: College Office, 228 Mrak Hall, 916-752-0108

The College of Engineering

The College of Engineering has a tradition of excellence in instruction, in research and in public service. To its undergraduate enrollment of approximately 2,400 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 sciences 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.

Information: Dean's Office, 1050 Engineering II, 916-752-0553
The College of Letters and Science

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 over fifty major programs of study and thousands of courses per year in the fine arts, humanities, life sciences, physical sciences, social sciences and mathematical 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 on-going 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 is designed to ensure 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 are designed to 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 dean's 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 are 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.

Information: Dean's Office, 200 Social Sciences and Humanities Building, 916-752-0392

ACADEMIC RESOURCES

Central Support

The University Library

The General Library at UC Davis is composed of the Peter J. Shields Library, the Physical Sciences Library, the Loren D. Carlson Health Sciences Library, the Agricultural Economics Library, and the library at the UC Davis Medical Center in Sacramento. A number of specialized departmental libraries are located on the campus, and the Law Library is located at the King Hall Law School.

The libraries contain over 2.6 million volumes and receive about 49,000 periodical and journal titles annually. UC Davis collections are accessible via the MELVYL on-line catalog. Shields Library houses the collections in the humanities, arts, social sciences, biological sciences, agricultural sciences and mathematics. The collections of the Physical Sciences Library support teaching and research in engineering, computer sciences and physical sciences. The library maintains a collection of one million research reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission and other governmental agencies. The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine with a collection of approximately 241,000 volumes. The Agricultural Economics Library holds more than 7,900 bound volumes and 251,000 unbound pamphlets in this field. The library at the UC Davis Medical Center provides a clinical collection of 25,000 volumes.

Information: Library Administration Office, Shields Library, 916-752-2110

Information Technology

The Division of Information Technology (I.T.) provides a range of computing, communications and media services in support of research and instruction. A central Campus Access Point offers information and consulting on all aspects of information technology use at UC Davis. I.T. also provides academic access to microcomputing, workstation computing and supercomputing (at various sites
nationally). Students have access to media production equipment and to taped lectures and slide/tape programs at media resource centers. Microcomputer labs, both PC and Macintosh, are available for student use, and Student Easy Access (EZ) computer accounts allow students to use network services, including electronic mail and file transfer, and to do computing on the UNIX and VMS operating systems available for academic use. Campus computer accounts are available to all registered students and can be activated at the Campus Access Point Walk-in Facility, located with the Copy Center on the first floor of Shields Library.

Information: 916-752-2548; e-mail: ithelp@ucdavis.edu

**Davis Arboretum**

The 150-acre Davis Arboretum, located along Putah Creek’s historic north fork, maintains a large collection of dry-land trees and shrubs for use in teaching and research. Outstanding plant collections include the Shields Oak Grove, the Mary Wattis Brown Garden of California native trees and shrubs, the Ruth Storer Garden of drought-tolerant flowering perennials and the T. Elliot Weier Redwood Grove. The Arboretum program of seed exchange is 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: Arboretum Headquarters, 916-752-2498

**Agricultural and Environmental Sciences**

**Agricultural History Center**

The center coordinates and administers several research and publication programs designed to further the study of agricultural history. Primary research activities include studies of comparative farm policy, migration and agricultural development, the history of farm land values, the agricultural-environmental border, the causes and consequences of agricultural mechanization and other sources of productiviy improvements in the nineteenth and twentieth centuries, and the impact of scientific research.

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

**California Agricultural Experiment Station**

The California Agricultural Experiment Station has branches in Davis, Riverside and Berkeley. The Davis branch includes 500 faculty in over 30 departments in the College of Agricultural and Environmental Sciences, the Division of Biological Sciences and the School of Veterinary Medicine. In addition to lab 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. Research emphasis is placed on resource conservation and management, water and soil pollution and regional planning.

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

**Institute of Toxictology and Environmental Health (ITEH)**

ITEH coordinates interdisciplinary research on biomedical and toxicological problems related to exposure to chemical, physical and biological toxic agents or to ionizing radiation. The aim of this research is 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 animl holding facilities. Laboratories are equipped for analytical chemistry, biochemical toxicology, cell and molecular biology, endocrinology, inhalation toxicology, morphology and reproductive and developmental biology. The institute houses universitywide programs and federally funded centers in toxicology and occupational health.

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

**J.M. Tucker Herbarium**

The J.M. Tucker Herbarium is used for research in plant systematics and ecology, and for handling public service requests. The herbarium contains more than 120,000 vascular plant specimens. It also houses 30,000 specimens of the Beecher Cramp顿ion Herbarium Collection of grasses and other range plants. Smaller teaching herbaria are located in various plant science departments on campus.

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

**John Muir Institute of the Environment (JMIE)**

The central mission of the John Muir Institute of the Environment is to apply research to improve the scientific basis for decisions on environmental issues. Three integrated functions are central to this mission: encourage and facilitate multidisciplinary research focused on environmental topics; act as administrative coordinator for specific programs of organized environmental research; and facilitate exchange of information and communication between policy makers, resource agencies, academic scientists and the public by effective outreach programs.

Information: Office of Research, 916-752-6374

**Mann Laboratory**

Plant scientists in the Mann Laboratory study the physiology, biochemistry and molecular biology of harvested horticultural crops. They train students and disseminate information about postharvest biology and technology to growers, shippers, marketers and consumers. The facility is part of the Department of Vegetable Crops, houses six faculty and is equipped with 16 controlled-temperature rooms, seven research laboratories, a teaching laboratory and a conference room.

Information: 104 Mann Laboratory, 916-752-1410; fax: 916-752-4554
Natural Reserve System

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 below.)
- 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 fifteen 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.

Information: Office of Research, 410 Mrak Hall, 916-752-6949/7073

Sustainable Agriculture Program: Student Experimental Farm

The Student Experimental Farm is an innovative teaching and research facility located on 25 acres of university land, and is the main focus of the Sustainable Agriculture Program. 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 over a decade, it provides researchers with a facility for conducting field research into sustainable agriculture.

Information: Student Experimental Farm, 916-752-7640

UC Agricultural Issues Center

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.

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

Water Resources Center

The center supports aquatic-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.

Information: 1323 Academic Surge, 916-752-8070

Wildland Resources Center

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's goal is to increase awareness of and advance the university's research and extension programs related to wildlands. The center serves as liaison between the university and state and federal agencies and other organizations concerned with wildland resources and problems.

Information: 1323 Academic Surge, 916-752-8070

Biological and Life Sciences

Adult Fitness Program

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 are conducted in the areas of cardiovascular, respiratory and metabolic functions. The program emphasizes risk reduction for cardiovascular disease and development of cardio-respiratory 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.

Information: Department of Exercise Science, 916-752-2540

Bodega Marine Laboratory and Reserve

The Bodega Marine Laboratory is an organized research unit 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 contain running seawater to 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. A number of undergraduate courses are taught 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. Adjacent subtidal sand and rock habitats in a marine life refuge are administered as part of the reserve. Areas of research include a broad spectrum of field studies of plants and animals in coastal marine, intertidal and terrestrial ecosystems.

Information: Bodega Marine Laboratory, P.O. Box 247
Bodega Bay, CA 94923, 707-875-2211
fax: 707-875-2089; e-mail: ucdbml@ucdavis.edu

California Regional Primate Research Center (CRPRC)
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.

Information: Primate Center, 916-752-0447

Food Intake Laboratory
The Food Intake Laboratory supports predoctoral and postdoctoral research on nutrition and behavior. Studies on the control of food intake and the nature of the factors governing feeding choices are emphasized. 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.

Information: TB 33, 916-752-7516

Health Sciences Research Laboratories
The Health Sciences Research Laboratories are composed of several high technology biological science facilities with research staff and assistance for faculty, staff and students. These include:

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

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

- Biochemistry and Special Instrumentation Laboratory—a central facility providing 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, Beaplate and Elisa readers.

  Information: TB 161, 916-752-3286

- Protein Structure Laboratory—provides instrumentation for protein sequencing, amino acid analysis, and protein and DNA synthesis. Also available are a microbore HPLC for high sensitivity peptide mapping and a preparative HPLC for large scale purification.

  Information: 1145 Surge 1, 916-752-6228

Human Performance Laboratory
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. Apple Macintosh and IBM microcomputers are located within the laboratory and can be used for data collection, reduction, graphing and statistical analysis as well as for biomechanical, physiological systems and human performance modeling.

Information: 164 Hickey Gym, 916-752-0965

Veterinary Genetics Laboratory
The laboratory is recognized for its pioneering research on animal blood groups and biochemical polymor-
Introduction

Current research activities include gene mapping and discovery and screening of DNA markers and biochemical polymorphisms. Knowledge acquired will be applied to detecting parentage and solving questionable parentage cases arising from the breeding of horses, cattle, sheep, goats, llamas, alpacas, and dogs. Relationships between blood and DNA markers and livestock diseases are being investigated. The laboratory continues to explore red cell, serum and karyotyping for diagnosis of clinical diseases.

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

Veterinary Medicine Teaching and Research Center (VMTRC)

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.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.

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

Engineering and Physical Sciences

Center for Geotechnical Modeling

At the Center for Geotechnical Modeling, research in physical and numerical modeling is conducted by students from several departments and other universities. The center operates two centrifuges, including the 9-m radius, 4,500-kg payload National Geotechnical Centrifuge. These centrifuges are used for research on geotechnical problems such as the effect of earthquakes on earth structures, toxic waste transport in groundwater, and deformations of foundations of bridges and large buildings.

Information: 119 Everson Hall, 916-752-6986

Crocker Nuclear Laboratory

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, activation analysis, 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.

Information: Crocker Nuclear Laboratory, 916-752-1460

Facility for Advanced Instrumentation

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 and an atomic force microscope adjacent to a specimen preparation laboratory. Morphometric analysis is supported by a computerized digitizing tablet and digitizing video image analysis computer. A mass spectrometer laboratory consists of a research-grade GC/MS, a high resolution instrument; and a newly acquired HPLC/MS equipped with electrospray ionization for analysis of proteins and peptides. The facility also coordinates access to additional instruments located in other departments around the campus.

Information: 9 Hutchison Hall, 916-752-0284

Institute of Theoretical Dynamics

The institute is an organized research unit promoting research and graduate education in the mathematical sciences. The institute provides a focus for extramural and intramural research pursuits; the two most important research themes are dynamical 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. Three core research areas are currently supported: mathematical biology, mathematical physics and applied mathematical analysis, especially fluid dynamics. The institute houses the NSF Computer Graphics Facility for computational biology, which is open to faculty, graduate students and postdoctoral researchers for graphic visualization in biology.

Information: 2201 Academic Surge Building, 916-752-0938, e-mail: info@itd.ucdavis.edu

Intercampus Institute for Research at Particle Accelerators

This institute conducts research that uses the unique facilities at national and international accelerator laboratories, 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.

Information: Professor Richard L. Lander, associate director, 325 Physics/Geology Building, 916-752-1780

Nuclear Magnetic Resonance Facility

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 five spectrometers of varying purposes and capabilities. Two horizontal magnet bore spectrometers are used for in vivo spectroscopy and imaging of small animals and materials, and in vivo 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.

Information: Medical Sciences 101, 916-752-7677
**X-Ray Crystallographic Facility**

The X-Ray Crystallographic Facility is located in the Department of Chemistry. There are three automated four-circle diffractometers. One of these has a Siemens area detector and is used with an 18-kW rotating anode X-ray source, making it suitable for biocrystallography. There are also traditional Weissenberg and precession cameras. All diffraction equipment is fitted with low-temperature (liq. N2) attachments. In addition, the facility contains 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.

Information: Dr. Marilyn Olmstead, Department of Chemistry, 916-752-6668

**Humanities and Social Sciences**

**The Child and Family Study Center**

The Child and Family Study Center is a research, teaching and demonstration laboratory of the Division of Human Development and Family Studies in the Department of Applied Behavioral Sciences. The laboratory provides a facility where students enrolled in human development courses develop observational techniques and participate with peers, children, parents and professionals in a fully integrated early childhood program. 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 the research that is conducted at the laboratory by faculty and graduate students.

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

**Humanities Institute**

The Davis Humanities Institute organizes interdisciplinary research seminars open to graduates and faculty, and promotes creative exchanges between the humanities, social sciences and environmental sciences. Its fellowship program enables campus fellows, visiting fellows and distinguished visitors to spend time in residence at the institute, and to participate in year-long or quarter-long seminars on designated themes. The seminar theme in 1995-96 will be *Questions of National Identity: Nationalism and Transnationalism*. The institute also 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*.

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

**Institute of Governmental Affairs**

The Institute of Governmental Affairs (IGA) serves as a center for advanced social science research. IGA offers research opportunities for faculty, undergraduate and graduate students, as well as for visiting scholars from throughout the United States and around the world. The institute houses the Center for State and Local Taxation and the Joint Center for International and Security Studies. In addition, IGA sponsors five research programs: Program on Workable Energy Regulation; Pacific Rim Business and Development; Program on Leadership and Democracy; Program on Telecommunications Policy; and Program on Immigration, Population and the Economy. The institute also supports a wide range of public affairs programs, seminars and conferences designed to foster debate on political, economic and social issues. IGA provides specialized library services and oversees the Social Science Data Service.

Information: Shields Library, 916-752-2042

**Social Science Data Service**

The Social Science Data Service provides assistance to students and faculty interested in quantitative research involving the use of the computer. The facility offers consultation on statistical packages, database management, survey and database development and data archives.

Information: 107 Social Sciences and Humanities Building, 916-752-6063
Information:
Undergraduate Admissions and Outreach Services
175 Mrak Hall
916-752-2971
916-752-4360 (TDD)

You can get the Application for Undergraduate Admission and Scholarship 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 during the filing period for the quarter in which you want to attend UC Davis.

**Quarter of Attendance** | **Filing Period**
--- | ---
Fall quarter 1995 | November 1–30, 1994
Spring quarter 1996 | October 1–31, 1995
Fall quarter 1996 | November 1–30, 1995

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 directly to the Davis campus. Please call Undergraduate Admissions during the winter and spring filing periods to find out where to mail your application.

**Application Fees**
The basic application fee to apply to one campus of the university is $40. For each additional campus you select, you must pay an extra $40 fee. These fees are not refundable. Attach a check or money order made payable to the Regents of the University of California to the application form.

**PREPARING FOR UNIVERSITY WORK**

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, one year of history, 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 vary for California residents and 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.

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 7 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
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
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 9th grade laboratory science can be used to meet this requirement.

E. Language other than English—2 years
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, precalculus (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 placed on file with the university's Office of Student Academic Services. If you submit courses from an out-of-state school, the Undergraduate Admissions Office 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 600 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, composition, 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" through "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 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.

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 below 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

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<th>Grade Point Averages</th>
<th>SAT† Total Scores</th>
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*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.
†The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600.
24 Undergraduate Admission

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 admission to the University of California:

- 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 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 1300 on the SAT-I, or a score of 31 on the American College Test. Your total score on the SAT-II must be 1650 or higher with no score less than 500 on an individual test. If you are a non-resident applicant, your score on the SAT-II must be 1730 or higher.

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, 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.

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. Rather, AP credits are counted as transfer credits and may reduce the number of General Education (GE) courses you have to complete. (See the GE section in Bachelor's Degree Requirements 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.

Minimum Requirements for California Residents

Transfer applicants 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 coursework.

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. 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
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<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT TOWARD DEGREE</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
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<td>English</td>
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<td>English/Humanities Credit: 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. College of Humanities Credit/Unrestricted Electives: 4 units. For each foreign language examination passed. In the College of Agricultural and Environmental Sciences, satisfies credit toward breadth/Unrestricted electives in the College of Letters and Science, examinations (except for Latin) satisfy the English Language requirement. In the College of Engineering, 4 units toward Humanities/Social Science electives.</td>
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<tr>
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<td>Latin (Lyric)</td>
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<tr>
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<td>HUMANITIES</td>
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<td>Humanities Credit/Unrestricted Electives: 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree. 8 units. In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
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<td>Mathematics 16B or 21B</td>
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<td>Mathematics BC</td>
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<td>Physics c</td>
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<td>American Government and Politics</td>
<td>5, 4, 3</td>
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<td>Comparative Government and Politics</td>
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<td>Economics (Micro)</td>
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<td>Psychology</td>
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<td>Social Science Credit/Unrestricted Electives: 4 units. Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences. Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 2HA, 2HB, 2HC sequence. Credit for Computer Science Engineering 30 may serve as prerequisite for Computer Science Engineering 40 with consent of instructor. In the College of Engineering, examination awards units towards the unrestricted electives requirement.</td>
<td>4 units</td>
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<tr>
<td>Social Science Credit/Unrestricted Electives: 4 units. Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalent may serve as prerequisite for Mathematics 16B or 21B. 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 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 5A, 5B, 5C and 7A, 7B, 7C may be taken for full credit. Course equivalents may be used as prerequisite for succeeding courses of same series with consent of instructor. In the College of Engineering, only a score of 5 on Physics (C1 and C2) Examinations applies toward Physics requirement.</td>
<td>4 units</td>
<td></td>
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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 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 campus of the University of California and have not since been registered in another institution, you may apply for transfer to the Davis campus. Filing dates and application fees 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. 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, coursework is considered transferable if the applicant completed the course at an institution that is recognized by the University of California and is comparable to coursework offered at the University of California.

Most international students are required to complete a "Financial Statement for Students Seeking Non-immigrant Status" that attests to the student's ability to pay for non-resident tuition and fees and living expenses. All international students who have not satisfied the subject A requirement through domestic coursework or testing, or whose native language is not English, must take the Examination in English as a Second Language upon entrance to 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 SELECTION CRITERIA**

UC Davis makes every effort to provide a place for all California resident applicants who meet the minimum 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 1993 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 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 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 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 hardships, disabilities, economic disadvantage, and membership in groups historically underrepresented at the university.
Transfer Applicants

Academic Criteria: Top priority for admission consideration is given to UC-eligible California community college junior level transfer applicants. 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, environmental policy analysis and planning, 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 Admissions 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. Intercampus transfer, 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) should be returned by May 1 (as a freshman) or June 1 (as a 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 of admission. Students not selected for admission consideration at the UC campuses to which they have applied may have their application considered at another UC campus where space is still available.

READMISSION

If you are a former UC Davis undergraduate student planning to return to the Davis campus, you must file an Application for Readmission and pay a nonrefundable, nontransferable fee of $40. This application is available in the Office of the Registrar. (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.

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

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deadline Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1996</td>
<td>July 31, 1995</td>
</tr>
<tr>
<td>Winter 1996</td>
<td>November 9, 1995</td>
</tr>
<tr>
<td>Spring 1996</td>
<td>February 1, 1996</td>
</tr>
<tr>
<td>Fall 1996</td>
<td>July 29, 1996</td>
</tr>
</tbody>
</table>

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/Student Affirmative Action (EOP/SAA)

The Educational Opportunity Program/Student Affirmative Action assists students from ethnic groups that are underrepresented in the UC eligibility pool (African American, American Indian, Chicano, and Latino). Also, the program assists students with disabilities and students from economically and/or educationally disadvantaged backgrounds. EOP/SAA can help you 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. You can contact Undergraduate Admissions and Outreach Services for information on obtaining the fee waiver, and you can 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 places related to EOP. In addition, the applicant is advised to discuss the reasons for requesting EOP assistance in the required essay.

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. Fees and filing dates are the same as those for new applicants. 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 also submit transcripts from all schools attended. You will not be admitted to limited status for the purpose of raising a low scholarship average.

As a limited status student you will be expected to maintain a certain scholarship average during a predetermined time of enrollment.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the Admissions Officer 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. A Duplicate Degree Fee of $6,000 annually is assessed for students with a bachelor’s or higher degree who attend the University of California to obtain instruction at the baccalaureate level. Students are exempt from paying the Duplicate Degree Fee if they are enrolled in joint degree and double major programs; are seeking post-baccalaureate degrees, including education credentials or certificates; are nonresident students paying nonresident tuition; or qualify for certain categories of low-income student status, as defined in state law.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the Admissions Officer and the dean of the college.

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.

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 Officer and are subject to approval by the dean of the college in which you plan to enroll. Admission is for a specified time only and a prescribed scholarship average must be maintained. 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 undergraduate admissions packet from your high school, a 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 Mirk Hall, University of California, Davis, CA 95616.

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.

3. Keep a copy of your application and essay.

4. Keep for your records the notices received 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.

6. High school applicants for the fall quarter should take the SAT-1 or ACT and 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 transcripts, test scores, or confirmation of work in progress. Send this information right away so your application can be processed without delay.

   Note: Your eligibility for admission cannot be evaluated until all your application materials are received; i.e., application form, filing fee, essay, official transcript (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,” and Student Address form along with the nonrefundable advance deposit of $100 (if required) as soon as possible, and no later than the date stated on the SIR, so your registration materials can be ordered before you register.

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

Given 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 financial aid (grants, loans, work-study, and scholarships) are listed on the following pages.

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

Given state budget uncertainties, the University of California Board of Regents has not taken action on systemwide fee levels for 1995-96. Until the Regents take action, the systemwide Registration and Educational Fee levels remain the same as those for 1994-95, as shown below. The university’s current budget plan proposes a 10% increase in annual systemwide fees for 1995-96. Accordingly, students and their families may wish to plan for a possible 10% increase. The university’s fee proposal is subject to change based on state budget decisions.

### Undergraduate Student Fees (per quarter)

<table>
<thead>
<tr>
<th>Fee Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee</td>
<td>$238.00</td>
</tr>
<tr>
<td>Educational Fee</td>
<td>$1,029.00</td>
</tr>
<tr>
<td>Memorial Union Fee</td>
<td>$28.50</td>
</tr>
<tr>
<td>Associated Students Fee</td>
<td>$23.50</td>
</tr>
<tr>
<td>Student Services Maintenance Fee</td>
<td>$34.00</td>
</tr>
<tr>
<td>Student Activities and Services Initiative Fee</td>
<td>$17.00</td>
</tr>
<tr>
<td>Student Facilities Safety Fee</td>
<td>$22.00</td>
</tr>
<tr>
<td><strong>Total for full-time California residents</strong></td>
<td><strong>$1,392.00</strong></td>
</tr>
<tr>
<td>Tuition for nonresidents</td>
<td>2,566.00</td>
</tr>
<tr>
<td><strong>Total for full-time nonresidents</strong></td>
<td><strong>$3,958.00</strong></td>
</tr>
<tr>
<td>Optional Undergraduate Health Insurance Fee</td>
<td>($165.00)</td>
</tr>
</tbody>
</table>

Total Part-time California resident: $877.50
Total Part-time Nonresident: $2,160.50
Duplicate Degree Fee: $2,000.00
Total Full-time California Resident with Duplicate Degree Fee: $3,392.00
Total Part-time with Duplicate Degree Fee: $1,877.50
Total Employee-Student: $473.50
Total Employee-Student with Duplicate Degree Fee: $2,473.50

*The Undergraduate Health Insurance plan is a voluntary plan available to all undergraduates except for foreign undergraduate students, who must participate in the Graduate Student Health Insurance Plan and pay the Graduate Student Health Insurance Plan Fee.*

For details concerning fees and deposits, consult the publication 1995-96 Student Fees and Deposits, available from the Office of the Registrar. Current fees are also published in the Class Schedule and Room Directory.

### 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, the Memorial Union Fee and the Student Facilities Fee. Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Section 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff program) available in department offices, at Shields Library or the Staff Development and Professional Services Office. Petitions can be obtained through the employee’s unit.

### Duplicate (Second) Degree Fee

Students who have earned a baccalaureate or higher degree and who attend the University of California to obtain instruction at the baccalaureate level must pay a Duplicate Degree Fee of $6,000 annually. Students are exempt from paying the Duplicate Degree Fee if they are enrolled in joint degree and double major programs; are seeking post-baccalaureate degrees, including education credentials or certificates; are nonresident students paying nonresident tuition; or qualify for certain categories of low-income student status, as defined in state law.

### Graduate Student Fees

Graduate student fees are listed in the Graduate Studies chapter of this catalog.

### Professional School Fees

Students in the Graduate School of Management, or Schools of Law, Medicine, or Veterinary Medicine pay additional fees. Fees for the professional schools are listed in the relevant chapters in this catalog.

### Parking Permit and Bicycle Licensing Fees

Students may be subject to the following fees for optional services (rates subject to change):
Parking (per year; $60 to $276 for cars, depending on the type of permit; $108 for motorcycles; $108 for nighttime only permit; i.e., $20 to $74 per quarter)

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

**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.

<table>
<thead>
<tr>
<th>Average Student Costs Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Undergraduate</strong></td>
</tr>
<tr>
<td>Fees</td>
</tr>
<tr>
<td>Books and supplies</td>
</tr>
<tr>
<td>Housing</td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Personal expenses</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td><strong>Total (off-campus residence)</strong></td>
</tr>
<tr>
<td>Less for living on campus</td>
</tr>
<tr>
<td><strong>Total (on-campus residence)</strong></td>
</tr>
</tbody>
</table>

**Graduate** (Single, living off campus)
- General                          $13,640
- School of Law (depending upon the year in school) $14,275 to 18,493
- School of Medicine (depending upon the year in school) $18,992 to 20,516
- School of Veterinary Medicine (depending upon the year in school) $16,708 to 18,218

**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 1995-96 academic year, we estimate the cost will be $24,000. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, $24,000 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). 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 tuition, education 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, education fee, nonresident tuition and other student fees:**

- 1-14 days .................. 80%
- 15-21 days .................. 60%
- 22-28 days .................. 40%
- 29-35 days .................. 20%
- 36 days and over ........... 0%

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

**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.
Fees, Expenses and Financial Aid

FINANCIAL AID

Information:
Financial Aid Office
201, Voorhies Hall
916-752-2390 (TDD 757-2078)

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants and work-study employment.

<table>
<thead>
<tr>
<th>Financial Aid Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority filing period for grants, loans, work-study and California Student Aid</td>
</tr>
<tr>
<td>Commission applications for 1996-97</td>
</tr>
<tr>
<td>Deadline to file for fellowships and graduate scholarships for 1996-97 with Graduate Studies</td>
</tr>
</tbody>
</table>

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, or contact the UC Davis Scholarship Office, located at 207 Third Street, Suite B, 916-757-3153 (by mail: Scholarship Office, University of California, Davis, CA 95616-8696).

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 tuition and are based on undergraduate grades, test scores, parents' educational level and consideration of disadvantaged background.

Eligibility for most assistance is based upon demonstrated financial need. (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 are subtracted from the budget, and 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). Submit all parts of the SAR to the UC Davis Financial Aid Office. 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 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, unless the student receives permission to enroll for fewer units.

- Cal Grant A pays the full amount of registration fees.
- Cal Grant B pays a monthly stipend for living expenses for first-year students, and a portion of the registration fees plus a monthly 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.

- Amount of BIA grant depends on need and availability of funds at each BIA agency.

Loans

A Financial Aid Offer almost always includes a long-term, low-interest loan. Repayment of these loans (with the exception of Federal Direct Unsubsidized/Federal Direct PLUS loans) begins after you graduate or withdraw from school.

University Student Loans up to $18,000 per student are available for graduate studies; payment may be deferred until completion or termination of studies. Co-signer is required for annual amounts above $1,000.

- $4,500 undergraduate maximum for first 2 years
- $9,000 undergraduate maximum during 4 years
- $18,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)
- Repayment begins six months after graduation or withdrawal

Federal Perkins Loans are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of students' 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.

- $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

The 1992 reauthorization of financial aid programs changed the eligibility requirement for HPSL for medical students. Beginning with the 1993-94 academic year, new HPSL borrowers must commit themselves to complete a primary care residency program, and practice in a primary care field until their HPSLs are repaid.

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 counselor before borrowing an unsubsidized loan.

- Undergraduate students may borrow up to annual maximums of $2,625 for freshmen, $3,300 for sophomores, and $3,500 for juniors and seniors, up to a maximum aggregate indebtedness of $23,000.

- Self-supporting 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, pick up an application outside 116 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**

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. 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.

**The Student Employment Center** helps students, including those on the Planned Educational Leave Program, and their spouses find both part-time and temporary full-time employment on and off campus during the school year and vacation periods. Job opportunities are available in many fields of interest and require skills ranging from entry level to highly technical. For further information, see “Student Employment” in the Student Life chapter of this catalog.

**UNDERGRADUATE SCHOLARSHIPS AND AWARDS**

Information:

Scholarship Office
207 Third Street, Suite B
916-757-3133; e-mail: ugsscholofe@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 Scholarship Office for instructions no later than November 1, 1995. 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
LIVING AT DAVIS

Residence Halls

Information:
Student Housing Office
916-752-2033; e-mail: 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 undergraduates whose Statements of Intent to Register (SIR) are accepted 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 1995-96 is $5,005–$5,670 for a double-occupancy room and $5,540–$6,200 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: Orchard Park/Solano Park

Information:
916-732-4000

There are 476 university-operated, furnished and unfurnished on-campus apartments for UC Davis student families. The monthly rates for the academic year 1995-96 will be as follows:

- Orchard Park, two-bedroom unfurnished apartment, $470.
- Orchard Park, two-bedroom furnished apartment, $500.
- Solano Park, one-bedroom unfurnished apartment, $377.
- Solano Park, two-bedroom unfurnished apartment, $427.

Vacancies in Orchard Park/Solano Park are filled from a list based on the date of application. For a fall assignment, you should apply at least two to three months in advance. For an assignment during the remainder of the year, the waiting period is usually shorter. An application may be submitted before you are admitted to the university and before you are married, but you must show doc-umentation of your student, marital 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.

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. Monthly rents for academic year 1995-96 range from $482 for a one-bedroom unit to $778 for a three-bedroom unit.

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. Monthly rents for the academic year 1995-96 are $464 for a studio and $650 for a two-bedroom unit.

STUDENT SERVICES

Student Health

Information:
Cowell Student Health Center
916-752-2300

Your health is important to you and to the university. Consequently, new students are asked to submit a medical history form and evidence of rubeola and rubella immunity to the Health Center.

Since it is not intended that the Health Center supplant the medical care of your family physician, you are advised to have a physical examination by your own doctor before coming to UC Davis. Any problems capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent loss of study time. Students with contagious diseases will be excluded from the classroom.

The services of the Health Center are made possible, in part, by your registration fees. As an enrolled student paying full registration fees, 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
- Women's Clinic

The Health Center currently does not provide services for dental problems or routine eye care.

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 Account Office at Cowell Student Health Center, 8:00 a.m. to noon and 1:00 to 5:00 p.m., Monday, Tuesday, Thursday and Friday, and 9:00 a.m. to noon and 1:00 to 5:00 p.m. on Wednesday.

Child Care Programs

Need help with child care? The following programs are available on campus and in the community to help you with child care arrangements and expenses.

- The Student Housing Office/Child Care Services provides on-campus resource and referral assistance, 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. For further information, contact 260 Student Housing Office, or telephone 916-752-5415.

- City of Davis Parks and Community Services/Child Care provides further resource and referral information, particularly referrals to licensed family day care homes, and administers a variety of child care subsidies. The program is funded jointly by UC Davis, the City of Davis, and the State Department of Education. The program maintains information on licensed family day care homes, day care centers, nursery schools, playgroups, and other family-related services. Additional services include parenting workshops and handouts; a bimonthly newsletter; a parenting resource library; and a book, video and toy lending library. It is located at 604 Second Street, 916-757-5691.

- 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 family income, with awards determined through a lottery each fall. Parents may choose from licensed family day care homes and child care centers. To apply, call City of Davis Parks and Community Services/Child Care at 916-757-5691, or drop by 604 Second Street.

- The Child Care Grant Program, funded through the State Department of Education and administered by City of Davis Parks and Community Services/Child Care, can help low-income families pay for child care through a variety of subsidies. Eligibility requirements vary with each program, but all parents need to be employed, in school or seeking employment. All care is provided in Davis from a child care provider of the parents' choice. Parents may be required to pay a fee based on a sliding scale, and in some instances, an additional co-payment may be required. 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. For information call 916-757-5691, or drop by 604 Second Street.

- The Financial Aid Office can assist student parents who qualify for financial aid with allowances for direct child care costs. This office is in 201 Voorhies Hall, 916-752-2390.

- The Student Employment Center posts job listings of parents wishing to hire child care providers. This office is in 206 Voorhies Hall, 916-752-0520.

- LaRue Park Children's House and Russell Park Child Development Center are privately owned and operated child care centers on the UC Davis campus. Residents of Russell Park, Orchard Park, and Solano Park student family housing pay reduced rates. Information about LaRue Park Children's House, which serves infants through preschool-age children, can be obtained at 916-753-8716. Information about Russell Park Child Development Center, serving infants through school-age children, is available by calling 916-753-2487.

- The Child and Family Study Center is a teaching and research facility for the Human Development and Family Studies Program. Four different programs accommodate children from the ages of four and one-half months to five years for three hours a day, following the UC Davis academic calendar. Student families pay reduced tuition. Children are selected from a waiting list according to criteria designed to meet academic goals. The center is located on campus, and the office is in West House, 916-752-2888.

- The International Mother-Child Learning Center operates a multicultural afternoon enrichment program for language development and intracultural exchange. Sponsored by International House–Davis, the program serves children aged 3 to 5 years and their parents. The center is located in TB 117, 916-753-4490.

- Cooperative playgroups are sponsored by the student family housing parents' associations of Orchard and Solano Parks, 916-752-4000. Each program may serve up to 15 children aged 2 to 5 years.
The Perfect Tender infant Care Cooperative serves infants under twelve months of age whose parent(s) attend the School of Law. Contact 916-752-0243 for more information.

The Women’s Resources and Research Center sponsors the Child Emergency Notification Service, which provides schools and child care providers with a way to contact 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. The center is located in 10 Lower Freeborn, 916-752-3372.

Student Employment

Information:
Student Employment Center
296 Voorhies Hall
916-752-0520

The Student Employment Center helps 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.

Employment opportunities exist on campus, in the city of Davis, and in adjacent communities. 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. Students are encouraged to begin looking in January for summer jobs.

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).

The center is open from 9:00 to 11:45 a.m. and from 1:00 to 4:00 p.m. Monday through Friday.

Transportation and Parking

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 Monday through Friday between the hours of 7:00 a.m. and 10:00 p.m. Parking lots on campus are financed solely by fees collected from parking permits and meters. Daily permits are currently $2.00 and may be obtained from permit dispensers located in lots 1, 2, 5, 25, 31, 47, 47A, 49, 50, 54, and 81; daily permits for lots 2B and 30 are $1.00. Long-term permits are required for all other parking lots, and may be purchased at the Transportation and Parking Services Office, located on Extension Center Drive directly south of lot 30 and the Rec Pool. Visitor parking information is available at the South Gate Kiosk on Old Davis Road, or call Transportation and Parking Services at 916-752-8277.

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 Transportation and Parking Services or the Campus Box Office. Full service is provided each UC Davis school day (Monday through Friday) and Monday through Thursday during the regular school year—fall, winter and spring quarters. Reduced schedule bus service operates during the summer, finals week, and all academic break periods. Schedules are available at the MU Information desk, bus terminals, City Hall and the Unitrans office.

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

RECREATION AND THE ARTS

No matter what your recreational bent—horseback riding, outdoor activities, listening to music, arts and crafts, bowling, swimming or sports—the Davis campus has a place where you can enjoy it.

Facilities and programs such as the Equestrian Center, Craft Center, Outdoor Adventures, Recreation Hall, Intramural Sports, MU Art Gallery, Recreation Swimming Pool, or the MU Games Area 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. Call 752-1730 to request a catalog.

Memorial Union and Campus Recreation

Information:
Memorial Union Programs and Campus Recreation
469 Memorial Union
916-752-1730

Memorial Union Programs and Campus Recreation at UC Davis provide the community with a variety of choices for social, physical, creative, intellectual and cultural expression. The purpose of these programs is to broaden the personal experiences of participants, to complement the academic mission of the university and to enhance the quality of life for the campus. These programs provide many healthy activities to offset the stresses associated with a rigorous academic environment.

Outdoor Adventures, located in the Barn on the corner of California and Hutchison, will help you develop your outdoor skills and plan your outdoor excursions. You can rent equipment of professional quality for your adventure. 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. Group rates and custom-
designed trips can be arranged. Many special activities such as wilderness emergency-care clinics, whitewater river guide training, slide presentations and programs conducted by outdoor experts are also held. Stop in and share your own outdoor experiences. For more information call 916-752-1995/1730.

The Equestrian Center, southwest of the Veterinary Medical Teaching Hospital off Garrod Drive, is active 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, and trained volunteers can provide an educational experience for those interested 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. Telephone 916-752-2372/1730 for details.

The Craft Center in the South Silo 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 such varied crafts as woodworking, weaving, jewelry-making, art and graphics, ceramics, photography, silkscreen printing, welding, leatherworking and stained glass. Call for more information: 916-752-1473/1730.

The Recreation Swimming Pool, at the corner of La Rue Road and Hutchison Drive, is a large free-form pool with a separate wading pool, a bathhouse, shuffleboard courts and an extensive grass area for sunbathing. The staff offers 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. For more information, call 916-752-2695 or 916-752-1995/1730.

The Games Area, located below the UCD Bookstore, is a recreational facility consisting of 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. Call 916-752-2580/1730 for details.

The Memorial Union (MU) complex, directly north of the Quad, serves as the community center for the campus. Bring yourself up to date on local events by stopping at the MU Campus Information Center on the first floor. The Information Center takes reservations for the use of tables and display boards in and around the MU. The center maintains an up-to-date database of 1,200 organizations and is able to refer you to people, places, programs and services both on and off campus. The goal is to save you the “run-around” so you can get the information you need quickly and conveniently. A valuable resource for current students as well as new students and visitors, the center can also be reached by telephone, 916-752-2222. Other first-level facilities include the UCD Bookstore, Corral gift shop and the Coffee House.

King Lounge, on the second floor, features music listening and periodicals in a comfortable and relaxed atmosphere popular for studying. The MU Art Gallery and a complex of meeting rooms, the MU II Conference Center, complete the second floor. In addition to the administrative offices of the Memorial Union and Campus Recreation, the offices of ASUCD, Student Leadership Center and Student Judicial Affairs can be found on the third and fourth floors of the MU tower. Freeborn Hall is a 1,250-seat assembly hall used for dances, performing arts, banquets, lectures and conferences. The Campus Box Office, where you can purchase tickets for campus events and cash checks, is outside Freeborn.
The MU Art Gallery and Music and Periodicals Center, adjacent to King Lounge on the second level of the Memorial Union, feature a changing series of contemporary and historical art exhibits throughout the school year. The gallery sponsors print sales, special programs and lectures, as well as 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. For more information, call 916-752-2885/1730.

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 eaves-covered patio surrounding the lodge offers a lovely, shaded environment for outside dining during the warm weather months. Situated in the secluded Arboretum on the southwest perimeter of campus, Putah Creek Lodge provides a relaxing atmosphere for lectures, banquets, weddings, or dances. The spacious lawn surrounding the lodge is available for a variety of activities such as volleyball, receptions and picnics. Additional lodge amenities include kitchens and outdoor barbecues.

The Silo Union, recently renovated to serve a variety of campus needs, offers food services, meeting/conference facilities, lounges and the campus pub. 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.

The South Silo houses the ASUCD Experimental College (916-752-2569), Student Special Services (916-752-2007), Graduate Student Association (916-752-6108) and a small branch of the Bookstore serving the School of Law (916-752-2961).

Recreation Hall Information:
Entrance 1B
916-752-6073

Recreation Hall is a multi-use arena available 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 Recreation Hall. The three-level facility has locker rooms; a flat running track; an equipment room; racquetball, wallyball and squash courts; a weight room 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. The upper level north area has a state-of-the-art artificial rock climbing wall for climbers of all skill levels. 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 privilege card at Rec Hall to use lockers, equipment and facilities. Patrons may also purchase a daily pass at the 1B entrance. Rec Hall is open Monday through Thursday, from 6:30 a.m. to midnight, Fridays 6:30 a.m. to 10:00 p.m., Saturdays 9:00 a.m. to 6:00 p.m., and Sundays noon to 10:00 p.m. throughout the year. Rec Hall hours are shortened during quarter breaks and summer.

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 student physical abilities. The underlying objective is to offer a coordinated program of sports 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 33 recreational and competitive offerings attract 1,400 athletes in activities ranging from archery, badminton, crew, horse polo, and water and snow skiing, to the traditional volleyball, lacrosse, rugby, water polo and equestrian events.

Although intercollegiate athletics at Davis is intended to benefit 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 eleven men's sports and nine 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 (916-757-3199), located at 200 B Street, Suite A, brings a wide variety of touring 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. Various departments such as English, the foreign languages, and history
sponsor lectures, poetry readings, and exhibits open to the university community. Bulletin boards, kiosks, the student radio station KDVS, and the California Aggie inform audiences about upcoming events.

You'll find annual and quarterly brochures and promotional materials on all events sponsored by UC Davis Presents at the Campus Box Office and at the UC Davis Presents office. Tickets for UC Davis Presents events may be purchased at the Campus Box Office in Freeborn Hall, or any BASS/TM outlet.

**Music**

The Department of Music (916-752-5537) sponsors the UC Symphony Orchestra, Chorus, Chamber Singers, Early Music Ensemble, Concert Band, and small ensemble groups. Music majors and other interested students can receive credit for participation in these groups, which perform at concerts and recitals open to the university community. The department sponsors the annual Theatre of Voices Festival and, 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 UC Davis Contemporary Music Players and the UCD Faculty Woodwind Quintet are in residence on campus. The Department of Music sponsors nearly 100 public concerts each year.

**Drama**

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

Each year's drama and dance schedule includes University Theatre Season (five major productions of established plays); Dance Collage (a collection of student and faculty choreographed dance numbers); and Second Season (four to six productions). Second 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. Second Season productions are held in the smaller department theatres 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 Memorial Union Art Gallery (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 Design Gallery (916-752-4139) on the first floor of Walker Hall is 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. The Design Gallery is an innovative space where the installations are as interesting as the material presented. 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 (916-752-8500), named in honor of the first chairperson of the Department of Art and dedicated in 1976, is located on the first floor. The gallery 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 provides aesthetic enrichment 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 (916-752-8500) is located adjacent to the Nelson Gallery. Representing various historical periods and cultures, it is the Davis campus's major collection of art. Selected works are available for viewing weekday afternoons. The Basement Gallery 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 (916-752-6567, Native American Studies). The museum was established in 1973 in honor of Carl N. Gorman, 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. The museum is located on the first floor in Hart Hall and is open from noon to 5:00 p.m., Tuesday through Friday, and by appointment.

**ASSOCIATED STUDENTS (ASUCD)**

Information:

- Senate Office
  - 370 Memorial Union
  - 916-752-3632
- ASUCD Main Office
  - 364 Memorial Union
  - 916-752-1990

The Associated Students of the University of California, Davis (or ASUCD), authorized by the Regents and the Chancellor, represents all undergraduate students. Law and graduate students also currently 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 city council form of government, the Senate consists of 10 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 in the Memorial Union. The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. Other ASUCD activities include Radio KDVS stereo 90.3 FM, 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 and registration 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 make sure 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 following 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 LEADERSHIP CENTER**

Information:
Student Leadership Center
4th Floor, Memorial Union
916-752-2027

There are over 300 registered student organizations at UC Davis, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall and service groups. The Student Leadership Center registers these diverse groups and provides advising on activities, resources and campus policies. In addition to the subunits described below, the Student Leadership Center administers a number of campus programs: Black Repertory dance troupe, Danzantes del Alma folkloric dance troupe, Club Finance Council, activities faire, leadership training programs, campus service awards, College Bowl and liaison to fraternities and sororities. Student Leadership Center staff assist individ-
ual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the office to explore these “hands-on” experiences that help to 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, Semana de la Raza 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.

JUDICIAL AFFAIRS
Information:
Student Judicial Affairs
4th Floor, Memorial Union
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 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 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, in the Student Activities Handbook, in the Guide to Residence Hall Life and in 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, 463 Memorial Union.

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.

ALUMNI ASSOCIATION
Information:
Cal Aggie Alumni Association
Walter A. Buehler Alumni and Visitors Center
UC Davis
Davis, CA 95616-8517
916-752-0286; toll free in California: 1-800-242-GRAD

After graduation, you can maintain your ties with UC Davis and your fellow alumni by joining and participating in the Cal Aggie Alumni Association.

This worthwhile and vibrant organization sponsors a wide variety of activities and programs that support UC Davis and keep alumni in touch with the campus. Members are also entitled to special privileges. As a new graduate, your first year of membership is only $20, a $15 savings off the regular annual membership fee. For more information, call the alumni association or drop by the Alumni Center before you graduate.
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 of Agricultural and Environmental Sciences

Office of the Dean
228 Mrak Hall
914-752-0108

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.

Academic Advising Center

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. Advising for Individual Majors, as well as for other College majors and programs, is also available at the center.

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 Adviser 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.

College of Agricultural and Environmental Sciences Undergraduate Programs

Major programs in the College of Agricultural and Environmental Science 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 following areas of study include majors with specific focuses:

Environmental and Resource Sciences and Policy majors focus on the broad facets of the human and natural environments and their interactions. These majors 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.

Applied Behavioral Sciences
Atmospheric Science
Environmental and Resource Sciences
Environmental Horticulture and Urban Forestry
Environmental Policy Analysis and Planning
Environmental Biology and Management
Environmental Toxicology
Landscape Architecture
Soil and Water Science
Wildlife, Fish and Conservation Biology (See Animal Biology area)

Plant Science majors provide students with a strong background in plant biology in the context of 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. A wide range of options within the major allows students to focus on such areas as agricultural communications and education and sustainable agriculture. The plant biology major provides a basic background in all areas of plant biology, including plant development and protection, biotechnology and post-harvest physiology.

Agricultural Systems and Environment
Plant Biology (with the Division of Biological Sciences)

Plant Science

Animal Biology major programs 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.

Animal Science
Animal Science and Management
Avian Sciences
Entomology
Wildlife, Fish and Conservation Biology (see Environmental and Resource Sciences and Policy area)

Human Health and Development programs offer a wide assortment of curricula focusing on basic human needs (i.e., food, diet, clothing and shelter) and human development. Together, these programs link the processing of food and fiber with consumer health and well-being. Emphasis is on the continuum between food/fiber production and consumer use—a continuum that includes a strong attention to product quality as well as to human needs and preferences. These majors also address the physiological, psychological, social and aesthetic dimensions of human health, comfort, safety and the quality of life.

Agricultural and Managerial Economics
Community Nutrition
Design
Dietetics
Fermentation Science
Fiber and Polymer Science
Food Biochemistry
Food Science
Human Development
Nutrition Science
Textiles and Clothing

Collegewide Programs include those that 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 socioeconomic issues. Collegewide programs also include lower division curricula aimed at providing students with a foundational knowledge base and the potential for developing individualized programs.

Exploratory†
Individual Major
International Agricultural Development
Science and Society†
† These programs provide primarily lower division preparation and exploration; that is, they are not degree programs.

Associate Dean of Undergraduate Academic Programs
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.

Exploratory Program (non-degree program)
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 specialization options, develop your decision-making abilities and ultimately select the major best suited to your needs. A major must be declared before you complete 120 units (see Declaration of Major). For registration purposes, indicate “Exploratory” on your admissions materials.

College of Engineering

Undergraduate Office Advisers (1050 Engineering II). 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. You will be assigned a faculty adviser your first term on campus by your departmental office. 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.

You are encouraged to meet individually with your faculty adviser at least once each quarter. Freshmen are strongly urged to do so each quarter of the first year of enrollment, and new advanced-standing transfers should meet with a faculty adviser for the first quarter.

To facilitate dialogue with your adviser on your program of study, use the Advising Worksheets. Copies are available in the Undergraduate Office. You should complete your Lower Division Worksheet early in your freshman year, have your adviser sign it, and then review it regularly with your adviser. Similarly, you should complete your Upper Division Worksheet early in your junior year, have it signed by your adviser, and then review it regularly with your adviser.

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 described in the Other Academic Advising section of this chapter.

College of Letters and Science

Office of the Dean/
Letters and Science Advising Office
200 Social Sciences and Humanities Building
916-752-0392

The associate deans and staff in the Letters and Science 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

• 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

Advising

Faculty Advisers. New students are assigned to a faculty adviser when the university receives their Statement of Intent to Register. 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 cam-
pus 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 (below). They are urged, however, to maintain regular contact with an adviser in their 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 in the Letters and Science Outreach Advising Offices located in each of the university residence hall complexes. Students living off campus are asked to contact the Letters and Science 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 expeditiously 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 Letters and Science 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.

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**Division of Biological Sciences**

**The Division of Biological Sciences Office**

66 Briggs Hall
916-752-0410

The associate dean and staff in the Division of Biological Sciences 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, evolution and ecology, genetics, microbiology, physiology 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 Office for academic advising services.

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**OTHER ACADEMIC ADVISING**

**Academic Peer Advising**

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. For more information contact the main APA office in 227 Voorhies Hall, 916-752-3000.

**The First Resort**

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 tutor listing and referral service, a listing of courses of 1 to 3 units and other valuable resources. Pre-graduate 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, open from 10:00 a.m. to 4:00 p.m. throughout the academic year. (Temporary Building 98, across from the Chemistry building; 916-752-2807 for information or 916-752-3323, the advising hotline.)

**Orientation and Summer Advising Office**

The Orientation and Summer Advising Office coordinates the Summer Advising and Registration Program,
A 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 coordinator's office is located in 227 Voorhis Hall, 916-752-3000.

**Advising Services**

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. Advisers are available through the main Advising Services office, 227 Voorhis Hall, 916-752-3000.

The Pre-Law Advising Office is where students interested in the legal profession can come for information. The staff can advise you about admission requirements and program planning. The office maintains a reference library of law school bulletins, legal assistant information, admission test materials and general career information. Students can get more information on preparation for law school and a legal career through the many seminars and workshops held each year. You may contact one of the pre-law advisers in 227 Voorhis Hall, 916-752-3000.

The Health Sciences Advising Office, 227 Voorhis Hall (916-752-2672), will be an important place for you if you are preparing for a profession in the health science area. The professional staff and student advisers can provide information on requirements, application procedures, professional school curricula and related options. The office maintains an extensive library of school catalogs, statistics and books and journals related to health education.

**Educational Opportunity Program/Student Affirmative Action (EOP/SAA)**

Information:
394 Voorhis Hall
916-752-9472

The Educational Opportunity Program/Student Affirmative Action Information Office serves EOP/SAA students by assisting them with their academic, social and personal adjustments to the university environment; coordinates EOP/SAA 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/SAA 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/SAA Information Office on the third floor of Voorhis Hall or any one of the outreach locations to find out more about the peer counseling services.

**ACADEMIC HELP**

**Learning Skills Center (LSC)**

Information:
178 Voorhis 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

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.

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.

The Learning Skills Center is open Monday through Friday, 8:00 a.m. to 5:00 p.m. Come in and ask about our services, which are free to all UC Davis students.

**EOP/SAA Tutoring**

Information:
Learning Skills Center
178 Voorhis Hall
916-752-2013

EOP/SAA tutoring is a free service for EOP and affirmative action students. If you are having difficulty with your coursework, the Learning Skills Center offers tutoring in most course areas. Tutoring is provided in groups and on a drop-in basis. For students in academic difficulty, pre-arranged 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.

**Special Transitional Enrichment Program (STEP)**

Information:
Learning Skills Center
178 Voorhis Hall
916-752-2013

New EOP/SAA students (freshmen) admitted by special
action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected regularly admitted EOP/SAA students are encouraged to do so. The program begins in summer and continues through the first academic year, providing preparatory coursework 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
Sue Franck
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, a reference library, language tapes, study skills sheets, an exam file and a quiet place to study.

**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 department for information on your college's procedures. If you cannot get satisfaction through normal channels, contact the ASUCD Grievance 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 (752-0650) and/or the Graduate Student Association (752-6108).

**ASUCD Grievance Center**

Information:
ASUCD Academic Affairs Office
378 Memorial Union
916-752-6101

The ASUCD Grievance Center advocates students' academic concerns to the faculty and administration. Grievance counselors deal with students one-on-one, directing them to appropriate channels through which to state their grievances (i.e., student-faculty relations, sexual harassment, grade change problems, prejudicial treatment in the classroom and problems with academic procedure and policy). 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
916-752-3620

If students have 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
4th Floor, Memorial Union
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.

**STUDENT SERVICES**

**Counseling Center**

Information:
378 Voelches Hall
916-752-3871

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 center's staff offers assistance for personal and interpersonal issues such as relationships, family, stress, cultural differences, assertiveness, self-esteem and intimacy. Additionally, staff provide assistance for 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
24-hour hotline: 916-752-2790; business line: 916-752-5665
Located in a green, two-story house next to the Housing Office, 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 or telephone basis. 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
Health education programs listed below are administered by Cowell Student Health Center.

Because maintaining good health is vital for the successful pursuit of your educational goals, the Health Education Program provides information and services through five programs. Trained peer counselors, health educators, workshops and resource libraries are available through:

**BikeRight—Bicycle Safety and Injury Prevention Program** (916-752-8812)—Information on topics such as bicycle safety, equipment, laws and injury prevention, and discount coupons for bicycle helmets.

**Campus Alcohol and Drug Abuse Prevention Program (CADAPP)** (916-752-6334)—Individual assessments, six-week small group education courses and workshops on alcohol/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 SESAP (Student Educators in Substance Abuse Prevention).

**Student Educators in Substance Abuse Prevention** (916-752-DRUG or 752-3784)—Information, peer counseling and resource referrals for students dealing with substance abuse issues of their own, or of their friends or family members. Programs and materials on responsible hospitality and non-alcohol party planning options.

**Health Advocates** (916-752-9651)—Information on personal nutrition, exercise, stress management, wellness issues and many other topics is available. Students may also receive free individual computerized dietary analysis and peer nutrition counseling.

**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, sex roles and other issues related to sexuality.

International Student Services (S.I.S.S.)
Information:
Services for International Students and Scholars
916-752-0864
The S.I.S.S. office assists international students throughout their programs of study at UC Davis, providing orientation and personal and cultural advising. S.I.S.S. also provides information and assistance regarding immigration regulations and helps students maintain their legal status while at UC Davis.

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

Students must report to Services for International Students and Scholars as soon after their arrival as possible. S.I.S.S. can help new international students with their immediate needs, and familiarize them with the Davis campus and community. S.I.S.S. will introduce students to the Davis international community and help them locate other individuals from their home countries.

Lesbian, Gay and Bisexual Resource Center
Information:
University House
916-752-2452
The Lesbian, Gay and Bisexual (LGB) Resource Center offers a safe, supportive environment for people to learn more about lesbian, gay and bisexual concerns and to meet other members of the Davis community. The center has a wealth of information and resources about lesbian, gay and bisexual 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 The Advocate, Mom Guess What and San Francisco Sentinel.
- 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 for women, offered quarterly, and tear gas certification classes
• Short-term counseling, referrals and support groups for victims of rape, sexual assault, or incest survivors
• Training for peer counselors and professionals
• A circulating library of books, videos and articles on sexual assault and related issues
• Quarterly newsletter, Freeing Our Lives

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.

Women's Resources and Research Center (WRRC)

Information:
10 Lower Freeborn
916-752-3372; FAX: 752-0222

The Women's Resources and Research Center brings attention to and challenges the barriers that inhibit the inclusion, equal power and advancement of women. The center promotes an understanding of the evolving roles of women and men, helps women develop their full potential, and highlights and celebrates women's achievements.

Programs
• Popular and scholarly lectures, workshops, forums, films and other events of special interest to women
• Support and discussion groups for campus women
• Advice and assistance to individuals, departments and organizations planning activities on women or gender

Library
• A large, specialized collection of books, periodicals and other materials focusing on women and gender, staffed by a full-time librarian

Information
• Women's Writes, a monthly calendar of events
• Resources—extensive listings of campus and community services such as health care, counseling, child care, women's organizations and legal assistance

Services
• Consultation with campus departments, organizations and individuals to expand awareness of gender differences, sexism and women's concerns
• Child emergency notification service for student parents

Academic Activities
• 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 752-6TDD

The Disability Resource Center (DRC) serves students who find their disability is a barrier to achieving academic or personal goals. DRC provides information about campus and community resources, and provides specialized support not available elsewhere.

DRC was founded with a strong commitment to improving individual choices, personal control of essential resources and integrated participation in campus life. All university students are assumed to have similar needs, but the consequences of a disability may include some specialized requirements. We work closely with each student to identify his or her particular needs.

Academic and mobility resources for registered students with verified permanent or temporary disability-based needs include the following:
• Alternative educational materials, including large-print and taped textbooks
• Disability management counseling
• Emergency wheelchair repair
• Facilitation of access to all campus programs
• Registration assistance and priority registration
• Maintenance of a list of personal care attendants
• Peer support groups
• 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. Preadmission counseling is also available for persons with disabilities.

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 the 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.

**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 Veterans Administration, 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, Voorhies 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, Voorhies Hall
916-752-2855

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 Howe Career Resources Library 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 Placement 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.

**Education and Graduate Placement Services**

Information:
The Internship and Career Center
2nd floor, Voorhies 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 the following:

- Teaching job vacancy listings
- Placement files (professional dossiers)
- Special workshops on writing teaching resumes and curriculum vitae, and on preparing for interviews
- 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
348 Voorhies 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.
REGISTRATION

Information:
Office of the Registrar
124 Ms. Hall
(916) 752-2973

Registration is the way in which you become a student at
the university. The registration process includes enrolling in
classes via RSVP, the telephone registration system
(752-7787); paying fees and other financial obligations;
and completing and filing information forms. Every
UCDavis student must register each quarter.

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 previ-
ously at Davis as undergraduates are considered to be
new students.

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. Per-
misson to register 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.

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 perm-
manent address up to date. Change of Address forms are
available at the Office of the Registrar.

REGISTRATION FOR COURSES

The Class Schedule and Room Directory, available several
weeks before the start of each quarter, gives class meet-
ing times and room numbers, changes to the General Cat-
alog and the most up-to-date information on registration
procedures, including RSVP (telephone registration).

Class Level

Undergraduate classification is determined by the num-
ber of quarter units you have completed:

<table>
<thead>
<tr>
<th>Class</th>
<th>Unit Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0.0 — 44.9</td>
</tr>
<tr>
<td>Sophomore</td>
<td>45.0 — 89.9</td>
</tr>
<tr>
<td>Junior</td>
<td>90.0 — 134.9</td>
</tr>
<tr>
<td>Senior</td>
<td>135.0 —</td>
</tr>
</tbody>
</table>

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 stu-
dents who have met the necessary prerequisites as indi-
cated in the catalog course description. Preparation
should generally include completion of one lower divi-
sion course in the given subject or completion of two
years of college work.

Variable-Unit Courses

Subject to approval by the department chair, an instruc-
tor may arrange to give a special study course (numbers
90X, 92, 97T, 97TC, 96, 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 stu-
dents to obtain practical experience to complement
their educational goals or to explore potential career
interests and opportunities. Students must have com-
pleted 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—gen-
ernally in their major field—while enrolled as an under-
grade.

• 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 accom-
mmodated within the formal course structure.

• 194H (Special Study for Honors Students) courses
are for individual students with honor status, as deter-
mined 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 sub-
ject proposed for study as well as prior completion of
84 units.

Credit in courses 99, 194H and 199 is limited to a total
of 3 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 crit-
cal 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.

Adding or Dropping Courses

You are officially registered in all courses listed on your individual study list. You will be held responsible for completing each of the courses. To confirm the courses on your official study list, call RSVP. You may adjust your schedule by adding or dropping courses via RSVP until the published deadlines.

After published deadlines, permission to change your study list may only be granted by the dean of your college or school and only in special circumstances. Certain fees may apply. Graduate students must have their adviser's approval in order to drop courses. 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 "E-NWS" (Enrolled-No Work Submitted).

See the Academic Calendar in the front of this catalog for the deadlines each quarter to add or drop courses. The Class Schedule and Room Directory for each quarter explains how to use RSVP to add and drop courses and what add/drop procedures and fees apply after the published deadlines.

Retroactive Drops

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 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 "F" 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 Adds

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

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.

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 will be subject to academic disqualification. 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 death in the immediate family or an accident.

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 non-credit 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 the quarter, and graduate students must be registered in 6 units or fewer by the tenth day of the quarter. 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.

**ACADEMIC 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 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 registering 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.

**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.

THE MAJOR

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 your further registration. In order to declare a major, you must meet with your faculty adviser and/or advising associate, fill out a Declaration 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. You'll find a complete list of the majors offered at UC Davis in a chart at the front of this catalog.

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 consult 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 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 you complete your degree work.

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.

Change of Major Accompanied by Change of College

Petitions for a change of major involving change of college must be filed within the first five weeks of the quarter. 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 may submit petitions for a transfer into the College of Engineering from another UC Davis college only if you (1) are in good academic standing and are making minimum progress; (2) have completed at least 40 units as a registered student on the Davis campus; (3) have successfully completed Mathematics 21A, 21B and 21C and Physics 9A (or their equivalents) on a letter-grade basis; (4) have a minimum GPA of 2.5 in all mathematics and physics coursework in the Mathematics 21 series and Physics 9A and above; and (5) have the minimum UC GPA specified for the year in which you wish to transfer. Additional restrictions may apply to students who want to major in Civil Engineering, a currently impacted major. If you have completed more than 120.0 units, you will not be allowed to change your major, except by appeal. Your appeal must include a quarter-by-quarter program plan of study before a review of your appeal will be considered.

You must declare a specific major at the time you petition to transfer and must have the minimum GPA specified for transfer into that major in that year. Consult the Engineering Undergraduate Office for details on minimum GPAs for transfer to specific majors.

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 approved double majors. Enrollment in combinations of engineering majors other than the approved 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.

**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 towards 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.

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.

It should be possible to complete all degree requirements within the 225-unit limit.

Combination proposals that cannot be approved are two or more majors

1. in the following group: biochemistry, biological sciences, evolution and ecology, genetics, microbiology, physiology and plant biology;

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, evolution and ecology, genetics, microbiology, physiology 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 at least four quarters before you plan to graduate. If you wish to undertake an individual major, request the appropriate forms from your dean's office. Program requirements are outlined 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. 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. 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, develop minors in either the College of Letters and Science or the College of Agricultural and Environmental Sciences. 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.

If you are enrolled in the College of Engineering but 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.

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.

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 be 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 learning disabilities may have additional time for examinations (or alternate examination formats). An adjustment request must be submitted in writing to the instructor of the course involved by the tenth day of the quarter, and must include proof of the
existence of a learning disability. The instructor determines, in consultation with the student and the campus learning disability specialist, whether an adjustment is necessary and specifies the terms of the adjustment.

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. It is the responsibility of the student to provide, in writing and at the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the test or examination and to request 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 registered 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
E-NWS enrolled—no work submitted

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

Grade Points

Grade points are assigned each letter grade as follows:

4.0=A+
3.7=A-
3.3=B+
3.0=B
2.7=B-
2.3=C+
2.0=C
1.7=C-
1.3=D+
1.0=D
0.0=F
0.0=IP
0.0=I
0.0=NP
0.0=S
0.0=U

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 introduced 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 Passed/Not Passed.

College of Engineering: While registered in the College of Engineering, you may take a maximum of one course per quarter for which you choose the Passed/Not Passed grading option; you must be registered in at least 12 units. Courses that are graded P/NP only may be taken simultaneously with the courses for which you exercise the Passed/Not Passed option.

In the engineering curricula, only courses taken to satisfy the (a) unresricted electives requirements, or (b) Humanities-Social Sciences electives (not General
Education), or (c) English and rhetoric requirements may be taken on a Passed/Not Passed basis. In addition, certain other courses may be taken on a Passed/Not Passed basis. Consult the Undergraduate Office for information about which other courses may be taken on this basis. All other courses must be taken for a letter grade. Humanities–Social Science courses that you plan to offer in fulfillment of the campus General Education requirement must be taken for a letter grade.

Please note that students in the Electrical Engineering, Computer Engineering, or Electrical/Materials Science and Engineering majors, or in any double major that includes one or more of these majors may not exercise the Passed/Not Passed option.

You must meet the following conditions to exercise the Passed/Not Passed option:

- be in good academic standing (not on probation or subject to dismissal)
- carry at least 12 units, including the course to be taken P/NP, in that quarter
- have a P/NP petition approved by the Associate Dean for Undergraduate Studies or a designated representative

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 option (see the College of Letters and Science entry in the "Bachelor's Degree Requirements" chapter). Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before petitioning for Passed/Not Passed 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 are available from the Graduate Studies Office and must be signed by your graduate adviser. (See also Individual Study courses.) 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 Not Satisfactory grades. Such courses count toward the maximum number of units graded S allowable toward the degree.

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 illness, personal problems, an accident, a 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 coursework 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 (excluuding 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-register 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 to jeopardize graduation.

Changes of Grade

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.

Repeating Courses

Undergraduates 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 basis. (Courses in which a grade of NP was received may be repeated on a P/NP 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.

**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. Students can call RSVP to hear their grades at the times and dates announced by the Office of the Registrar. If you wish to have your grades mailed to you, bring in 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. 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.

Application for a transcript of record should be made at least two weeks in advance of the time needed.

**HONORS AND PRIZES**

**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 on bulletin boards outside deans’ offices, and a notation of these honors will be placed on each student’s permanent record by the Office of the Registrar.

**Scholarships**

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. Information about scholarships is available from the Scholarship Office, 207 Third Street, Suite B, 916-752-3153 (or by mail at Scholarship Office, University of California, Davis, CA 95616-8696).

**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.)

<table>
<thead>
<tr>
<th>Total Quarter Units Completed at UC</th>
<th>Highest Honors Grade Point Average</th>
<th>Honors Grade Point Average</th>
<th>Total Grade Point Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-49</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>50-59</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>60-69</td>
<td>4%</td>
<td>4%</td>
<td>8%</td>
</tr>
</tbody>
</table>

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 1994. These averages will be used through winter 1995.

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 for all courses as described in the above table. Students who complete the College Honors Program and who meet the grade point requirement for graduation with honors 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. Graduating students will not be awarded honors with the bachelor’s degree if more than eight units of grade 1 (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 is designed to permit students to pursue a program of study in their major at a level significantly beyond that defined by the normal curriculum. It represents an oppor-
tunity 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 coursework for the project.

**Prizes**

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 College of Engineering 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.

**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)
- Dobro Slovo (Russian)
- Golden Key (All colleges and schools)
- Kappa Omicron Nu (Applied Behavioral Sciences)
- Omicron Delta Epsilon (Economics)
- Order of Omicron (Fraternities—Sororities)
- Order of the Delta (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 Alpha Xi (Environmental Horticulture)
- Pi Delta Phi (French and Italian)
- 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)

**WITHDRAWALS AND LEAVES OF ABSENCE**

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 in
Academic Information

the Fee Refund section of this catalog. The following signatures are required on withdrawal petitions: director of the Student Health Center; adviser, lab or course instructor; Student Aid Accounting Office; Cashier’s Office; and the dean of your college, division, or school.

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.

Planned Educational Leave Program (PELP)

The Planned Educational Leave Program allows students to suspend academic work, leave the campus and later resume studies 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. 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, a 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. (See Fee Refunds.)

Students enrolled in the program are expected to devote their leave period to non-classroom activities. Students on Planned Educational Leave are not eligible to register in concurrent courses on the Davis campus and may not earn academic credit at Davis during the period of the leave.

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.

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.

A student will be placed on probation for failure to meet qualitative or quantitative standards of scholarship. The quantitative 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.
- 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 (GPA) is less than 1.5 for the quarter.
- the student has attempted more than 16 units graded 1 (Incomplete).
- 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 quantitative 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. 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. 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 death in the immediate family, or an accident.

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. The notation “mini-
mum 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. It is assumed that a student will earn the 180-unit minimum degree requirement before completing 15 quarters of enrollment. Normal progress would achieve 180 units in 12 quarters.

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 during Summer Sessions at UC Davis or at another accredited school and transferred to UC Davis will be counted as units passed (applied to 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. See your faculty adviser or go to the dean's office of your college if you need academic advising about probation and dismissal.

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.

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.

SUMMER SESSIONS

44 Mrak Hall
Davis, California, CA 95616-8715
(916) 752-1641 or 1-800-VIP-2738;
e-mail: summer-sessions@ucdavis.edu
WWW: http://pubweb.ucdavis.edu/Documents/summer-sessions/UCDsummer.html

Every summer, several thousand students (approximately 6,400 in 1994) turn to the Office of Summer Ses-

ions at UC Davis for an opportunity to complete their undergraduate degrees, earn units, expand their knowledge, do research, take special study courses, meet prerequisites, or take courses that are often over-enrolled during the academic year.

Summer Sessions offers a wide range of lower and upper division courses (250 in 1994) that provide full university credit transferable to most campuses. Since admission is open to virtually all mature adults, Summer Sessions has traditionally attracted students from a wide range of universities and colleges, high school graduates and juniors, 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 1996, the Office of Summer Sessions will offer a wide array of courses. Two six-week sessions will run from June 24 to August 2 and from August 5 to September 13. All UC Davis undergraduates will automatically receive our 1996 Summer Sessions Catalog and application materials by the end of April; non-UC Davis undergraduates should contact us at the address above, at 916-752-1641, or at summer-sessions@ucdavis.edu.

A variety of international and special programs will be offered in 1996, including an intensive Spanish language program, the Summer Humanities Institute: An Honors Program for High School Juniors, the Summer Institute of Fine Arts, the Summer Institute for the Literature of Northern California, Literature of the Wilderness in McCall, Idaho, and other special topic programs of different lengths. In 1995, UC-registered students had the opportunity to study in Chile, England, France, Italy and Japan. For more information on international programs, call 916-752-0435; for the Summer Humanities Institute, call 916-752-7649; for all other programs and courses, please contact the Office of Summer Sessions at 916-752-1641 or at summer-sessions@ucdavis.edu.
BACHELOR'S DEGREE

REQUIREMENTS
You must satisfy four groups of requirements before you can become eligible for candidacy for the bachelor's degree. The four groups are as follows:

1. University requirements, which apply to all colleges;
2. General Education requirement, which applies to all colleges;
3. College requirements; and
4. 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 degree requirements are fulfilled.

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**UNIVERSITY REQUIREMENTS**

**Subject A: English Requirement**

The university requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfactory completion 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 600 or higher on the College Board Achievement Test in English Composition.
- By achieving a grade of 5, 4, or 3 in 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 of registration, 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 coursework before meeting that requirement.

**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 the following ways:

- By offering one high school unit in American history, or \( \frac{1}{2} \) high school unit in American history and \( \frac{1}{2} \) 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
  - Native American Studies 1, 10, 35, 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 that apply 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 the Davis campus.

- 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). 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. 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 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.

**Filing for 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.

**College of Agricultural and Environmental Sciences.** A Major Certification form must be received and evaluated by the dean's office before your candidacy for a degree can be finalized. A Major Certification is completed during the quarter a student plans to graduate. At that time, the adviser and student 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.

**GENERAL EDUCATION REQUIREMENT**

The General Education Program promotes the intellectual growth of all undergraduates. The program's objectives are to offer a choice of courses in all major fields of learning; to stimulate intellectual growth through the study of important methods as well as significant material in a particular discipline; to involve students in the learning process by requiring considerable writing and participation in class activities; and to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.

In designing the UC Davis General Education Program, the faculty specified that General Education (GE) courses should help students acquire skills that will serve them well
beyond their undergraduate years. GE courses are designed
to encourage development of analytical reasoning and clear
communication skills through active participation in the
classroom. GE courses stress understanding of intellectual
concepts and methods, connect their subject with other
fields of knowledge, and discuss the social, ethical and aes-
thetic issues raised by their inquiry. To break away from tra-
ditional ways of categorizing the broad fields of inquiry and
to encourage interdisciplinary connections, GE courses
are grouped into three broad areas of knowledge:

1. Civilization and Culture. Courses in this area pre-
sent dominant intellectual traditions, achievements
and socio-political institutions, and increase aware-
ness of cultural diversity within the Western tra-
dition and in other civilizations.

2. Contemporary Societies. Courses in this area create
an awareness of critical economic, political and social
problems of the contemporary world.

3. Nature and Environment. Courses in this area pro-
vide students with knowledge of major scientific ideas
and discoveries and some perception of the methods,
scope, power, limitations and appeal of science.

General Education courses may be either lower division
or upper division. Courses numbered 0–99 are lower
division and courses numbered 100–199 are upper di-
vision. You should consult the course descriptions con-
tained in the Programs and Courses section of this
catalog for the courses designated as prerequisite for
upper division courses.

**Determining Your General Education Requirement**

You must complete three courses in each of the two Gen-
eral 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.

Each academic major, minor and degree program has
been assigned to one of the three areas of General Edu-
cation. Each GE course has also been assigned to one of
the three areas. You must complete courses in those areas
of General Education other than the one that contains
your major field.

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 require-
ment in any one of the three areas. 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.

If you have an approved individual major, it should
have been assigned to one of the three General Education
areas at the time it was 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. The specific General Education requirements for
students entering UC Davis from the 1984-85 academic
year and thereafter are detailed in the General Educa-
tion Requirements table on the following page.

**Transfer Credit.** If you have transferred from a com-
unity 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
Bachelor's Degree Requirements

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 by Undergraduate Admissions and Outreach Services to determine your transfer credits.

You are exempt from the UC Davis General Education Requirement if

- you come from a California community college and have completed the “Intersegmental General Education Transfer Curriculum,”

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.

### GENERAL EDUCATION REQUIREMENTS

( GE courses must be completed in the areas of General Education other than the area containing the major.)

<table>
<thead>
<tr>
<th>Academic Year of Entrance to UCD</th>
<th>Freshman or transfer student with 40 or fewer transfer units¹</th>
<th>Transfer student with more than 40 but fewer than 84 units²</th>
<th>Transfer student with 84 or more units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-85</td>
<td>2 GE courses:</td>
<td>No GE requirement</td>
<td>No GE requirement</td>
</tr>
<tr>
<td></td>
<td>• may be in same or different areas;</td>
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</tr>
<tr>
<td></td>
<td>• may be introductory or non-introductory</td>
<td></td>
<td></td>
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<tr>
<td>1985-86</td>
<td>4 GE courses:</td>
<td>2 GE courses:</td>
<td>No GE requirement</td>
</tr>
<tr>
<td></td>
<td>• maximum of 3 in one area;</td>
<td>• may be in the same or different areas;</td>
<td></td>
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<tr>
<td></td>
<td>• maximum of 2 introductory</td>
<td>• may be introductory or non-introductory</td>
<td></td>
</tr>
<tr>
<td>1986-87</td>
<td>6 GE courses:</td>
<td>4 GE courses:</td>
<td>2 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• 3 courses in each of two areas;</td>
<td>• only 1 course in each area may be</td>
<td>• may be in the same or different areas;</td>
</tr>
<tr>
<td></td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
<td>• introductory</td>
<td>• may be introductory or non-introductory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Option 1: 2 courses in each of two areas:</td>
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<tr>
<td></td>
<td></td>
<td>• at least 1 course must be upper division;</td>
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<td></td>
<td></td>
<td>• at least 1 course must come from the list of certified GE courses;</td>
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<tr>
<td></td>
<td></td>
<td>• the second course in each area may come from a list of courses approved for GE credit by your college.</td>
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<tr>
<td></td>
<td></td>
<td>Option 2: 3 courses in one area:</td>
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<tr>
<td></td>
<td></td>
<td>• at least 1 course must be upper division;</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• 2 courses must come from the list of certified GE courses;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the remaining course may come from a list of courses approved for GE credit by your college;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>and</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1 upper division course in the other area, which must come from the list of certified GE courses.</td>
<td></td>
</tr>
<tr>
<td>1987-88 to 1991-92</td>
<td>Same as for 1986-87</td>
<td>Same as for 1986-87</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Option 1: 1 course in each of two areas:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• both courses must be non-introductory</td>
</tr>
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<td></td>
<td></td>
<td>Option 2: 3 courses in one area:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• must have 1 introductory and 2 non-introductory courses</td>
</tr>
<tr>
<td>1992-93, and thereafter</td>
<td>6 GE courses:</td>
<td>4 GE courses:</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• 3 courses in each of two areas;</td>
<td>• at least 1 course in each area must be upper division;</td>
<td>Option 1: 1 upper division course in each of two areas:</td>
</tr>
<tr>
<td></td>
<td>• at least 1 of the 3 courses in each area must come from the list of certified GE courses;</td>
<td>• at least 1 course in each area must come from the list of certified GE courses;</td>
<td>both courses must come from the list of certified GE courses.</td>
</tr>
<tr>
<td></td>
<td>• the third course in each area may come from a list of courses approved for GE credit by your college.</td>
<td>• the second course in each area may come from a list of courses approved for GE credit by your college.</td>
<td>Option 2: 3 courses in one area:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• at least 1 course must be upper division;</td>
<td>• at least 1 course must be upper division;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2 courses must come from the list of certified GE courses;</td>
<td>• 2 courses must come from the list of certified GE courses;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the remaining course may come from a list of courses approved for GE credit by your college;</td>
<td>• the remaining course may come from a list of courses approved for GE credit by your college;</td>
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<tr>
<td></td>
<td></td>
<td><strong>and</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1 upper division course in the other area, which must come from the list of certified GE courses.</td>
<td></td>
</tr>
</tbody>
</table>

¹ For the academic years 1984-85 through 1986-87, this category of GE requirements applied to freshmen or transfer students with fewer than 41 units the unit cut-off was changed fall 1987.

² For the academic years 1984-85 through 1986-87, this category of GE requirements applied to transfer students with 41 or more but fewer than 84 units; the unit cut-off was changed fall 1987.
Fulfilling Your General Education Requirement

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 coursework. 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.

If you completed a GE course before Fall 1986 on a Passed/Not Passed basis or before having completed Subject A, you will receive GE credit for that course.

**Approved General Education Clusters**

General Education “clusters” are groups of closely related introductory GE 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.

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.

**Selecting General Education Courses**

Since GE courses must be chosen from the two areas of General Education other than the one containing your major field, you must begin by identifying the area of General Education to which your major has been assigned. The following list provides this information.

**Civilization and Culture (CC)**

<table>
<thead>
<tr>
<th>American Studies</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History</td>
<td>Italian</td>
</tr>
<tr>
<td>Art Studio</td>
<td>Landscape Architecture</td>
</tr>
<tr>
<td>Chicana/Chicano Studies (Humanities emphasis)</td>
<td>Latin</td>
</tr>
<tr>
<td>Classical Civilization</td>
<td>Linguistics</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td>Medieval Studies</td>
</tr>
<tr>
<td>Design</td>
<td>Music</td>
</tr>
<tr>
<td>Dramatic Art</td>
<td>Philosophy</td>
</tr>
<tr>
<td>East Asian Studies</td>
<td>Religious Studies</td>
</tr>
<tr>
<td>English</td>
<td>Rhetoric and Communication</td>
</tr>
<tr>
<td>French</td>
<td>Russian</td>
</tr>
<tr>
<td>German</td>
<td>Spanish</td>
</tr>
<tr>
<td>Greek</td>
<td></td>
</tr>
</tbody>
</table>

**Contemporary Societies (CS)**

<table>
<thead>
<tr>
<th>African American and African Studies</th>
<th>Agricultural and Managerial Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology (A.B. degree)</td>
<td>Applied Behavioral Sciences</td>
</tr>
<tr>
<td>Asian American Studies (non-degree program)</td>
<td>Economics</td>
</tr>
<tr>
<td>Chicana/Chicano Studies (Sociology emphasis)</td>
<td>Environmental Policy Analysis and Planning</td>
</tr>
<tr>
<td>Geography (A.B. degree—emphasis I, II, III, V)</td>
<td>Human Development</td>
</tr>
<tr>
<td>International Agricultural Development</td>
<td>International Relations</td>
</tr>
<tr>
<td>Native American Studies</td>
<td>Political Science</td>
</tr>
<tr>
<td>Political Science—Public Service</td>
<td>Sociology</td>
</tr>
<tr>
<td>Sociology—Organizational Studies</td>
<td>Textiles and Clothing</td>
</tr>
<tr>
<td>Women’s Studies</td>
<td></td>
</tr>
</tbody>
</table>

**Nature and Environment (NE)**

| Agricultural Systems and Environment |
| Animal Science |
| Animal Science and Management |
| Anthropology (B.S. degree) |
| Applied Science |
| Atmospheric Science |
| Avian Sciences |
| Biochemistry |
| Biological Sciences |
| Chemistry |
| Community Nutrition |
| Computer Science |
| 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 |
| Geography (B.S. degree; A.B. degree—emphasis IV) |
| Geology |
| Mathematics |
| Microbiology |
| Nutrition Science |
| Physics |
| Physiology |
| Plant Biology |
| Plant Science |
| Psychology |
| Soil and Water Science |
| Statistics |
| Wildlife, Fish and Conservation Biology |

**Approved General Education Courses**

A list of the courses and course sequences that have been approved for offering under the General Education Program appears on the following page. This listing is subject to change. You should check the Class Schedule and Room Directory each quarter for the most current information.
**GENERAL EDUCATION COURSES FOR 1995-96**

Note: This list contains approved GE courses for the current academic year only. 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

#### Lower Division
- American Studies 1B, 1E
- Art History 1A/1G, 1B/1G, 1C/1G, 1D/1G, 25/25G
- Chinese 11
- Classics 4A, 15, 17A, 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, 52A, 52B, 52C
- History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 30, 72A, 72B
- History and Philosophy of Science 20
- Human Development 13
- Integrated Studies 2B, 2D, 3B, 3C, 8B
- Italian 50
- Landscape Architecture 40
- Linguistics 1, 50
- Medieval Studies 20A, 20B, 20C
- Music 3A-3B, 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

#### Upper Division
- Art History 178C
- Chinese 110
- Classics 140, 141, 143, 150
- Dramatic Art 156, 157
- Education 120
- English 118, 156, 162, 171A, 171B, 182, 184
- French 112, 113, 114
- History and Philosophy of Science 130A, 130B, 131
- Humanities 110A
- Italian 140, 141, 142
- Landscape Architecture 140
- Medieval Studies 120A, 120D, 120E
- Music 105, 110A, 110B, 110C, 110D, 110E, 129
- Native American Studies 130A, 130B, 156, 181A, 181B, 181C

#### Philosophy
- Philosophy 101, 102, 104, 105, 107, 108, 151
- Religious Studies 141A, 141B, 141C, 142
- Rhetoric and Communication 110
- Russian 129, 130, 131, 143, 151, 166
- Spanish 149
- Veterinary Medicine 170

### Contemporary Societies

#### Lower Division
- Agricultural Economics 15
- American Studies 1A
- Anthropology 2, 4
- Applied Behavioral Sciences 2
- Chicano Studies 40
- Economics 1A-1B
- Environmental and Resource Sciences 10-10G
- Environmental Studies 10
- Geography 2-2G, 5-5G
- History 10, 72B
- Human Development 15
- Integrated Studies 3A, 3D, 3E, 3C, 3F
- 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 30

#### 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
- Applied Behavioral Sciences 151, 153, 154
- Chicano Studies 132
- Consumer Science 100
- Education 110, 122, 132
- Engineering 160
- Engineering: Applied Science 137
- Engineering: Civil and Environmental 160
- Environmental Studies 101, 133, 161, 166
- Geography 124, 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

#### Lower Division
- Agricultural Systems and Environment 1
- Animal Science 1, 2, 42
- Anthropology 1, 15, 23
- Astronomy 10
- Avian Sciences 11, 13
- Biological Sciences 10
- Chemistry 2A-2B, 10
- Engineering: Civil and Environmental 30
- Engineering: Computer Science 15
- Entomology 17
- Environmental and Resource Sciences 2, 3-3G
- Environmental Studies 30-30G
- Food Science and Technology 2
- Geology 1-1G, 3-3G, 43
- Human Development 19
- Hydrologic Science 21
- Integrated Studies 1A, 1B, 8A
- Microbiology 20
- Molecular and Cellular Biology 10
- Nutrition 10-113, 20
- Philosophy 31
- Physics 10
- Plant Biology 10
- Plant Science 10
- Pomology 10
- Science and Society 20
- Soil Science 10
- Statistics 10
- Viticulture and Enology 3

#### Upper Division
- Agricultural Systems and Environment 121
- Anthropology 152, 153
- Atmospheric Science 100
- 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
- Evolution and Ecology 121, 138
- Fiber and Polymer Science 110
- History and Philosophy of Science 130A, 130B, 131
- Hydrologic Science 100
- Landscape Architecture 155
- Philosophy 108
- Physics 137, 160
- Plant Pathology 140
- Plant Science 104

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1These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.

2This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.

3Nutrition 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).

4GE courses in Integrated Studies are open only to students in the Integrated Studies program.
COLLEGE REQUIREMENTS

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 92, 99, 190C, 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 taken before the completion of 84 units)
- 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.

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 Committee.

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.

English Composition Requirement

The English Composition requirement can be met in one of two ways:

1. 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);

OR

2. 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 have been approved for satisfaction of this requirement:

(a) one course must be selected from English 1, 20, 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, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills).

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.

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 your 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.

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 regulation (see the Academic Information section).

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.
**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 transferred to the College with 84 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.

If you are admitted with 84 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.

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong> (calculus, differential equations, linear algebra, vector analysis)</td>
<td>22</td>
</tr>
<tr>
<td><strong>Physical and biological sciences</strong> (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)</td>
<td>22-26</td>
</tr>
<tr>
<td><strong>Engineering</strong> (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 of engineering in their lower division programs)</td>
<td>15-26</td>
</tr>
<tr>
<td><strong>Written and oral expression</strong> English 1 or 3 and Rhetoric and Communication 1 or 3, or courses that are their equivalents</td>
<td>8</td>
</tr>
<tr>
<td><strong>Humanities—Social Sciences</strong> (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study)</td>
<td>5-12</td>
</tr>
<tr>
<td><strong>Unspecified subjects</strong> (Chemical Engineering majors should cover quantitative analysis and one course in organic chemistry with laboratory during their sophomore year)</td>
<td>7-8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>84</td>
</tr>
</tbody>
</table>

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.

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.

**Credit in University Extension Courses.** Appropriate courses taken through University Extension may be used 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 coursework.

**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.)
upon completion of 84 quarter units, you may satisfy this requirement by

1. completing an English 102 adjunct to an approved upper division course in the College of Engineering with a grade of C– or higher; or
2. completing 3 units of English 104E with a grade of P (Passed).

This requirement is in addition to the expository writing course requirement (English 1 or 3, or Comparative Literature 1, 2, 3 or 4) specified in the Lower Division Programs.

During the 1995-96 academic year, the English Composition Examination will be offered on the following three Saturdays: October 28, 1995, January 27, 1996 and April 27, 1996. Sign-up rosters will be posted at a designated location on the first floor of Sproul Hall, Monday through Thursday (or until they are filled) just preceding each Saturday examination date. You must sign up, in person, by Thursday. 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 coursework 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**

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 coursework in the humanities and social sciences. 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 depart-
Bachelor’s Degree Requirements

College of Engineering

Comparative Literature 1 through 53B, 120, 135 through 180

Consumer Science 100

Design 140, 142A, 142B, 143, 144

Dramatic Art 20, 115, 150 through 159

East Asian Studies 113

Economics 1A-1B, 100, 101, 103, 104, 105, 110A through 136B, 151A through 175

Education 110, 117, 120, 122, 123, 130, 132, 145, 153

English 3, 4, 30A, 30B, 46A, 46B, 50A, 50B, 105C, 110A through 189

Environmental Studies 101, 133, 160 through 162, 164 through 167, 175

French 25, 101, 102, 103, 107, 112 through 133, 140, 141, 162

Geography 2, 5, (2G, 5G when taken concurrently with 2 or 5), 6, 10, 50, 104, 120 (but not 120L), 121, 122A through 127, 131, 141 through 162, 168, 170 through 173, 175

German 48, 50, 51, 52A, 52B, 52C, 106, 110 through 133, 140, 141, 142C, 150, 160, 165, 166, 176, 185

Greek 100 through 116

History 3 through 86, 101 through 104A, 110 through 191D, 193 through 196B

History and Philosophy of Science 20, 130A, 130B, 131, 150

Human Development 15, 19, 100A through 103, 110, 130, 131, 132, 151, 160

Integrated Studies 1A, 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E, 8B, 8C (Open only to students accepted to the Integrated Studies Program)

International Agricultural Development 10, 103

Italian 25, 50, 105, 107 through 145

Japanese 10, 15, 25, 50, 101 through 106, 108, 131 through 135

Landscape Architecture 140

Latin 100 through 116, 125

Linguistics 1, 10 through 15, 50, 102, 113, 115, 116, 120, 135, 138

Medieval Studies 20A, 20B, 20C, 120A-F

Military Science 21


Native American Studies 1, 10, 32, 33, 55, 101 through 191

Nature and Culture 1

Nutrition 20, 118

Philosophy 1, 11, 13, 14, 21, 22, 23, 24, 101 through 111, 114A through 127, 137, 143 through 177, 190

Physical Education 36A, 36B

Political Science 1 through 7, 100 through 113, 115 through 191

Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132, 135, 136 through 150, 165, 168, 171, 175, 177, 183

Religious Studies 1 through 75, 100 through 178A-E

Rhetoric and Communication 103 through 145, 152

Russian 41, 42, 44, 121 through 154, 166

Sociology 1, 2, 3, 4, 25, 107 through 185

Spanish 100, 130 through 176

Textiles and Clothing 107, 177

Women’s Studies 20, 50, 70, 80, 103, 104, 187

General Education electives are used to satisfy a campus requirement and are chosen from the list of General Education Courses for 1995-96 given earlier in this chapter. Since all engineering majors are in the Nature and Environment GE area, you must fulfill the campus requirement by taking courses in the Civilization and Culture and Contemporary Societies areas which broadly overlap Humanities and Social Sciences, respectively.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) coursework 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 HSS course list above and the GE course list shown earlier in this chapter. In general, a good academic strategy is to satisfy the campus GE requirement first and then to satisfy any remaining HSS requirements by taking courses from the HSS list. In this way, you can benefit from the breadth and depth of course coverage inherent in the GE program structure. (For example, courses from areas outside of your major field of study are required and you must take coursework at both the lower division and upper division levels.)

In satisfying the GE requirement, note that (a) you must take GE courses for a letter grade and (b) you must fulfill the Subject Area requirement before you begin your GE coursework.

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 up 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 for each substantially different project. Academic credit for engineering internship courses (192s) is 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 engineering, physics, chemistry, mathematics and statistics courses, the following courses may be taken as technical electives:

Agricultural Economics 100A, 100B, 113, 118A, 118B, 155, 157, 171A, 171B, 175, 176

Agricultural Systems and Environment, any upper division course except 100 and 190 through 199

Animal Science 104, 105
Applied Biological Systems Technology 161, 163
Atmospheric Science 121A, 121B, 124, 128, 133, 149, 158
Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, 120, 120P, 121, 121P, 122, 122P
Chemistry 2C, 2CH, 8A, 8B
Economics 140
Environmental Toxicology 101, 131, 135, 155
Fiber and Polymer Science 100, 150, 161, 161L
Geology 17, 50, 50L, 105, 117A, 117B, 134, 150A, 150B, 150C, 152, 153, 154, 162
Hydrologic Science 113, 115, 122, 143, 150, 180
Management 11A, 11B
Microbiology 102, 102L, 105, 130A, 130B, 130L, 177, 177L
Molecular and Cellular Biology 160L, 161, 170L
Neurobiology, Physiology and Behavior, any upper division course
Soil Science 100, 102, 107, 111, 118, 120
Wildlife, Fish and Conservation Biology 100, 102, 110, 110L, 111, 111L, 120, 120L, 121, 122, 130, 131, 136, 140, 151, 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, 43, 113-113G, 116-116G, 131, 135, 144**
**Microbiology 20**
**Physics 137, 160**
**Plant Biology 191**

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 outlines.

**Degree Requirement Statements**

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.
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 Engineering Undergraduate Office.

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 internships 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 land 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, 20, Comparative Literature 1, 2, 3 or 4;
   b. English 102 or 103 (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, 20, 103A-G, or Comparative Literature 1, 2, 3, 4 will be accepted toward satisfaction of the English Composition requirement. Note that English 103 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 102 or 103 at UC Davis.

English Composition Examination. This academic year, the no-fee examination will be offered on the following Saturday mornings:

October 28, 1995
January 27, 1996
April 27, 1996

There are no examinations given during the summer.

Sign-up rosters will be available at a designated location on the first floor of Sproul Hall, Monday through Thursday (or until filled) just before each Saturday examination date.

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 requirements 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 as follows:

**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, 20, 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 2, 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 130  
Food Science and Technology 2, 100A, 100B, 101A, 101B  
Geography 1, 3, 102, 108, 110, 112, 115, 116, 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  
Statistics  
Wildlife, Fish and Conservation Biology 10

**Foreign Language Requirement (A.B. and B.A.S. degrees)**

A.B. and B.A.S. degrees—the 15-unit level or the equivalent in one language.  
B.S. degree—none.

**Acceptable Languages.** 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 admission.

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 the Undergraduate Admissions Office, 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. degree—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S degree—as 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 passing or nonpassing grade will be charged to your P/NP option, no petition is required. [See “Passed/Not Passed (P/NP) Grading” in the Academic Information section.]

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.
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.

Change in Requirements

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.

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.
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 coursework 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.

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**GRADUATE STUDENT DEADLINES**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Deadline for filing applications for admission to graduate standing, with complete credentials, with the Dean of Graduate Studies</td>
<td>April 1</td>
<td>March 1</td>
<td>April 1</td>
<td>April 1</td>
<td></td>
</tr>
<tr>
<td>United States residents</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>International students</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Deadline for filing applications for readmission to graduate status with Graduate Studies</td>
<td>April 1</td>
<td></td>
<td>April 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the Dean of Graduate Studies</td>
<td>Sept. 22</td>
<td>Jan. 5</td>
<td>Feb. 23</td>
<td>June 3</td>
<td></td>
</tr>
<tr>
<td>Deadline for candidates for master's degrees to file theses with the committee in charge</td>
<td>Nov. 1</td>
<td>Feb. 1</td>
<td>May 1</td>
<td>July 21</td>
<td></td>
</tr>
<tr>
<td>Deadline for candidates for master's degrees to file theses with the Dean of Graduate Studies</td>
<td>Nov. 30</td>
<td>Mar. 1</td>
<td>June 3</td>
<td>Sept. 2</td>
<td></td>
</tr>
<tr>
<td>Deadline for candidates for master's degrees to file final report on comprehensive examination with the Dean of Graduate Studies</td>
<td>Dec. 16</td>
<td>Mar. 24</td>
<td>June 16</td>
<td>Sept. 8</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Aug. 11</td>
<td>Nov. 10</td>
<td>Feb. 2</td>
<td>May 20</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Oct. 2</td>
<td>Jan. 4</td>
<td>Apr. 3</td>
<td>July 3</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Nov. 30</td>
<td>Mar. 1</td>
<td>June 3</td>
<td>Sept. 2</td>
<td></td>
</tr>
</tbody>
</table>
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.

FEES

At the time of registration each quarter, every student must pay the following fees.

Given state budget uncertainties, the University of California Board of Regents has not taken action on systemwide fee levels for 1995-96. Until the Regents take action, the systemwide Registration and Educational Fee levels remain the same as those for 1994-95, as shown below. The university's current budget plan proposes a 10% increase in annual systemwide fees for 1995-96. Accordingly, students and their families may wish to plan for a possible 10% increase. The university's fee proposal is subject to change based on state budget decisions.

<table>
<thead>
<tr>
<th>Graduate Student Fees (per quarter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee .......... $238.00</td>
</tr>
<tr>
<td>Educational Fee ..................... $1,029.00</td>
</tr>
<tr>
<td>Memorial Union Fee ................... $28.50</td>
</tr>
<tr>
<td>Health Insurance* ................... $150.00</td>
</tr>
<tr>
<td>Graduate Student Association Fee ...... $6.50</td>
</tr>
<tr>
<td>Student Facilities Safety Fee ....... $22.00</td>
</tr>
<tr>
<td><strong>Total Full-Time California Resident</strong> ... $1,474.00</td>
</tr>
<tr>
<td>Non-Resident Tuition .................. $2,566.00</td>
</tr>
<tr>
<td><strong>Total for full-time nonresident</strong> .... $4,040.00</td>
</tr>
<tr>
<td>Total Part-time California Resident .... $959.50</td>
</tr>
<tr>
<td>Total part-time nonresident .......... $2,242.50</td>
</tr>
<tr>
<td>Total Employee-Student .............. $473.50</td>
</tr>
</tbody>
</table>

*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 $150.00 winter quarter; $149.00 spring quarter.

APPLYING FOR ADMISSION

Applications are accepted for fall quarter only. Combined admission and fellowship application forms are available from Graduate Studies, University of California, Davis, CA 95616. 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 deadline is April 1, unless otherwise indicated by the program, or until your proposed graduate program is full, whichever occurs first.

The completed application form, along with the $40 nonrefundable application fee and official transcripts from each college and university you have attended, 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

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.

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 350.
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 section 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.

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.

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 campus of the University—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, ASSISTANTS AND LOANS

Financial support for graduate study at UC Davis is available in several forms: teaching and research assistantships, financial aid and fellowships/scholarships.

Information and application materials for TAships are available from the department in which you wish to teach. Contact the faculty directly about the availability of RAships.

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 February 28, 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, undergrad-

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 coursework 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.

General requirements for the program are:

- 15 or 16 units of specified graduate coursework, or a combination of specified graduate and undergraduate coursework
- Admission to Graduate Studies

Further information on the Graduate Certificate Program may be found in the College of Engineering Bulletin.

TEACHER CREDENTIAL PROGRAMS

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, 2078 Academic Surge, 916-752-0757.

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 coursework. 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, 2078 Academic Surge, University of California, Davis, CA 95616-8579 or the Department of Applied Behavioral Sciences (agricultural education), Hunt Hall, University of California, Davis, CA 95616-8523.

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 Applied Behavioral Sciences 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**

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 in College Teaching is administered through the Office of Graduate Studies and the Teaching Resources Center. 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. Further information may be obtained from the Teaching Resources Center, 17 Wellman Hall, University of California, Davis, CA 95616-8717.
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.

**PREPARATION 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.

Assistance in program planning may be obtained from the Pre-Law Advising Office, 227 Voorhis Hall, 916-752-3009.

For additional information, see the *Official Guide to U.S. Law Schools*, a publication of the Law School Admission Council and Law School Admission Services. 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.

**FEES**

At the time of registration each semester, every student must pay the following fees.

*Given state budget uncertainties, the University of California Board of Regents has not taken action on statewide fee levels for 1995-96. Until the Regents take action, the statewide Registration and Educational Fee levels remain the same as those for 1994-95, as shown below. The university's current budget plan proposes a 10% increase in annual statewide fees for 1995-96.*

<table>
<thead>
<tr>
<th>Student Fees: School of Law (students entering 1995-96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee ................................  $336.50</td>
</tr>
<tr>
<td>Educational Fee ..................................................  $1,543.00</td>
</tr>
<tr>
<td>Law Student Association Fee ....................................  $8.00</td>
</tr>
<tr>
<td>Memorial Union Fee ................................................  $42.75</td>
</tr>
<tr>
<td>Health Insurance* ..................................................  $224.50</td>
</tr>
<tr>
<td>Student Facilities Safety Fee ....................................  $33.00</td>
</tr>
<tr>
<td>Professional School Fee† ........................................  $2,188.00</td>
</tr>
</tbody>
</table>

**Total for California residents**  $4,395.75

**Total for nonresidents**  $8,245.25

*Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.
†The Professional School Fee for students admitted or readmitted to the School of Law in 1994-95 is $2,376 per year: total fall semester student fees for California residents is $3,395.75; for nonresidents, $7,245.25.

Students admitted or readmitted to the School of Law prior to 1994-95 pay the Law School Surcharge of $188 per semester: total fall semester student fees for California residents is $2,393.75; for nonresidents, $6,245.25.

**PELP students** are considered continuing students. Students who withdraw and later apply and are accepted as readmitted students are considered new (entering) students.

**APPLYING FOR ADMISSION**

**February 1**  Deadline for filing applications for admission for 1996-97 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. **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 (LDSAS) 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 submit the Law School Application Matching Form with your application 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. The information booklet 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 information 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 ethnic and 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 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 applications 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 Asian, African American, Hispanic, American Indian, Filipino and other underrepresented students.

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.

Scholarships for Indian and Alaskan natives are available from American Indian Graduate Center, 4520 Montgomery Blvd., N.E., Suite 1B, Albuquerque, New Mexico 87109, (505) 881-4584. Applicants must be enrolled members of federally recognized Indian tribes or Alaskan native villages or possess 1/4 recognized blood and must demonstrate need. The deadline for applications is April 30.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Hispanic students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 634 South Spring Street, 11th Floor, Los Angeles, CA 90014, Attention Scholarship Fund.

PROGRAM OF STUDY

The course of study in the professional curriculum requires six semesters for completion and extends over a period of three years. It is designed 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.

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. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

The courses of the professional curriculum are listed in the Programs and Courses section of this catalog.

Combined Degree Programs

Students may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. In order 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.

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, coursework 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 CALENDAR

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

Academic Calendar 1995-96

<table>
<thead>
<tr>
<th>FALL 1995</th>
<th>SPRING 1996*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction Week</td>
<td>Mon-Fri, Aug 14-18</td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 21</td>
</tr>
<tr>
<td>Labor Day holiday</td>
<td>Mon, Sept 4</td>
</tr>
<tr>
<td>Thanksgiving holiday</td>
<td>Thurs-Fri, Nov 23-24</td>
</tr>
<tr>
<td>Martin Luther King, Jr., holiday</td>
<td>Mon, Jan 15</td>
</tr>
<tr>
<td>President's Day holiday</td>
<td></td>
</tr>
<tr>
<td>Spring recess</td>
<td>Mon-Fri, Mar 25-29</td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, Dec 1</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Wed, Dec 2-6</td>
</tr>
<tr>
<td>Law School examination period</td>
<td>Thurs-Thurs, Dec 7-21</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td>Sat, May 18</td>
</tr>
</tbody>
</table>

*Friday, February 23 is treated as a Monday for class schedule purposes.
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.

**PREPARATION 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 coursework before enrollment in the program:

- **Accounting**—introductory course which 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.

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**FEES**

At the time of registration each quarter, every student must pay the following fees.

Given state budget uncertainties, the University of California Board of Regents has not taken action on systemwide fee levels for 1995-96. Until the Regents take action, the systemwide Registration and Educational Fee levels remain the same as those for 1994-95, as shown below. The university's current budget plan proposes a 10% increase in annual systemwide fees for 1995-96. Accordingly, students and their families may wish to plan for a possible 10% increase. The university's fee proposal is subject to change based on state budget decisions.

**Student Fees: School of Management**

<table>
<thead>
<tr>
<th>Fee Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee</td>
<td>$238.00</td>
</tr>
<tr>
<td>Educational Fee</td>
<td>$1,029.00</td>
</tr>
<tr>
<td>Student Association Fee</td>
<td>$65.00</td>
</tr>
<tr>
<td>Memorial Union Fee</td>
<td>$28.50</td>
</tr>
<tr>
<td>Health Insurance*</td>
<td>$190.00</td>
</tr>
<tr>
<td>Student Facilities Safety Fee</td>
<td>$22.00</td>
</tr>
<tr>
<td>Professional School Fee†</td>
<td>$1,334.00</td>
</tr>
</tbody>
</table>

**Total for California residents**

$2,808.00

**Nonresident Tuition**

$2,566.00

**Total for nonresidents**

$5,374.00

* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.
† The Professional School Fee for students admitted or readmitted to the Graduate School of Management in 1994-95 is $2,000 per year; total fall quarter fees for California residents is $2,142.00; for nonresidents, $4,708.00.

Continuing students enrolled prior to 1994-95 are not assessed the Professional School Fee; the total for California residents is $1,474.00; for nonresidents, $4,040.00.

**PELP students** are considered continuing students. Students who withdraw and later apply and are accepted as readmitted students are considered new (entering) students.

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**APPLYING FOR ADMISSION**

**April 1** Deadline for filing applications for admission for 1996-97 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. Completed applications for fellowship and graduate scholarships must be filed by January 15.

Students interested in admission to the school are urged to request an Announcement of the Graduate School of Management at an early date so that all minimum academic requirements and deadlines are met.

**In addition to your application, you will need to submit:**

- Transcripts from all colleges or universities previously attended.
- Scores from the Graduate Management Admission Test (GMAT). Applicants must take the GMAT no later than March. In order to be considered for fellowships and scholarships, applicants must take the October test to meet the January 15 deadline. 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.

**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. Registration forms may be obtained by writing to: TOEFL, Educational Testing Service, Box 899, Princeton, NJ 08541-6108.

**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 (WP MBA). If you would like more information about the evening program, please contact the Graduate School of Management Admissions Office at 752-7399.
PREPARATION 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 1996, the new MCAT must be taken no later than fall 1995. No scores before 1993 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 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:

1. English, 1 year or its equivalent. 12 8
2. Biological science, 1 year including laboratory, or its equivalent. 15 8
3. General chemistry, 1 year including laboratory, or its equivalent. 15 8
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. 12 8
5. Physics, 1 year including laboratory or its equivalent. 12 8
6. Mathematics, coursework sufficient to satisfy prerequisites for integral calculus. (Coursework through integral calculus is recommended).

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.

FEES

At the time of registration each quarter, every student must pay the following fees.

Given state budget uncertainties, the University of California Board of Regents has not taken action on systemwide fee levels for 1995-96. Until the Regents take action, the systemwide Registration and Educational Fee levels remain the same as those for 1994-95, as shown below. The university's current budget plan proposes a 10% increase in annual systemwide fees for 1995-96. Accordingly, students and their families may wish to plan for a possible 10% increase. The university's fee proposal is subject to change based on state budget decisions.

<table>
<thead>
<tr>
<th>Student Fees: School of Medicine (students entering 1995-96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee</td>
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<tr>
<td>Educational Fee</td>
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<tr>
<td>Memorial Union Fee</td>
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<tr>
<td>Health Insurance</td>
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<tr>
<td>Student Facilities Safety Fee</td>
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<tr>
<td>Disability Insurance Fee**</td>
</tr>
<tr>
<td>Professional School Fee</td>
</tr>
<tr>
<td>**Total for California residents</td>
</tr>
</tbody>
</table>

Nonresident Tuition | $2,566.00

**Total for nonresidents | $5,220.50

* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.
** The Disability Insurance Fee applies to medical students only (not interns, residents, or health science academies). The annual fee of $61.00 is assessed fall quarter.
† The Professional School Fee for students admitted or re admitted to the School of Medicine in 1994-95 is $792 per quarter, and the total fall quarter student fees for California residents is $2,320.50; for nonresidents, $4,886.50. Students admitted or re admitted to the School of Medicine prior to 1994-95 pay the Medical School Surcharge of $126 per quarter, and the total fall quarter student fees for California residents is $1,654.50; for nonresidents, $4,220.50.

PELP students are considered continuing students. Students who withdraw and later apply and are accepted as readmitted students are considered new (entering) students.

APPLYING FOR ADMISSION

November 1 Deadline for filing applications for admission for 1996-97 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 15 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 complete 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 F, 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 underrepresented in medicine as the result of societal discrimination and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of cultural 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 infor-
PROGRAM OF STUDY

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.

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 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. 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 Ms. Suzanne Mink, Office of Curricular Support, Room 2431, MS 1A, School of Medicine, University of California, Davis, CA 95616.

SCHOOL OF MEDICINE

Academic Calendar 1995-96

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, 2431 Medical Sciences 1A, 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.
Preparation 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**
- General Chemistry: 15 units
- Organic Chemistry: 6 units
- Physics: 6 units
- Biological Sciences: 10 units

**Upper Division Required Sciences**
- Embryology: 4 units
- Genetics: 4 units
- Biochemistry: 3 units
- Physiology: 5 units
- Required English: 12 units
- Required Humanities and Social Sciences: 12 units
- Required Statistics: 4 units

(To convert semester units to quarter units, multiply by \(\frac{3}{2}\). For example, a 4-unit semester course is equivalent to a 6-unit course in the quarter system.)

You should plan your pre-veterinary 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 and the Subject Test in Biology of the Graduate Record Examination (GRE) by the October test date. Graduate Record Examination scores received from the November test or later tests for the year the application is filed will not be accepted for consideration. 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 and Subject Test in Biology. 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 (45 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.

FEES

At the time of registration each quarter, every student must pay the following fees.

Given state budget uncertainties, the University of California Board of Regents has not taken action on systemwide fee levels for 1995-96. Until the Regents take action, the systemwide Registration and Educational Fee levels remain the same as those for 1994-95, as shown below. The university's current budget plan proposes a 10% increase in annual systemwide fees for 1995-96. Accordingly, students and their families may wish to plan for a possible 10% increase. The university's fee proposal is subject to change based on state budget decisions.

<table>
<thead>
<tr>
<th>Student Fees: School of Veterinary Medicine (Students entering 1995-96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee.................................. $238.00</td>
</tr>
<tr>
<td>Educational Fee.................................................. $1,029.00</td>
</tr>
<tr>
<td>Memorial Union Fee............................................... $28.50</td>
</tr>
<tr>
<td>Health Insurance*................................................ $150.00</td>
</tr>
<tr>
<td>Student Facilities Safety Fee................................... $22.00</td>
</tr>
<tr>
<td>Professional School Fee†....................................... $1,126.00</td>
</tr>
<tr>
<td><strong>Total for California residents</strong>.............................. $2,467.50</td>
</tr>
<tr>
<td>Nonresident Tuition.............................................. $2,566.00</td>
</tr>
<tr>
<td><strong>Total for nonresidents</strong>........................................ $5,033.50</td>
</tr>
</tbody>
</table>

* Students must purchase the Graduate Student Health Insurance Plan unless they are able to show comparable coverage under another plan.
† The Professional School Fee for students admitted or re-admitted to the School of Veterinary Medicine in 1994-95 is $792 per quarter; total fall quarter student fees for California residents is $2,135.50; for nonresidents, $4,701.50.

Continuing students enrolled prior to 1994-95 are not assessed the Professional School Fee; total fall quarter student fees for California residents is $1,467.50; for nonresidents, $4,033.50.

PELP students are considered continuing students. Students who withdraw and later apply and are accepted as readmitted students are considered new (entering) students.
APPLYING FOR ADMISSION

November 1 Deadline for filing applications for admission for Fall 1996 to the School of Veterinary Medicine

Effective fall 1995, 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, contact the Office of the Dean—Student Programs or by calling 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.

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. Residents of states participating in the Western Interstate Commission for Higher Education (WICHE) will be considered as residents for purposes of admission. Based on agreements with WICHE, a small number of applicants from WICHE states may be admitted with WICHE financial support. Other applicants from WICHE states may be admitted but only as nonresidents. For information related to the WICHE program, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302. The criteria or 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 coursework:
   1. GPA of all undergraduate and graduate coursework
   2. GPA of required science coursework
   3. GPA of last two years of college work (minimum of 72 quarter units)

B. Graduate Record Examination:
   1. General Aptitude Test (Verbal, Quantitative and Analytical)
   2. Subject Test in Biology

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, MPVM program. Application deadline for fall quarter admission is March 15 (Please note that the deadline for applications for Nonresident Tuition Fee Fellowships is January 15.) International applicants are encouraged to apply as early as possible. Students wishing to enter winter or spring quarter should contact the MPVM Program Director concerning application deadlines.

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 coursework 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 research study which culminates in a written report and oral presentation.
School of Veterinary Medicine

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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, MPVM Program, Office of the Dean, School of Veterinary Medicine, University of California, Davis, CA 95616.

Combined Program. Students may enroll in the combined DVM/MPVM 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 MPVM 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 1995-96 (tentative)

FALL QUARTER 1995
Orientation for 1st-year students
Instruction begins for 4th-year students
Instruction begins for 1st-, 2nd- and 3rd-year students
Schalm Lecture
Thanksgiving Holiday
Instruction ends
Finals end

WINTER QUARTER 1996
Instruction begins for 4th-year students
Instruction begins for 1st-, 2nd- and 3rd-year students
M. L. King Holiday
President's Holiday
Monday classes meet
Instruction ends
Finals end

SPRING QUARTER 1996
Instruction begins
Memorial Day Holiday
Instruction ends
Finals end
Commencement

Thur-Fri, Sept. 14-15
Mon, September 18
To be announced
Thur-Fri, Nov. 23-24
Friday, December 8
Friday, December 15

Tues, January 2
Thursday, January 4
Monday, January 15
Monday, February 19
Thursday, March 14
Friday, March 15
Friday, March 22

Monday, April 1
Monday, May 27
Friday, June 7
Friday, June 14
Saturday, June 8
COURSE DESIGNATIONS

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 dietary problems of community, rational 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, Animal Science 49A-49B-49C) 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 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.
One course from Statistics 13, Sociology 46A, or Psychology 41.  

Depth Subject Matter:  
A coordinated array of upper division courses, selected and approved in consultation with the major advisors to include:  
Core courses: African American Studies 101, 110, 120  
Additional upper division units chosen to reflect the student’s major emphasis.  
Total Units for the Major:  

Major Program Emphasis  
The following areas of emphasis are offered as a guideline for students interested in majoring in African American Studies:  
Culture of African American emphasis:  
African American Studies 107, 120, 121; Anthropology 140A, 140B, History 177A, 177B; Political Science 167.  
African emphasis:  
African American Studies 107, 120, 121; Anthropology 140A, 140B; History 115A, 116; Political Science 134, 146.  
The above areas of emphasis are not the only areas students may choose for the African American and African Studies major. However, it should be noted that the major program must (a) be developed in consultation with an African American and African Studies faculty member, and (b) be approved by the Program’s Major advisor. Information regarding the areas of emphasis may be obtained from the African American and African Studies Office.  

Related Upper Division Courses  
Student who contemplate majoring in African American and African Studies are advised that the following courses are offered by faculty members in other disciplines and focus on African and African American peoples and their culture.  
Major Advisor: P.A. Turner.  

Minor Program Requirements:  

African American and African Studies:  
Select one course from African American Studies 10, 110, or 120.  
American History and Institutions: This University requirement can be satisfied by completion of African American Studies 10, 100, 120, 121. (See also under University requirements.)  

Courses in African American and African Studies (AAS)  
Lower Division Courses  
10. Introduction to Afro-American Culture and Society:  
Lecture—4 hours. Introduction to the contemporary Black American experience by critically examining historical, political and social and economic factors that have affected its development and status of American Afro people.  
12. Introduction to African Studies:  
Lecture—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.  

*Course not offered this academic year.

15. Introduction to African American Humanities (4).  
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 to European, Caribbean, Latin-American, and North American variations on this tradition.  
50. Black Images in Popular Culture (4).  
Lecture—2 hours; discussion—2 hours. A survey of the depictions of Blacks in popular culture (print press, radio, film, television, advertising) from the middle of the sixteenth century to the present.  
51. History of Afro-American Dance (4).  
Lecture—2 hours; discussion—2 hours. Evolution of African American dance, tracing its history and development from West Africa through the Caribbean 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).  
Lecture—2 hours; discussion—2 hours. Introduction to the traditional religions of 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, warfare, prophecy, ceremony and adaptation to Islam and Christianity.  
80. Introduction to Black Politics (4).  
Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences.  
99. Special Study for Undergraduates (1-5).  

Upper Division Courses  
100. Survey of Ethnicity in the U.S. (4).  
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. General Education credit: Contemporary Societies.  
101. Introduction to Research in the Afro-American Community (4).  
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.  
Lecture—4 hours. Prerequisite: course 110 or consent of instructor. Analysis of African cultural systems as they adapted to the slave regimes in the antebellum and their repressive measures in the postbellum Americas.  
110. West African Social Organization (4).  
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.  
123. The Black Female Experience in Contemporary Society (4).  
Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women’s contributions in history, and social science; life experiences of Black women and philosophical underpinnings of the feminist movement.  
130. Education in the African American Community (4).  
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.)
Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

The major in agricultural and managerial economics teaches students to apply economic 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 food and fiber; consumer economics, which focuses on issues related to consumer decision making, protection, and welfare; agricultural 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.)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>English Composition Requirement</td>
<td>3-12</td>
<td>See College requirement</td>
</tr>
<tr>
<td>Additional English</td>
<td>(English 1, 3, 20, or 103A-G)</td>
<td>6-8</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>65-68</td>
<td></td>
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<tr>
<td>Accounting (Management 11A-11B)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Computer Science (Agricultural Systems and Environment 21, Computer Science Engineering 10, 15 or 30, Engineering 5)</td>
<td>3-4</td>
<td></td>
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<tr>
<td>Economic principles (Economics 1A-1B)</td>
<td>10</td>
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<tr>
<td>Calculus (Mathematics 16A-16B or 21A-21B)</td>
<td>6-8</td>
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<tr>
<td>Statistics (Statistics 13, 103)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Social Science, Natural Science, Agricultural Science (See undergraduate handbook in Department Advising Office for complete list of courses)</td>
<td>40</td>
<td></td>
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</tbody>
</table>

Breadth/General Education

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

Micro theory, Agricultural Economics 100A, 100B |
Quantitative methods and Agricultural Economics 106, 155 |
Macro theory, Economics 101 or 105 |
Restricted Electives (Choose at least one):

(a) Agricultural Economics 1

At least 15 units must be chosen from Agricultural Economics 120, 130, 131,

*A Course not offered this academic year.

Agricultural and Environmental Chemistry (A Graduate Group)

Everett Bandman, Ph.D., Chairperson of the Graduate Group Office, 109 Food Science and Technology Building (916-555-1415)

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. Hsin (Textiles and Clothing), T. Shibusawa (Environmental Toxicology), R.J. Zasowski (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)

The seminar — 1 hour. Selected topics in agricultural and environmental chemistry, directed by graduate students, studied in the regional and cultural settings of the Caribbean, Americas, and Africa.

297. Group Study (1-3) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. The student will be required to select a topic and prepare an outline for a research paper in the field of agricultural and environmental chemistry.

298. 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 Graduate Group in Agricultural and Environmental Chemistry (SU gazing only).

299. Thesis (1-12) I, II, III, summer. The Staff (Chairperson in charge)

Note: Advanced placement in the areas of agricultural and environmental chemistry is available through independent study and laboratory research.
MANAGERIAL ECONOMICS

Emphasis: Agricultural Economics 100A or the equivalent.
Additional upper division courses in Agricultural Economics.
Select 9 or more units from Agricultural Economics 112, 116A, 116B, 136, 157, 171A, 171B.
Select additional upper division Agricultural Economics courses to complete the 18-unit total for the minor.

ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS

Emphasis: Agricultural Economics 100A or the equivalent.
Additional upper division courses in Agricultural Economics.
Select 9 or more units from Agricultural Economics 175 and 176, and either 100B or 120.
Select additional upper division Agricultural Economics courses to complete the 18-unit total for the minor.

Graduate Study: See the Graduate Studies section in this catalog.

AGRICULTURAL 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
Student information: Undergraduate, 1176 Social Sciences and Humanities Building, 916-752-6165; Graduate, 1171 Social Sciences and Humanities Building, 916-752-6596

Faculty
Richard Alcawas, J.D., Instructor
Julian M. Alajian, Instructor
Steven Blank, Ph.D., Lecturer
Bayford D. Butler, M.S., Lecturer
Leslie J. Butler, Ph.D., Lecturer
Michael R. Caputo, Ph.D., Associate Professor
Hoy F. Carman, Ph.D., Professor
Colin A. Carter, Ph.D., Professor
James A. Chaffin, Ph.D., Professor
Robert L. Cook, Ph.D., Associate Professor
Richard D. Green, Ph.D., Professor
Arthur Havener, Ph.D., Professor
Thomas W. Hazlett, Ph.D., Associate Professor
Dan M. Helen, Ph.D., Professor
Gloria H. Helfand, Ph.D., Assistant Professor
Garth J. Holloway, Ph.D., Assistant Professor
Richard E. Howitt, Ph.D., Professor
Lovel S. Jervis, Ph.D., Lecturer
Donmond A. Jolly, Ph.D., Lecturer
Karen Kizonsk, Ph.D., Lecturer
Douglas M. Larson, Ph.D., Associate Professor
Philip L. Martin, Professor
Quirino Paris, Ph.D., Professor
Richard J. Sexton, Ph.D., Professor
Lawrence E. Shepard, Ph.D., Professor
Joe J. Stavile, Ph.D., Lecturer
Daniel A. Sumner, Ph.D., Professor
J. Edward Taylor, Ph.D., Associate Professor
Marilynn F. Whitney, Ph.D., Assistant Professor
James E. Wilen, Ph.D., Professor (Agricultural Economics, Environmental Studies)
Emeriti Faculty
Oscar R. Butt, Ph.D., Professor Emeritus
Harold O. Carter, Ph.D., Professor Emeritus
Jerry Foytik, Ph.D., Professor Emeritus
Benjamin C. French, Ph.D., Professor Emeritus

AGRICULTURAL ECONOMICS (AGE)

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.
15. Population, Environment and World Agriculture (4)
Lecture—3 hours; discussion—1 hour. Economic analysis of interaction among population, environment, natural resources, and development of world agriculture. Introduces students to economic thinking about population growth, its consequences and implications for world food demand, and environmental and technological limits to increasing food supplies. General Education credit: Contemporary Societies.
18. Business Law (4), III. Alcawas, 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 system.
49A-49B-49C. Field Practice (1) I, II, III. Statutes Discussion—4 hours; 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 economic and management and their application in agricultural production. (P/NP grading only.)
98. Directed Group Study (1-3) 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. Morrison; II. Astoll, 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.

*Course not offered this academic year.
100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) II. Martin III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

100G. Agricultural Methods in Agricultural Economics (II) I. Havener III. Helen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 103. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple regression analysis.

112. Fundamentals of Business Organization (4) I. The Staff III. Faber; summer. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: upper-division status, 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 and production relations, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, and retailing; marketing regulations and restraints. (Not open for credit to students who have completed course 136.)

118A-118B. Tax Accounting (3-3) II-III. Sosnich
Lecture—2 hours; discussion—1 hour. Prerequisite: Management 115. Determination of the federal income tax of employees, proprietors, partners, and corporations and the tax implications of alternative business decisions and methods of accounting.

120. Natural Policy (4) III. Sumner
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. General Education credit: Contemporary Societies.

130. Agricultural Markets (4) I. Carter
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. The nature, function, organizational structure, and operation of agricultural markets; price determination, marketing systems, market information, regulation, and controls; cooperative marketing.

131. Agricultural Markets, Prices and Trade (3) I. Holloway
Lecture—3 hours. Prerequisite: course 100B; course 130 recommended. Analysis of economic interdependencies among industries, geographically dispersed markets, alternative product forms and markets separation in time.

132. Cooperative Business Enterprises (3) I. Lang
Lecture—3 hours. Prerequisite: Economics 1A. Study of cooperative business enterprises in the United States and abroad; 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, and marketing systems.

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 time-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools.

140. Farm Management (5) II. Faber Lecture—6 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. Consumers and the Market (3) III. Helen
Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects of its performance on consumers. Agencies aiding and protecting consumers; sources of information available to consumers. (Students who have had or are taking course 100A, Economics 100, or the equivalent may receive only 3 units of credit, so course for 141M.) General Education credit: Contemporary Societies.

141M. Consumers and the Market (3) III. Helen
Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects of its performance on consumers. Agencies aiding and protecting consumers; sources of information available to consumers. (Students who have had or are taking course 100A, Economics 100, or the equivalent may receive only 3 units of credit, so course for 141.) General Education credit: Contemporary Societies.

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. (Same course as Consumer Economics 142.)

143. Investments (3) I. Shepard
Lecture—3 hours. Prerequisite: Agricultural Economics/Consumer Economics 142 or consent of instructor. Survey of investment institutions, sources of investment information, analysis of the stock, bond and real estate markets from the perspective of the investor.

145. Farm and Rural Resources Appraisal (4) III. Johanson
Lecture—3 hours; laboratory—3 hours; field trip. Principles of farm and rural appraisal; land utilization in relation to problems of development and valuation. Real estate instruments and elements of real estate finance.

147. Resource and Environmental Policy Analysis (3) III. Helfand
Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to upper-division students 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.)

147M. Resource and Environmental Policy Analysis (2) III. Helfand
Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-major 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.)

148. Economic Planning for Regional and Resource Development (3) I. The Staff
Lecture—3 hours. Prerequisite: Economics 1A and 1B; Mathematics 16A recommended. Relation of resource to economic growth, including regional problems; planning economic development with particular emphasis on resource use in agriculture; regional and national planning by both centralized and decentralized governments.

*Course not offered this academic year.

150. Agricultural Labor (4) I. Martin
Lecture—3 hours; discussion—1 hour. Importance of family and hired labor in agriculture; farm labor markets; problems and solutions in collective bargaining in California agriculture; simulated collective bargaining exercise; effects of unions on farm wages and earnings.

155. Quantitative Analysis for Business Decisions (4) I. Barton
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 behavior, game theory analysis, fitting equations to scattered data, forecasting, and introductory computer optimization methods.

156. Introduction to Mathematical Economics (4) I. Halloway
Lecture—4 hours. Prerequisite: course 100A and 155. Linear algebra for economic theory and optimal conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier 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.

158. Financial Management of the Farm (4) II. Whitney
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B; Management 114A-11B. Financial analysis at the farm 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 Farm (4) III. Whitney
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101A. 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 Resources Economics (3) I. Wilson
Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (rural and natural areas and wildlife populations), and non-renewable resources (minerals and energy resources, soil). (Same course as Environmental Studies 175.)

176. Environmental Economics (3) III. The Staff
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.

190A. Senior Research Project (2) II. Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A; Statistics 103 or consent of instructor; senior standing. Individual student-defined research project conducted under faculty guidance. Problem definition, study objectives, procedure, method of analysis, working outline, and preliminary elements of report writing to be completed in the first quarter. (Deferred grading only, pending completion of sequence.)

190B. Senior Research Project (2) III. Lecture—1 hour; discussion—1 hour. Prerequisite: course 190A or consent of instructor. The research report begun in course 190A will be completed and, if approved, evaluated by the instructor and rewritten and submitted by the student prior to the end of 190B. (Deferred grading only, pending completion of sequence.)
192. Internship (1-6). I, II, III, summer. The Staff (Chairperson in charge)
Internship—3-18 hours. Internship experience off and on course is offered in the Department of Agricultural Economics. Internships are supervised by a member of the staff. (P/NP grading only)

197T. Tutoring in Agricultural Economics (1-3). I, II, III. The Staff (Chairperson in charge)
Help and duties will vary depending upon the course being tutored. Prerequisite: senior standing in Agricultural 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). J. Caputo
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 distribution of income and wealth.

200B. Microeconomic Theory (5). I. Helms (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristic of market equilibrium under perfect competition, simple monopoly and monopoly.

200C. Microeconomic Theory (5). I. Makowski (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Uncertainty and information economics.

202A. Introduction to Applied Research Methods (3). I. Wilen
Lecture/discussion—3 hours. Prerequisite: courses 200A and 200C concurrently. Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communicating results.

202B. Applied Microeconomics I: Consumer and Producer Behavior (3). II. Ilston
Lecture/discussion—3 hours. Prerequisite: courses 200A and 202A. Course 202B concurrently.

202C. Applied Microeconomics II: Welfare Analysis and Imperfect Competition (3). III.
The Staff
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 imperfect competition and welfare analysis for inputs and outputs and market equilibrium displacement models.

211. International Agricultural Trade and Policy II (4). J. Carter
Lecture—3 hours; discussion—1 hour. Prerequisite: course 204B or Economics 204; Economics 108 or the equivalent. Food, fiber and forest products, and their interdependence in the world agricultural trade. Partial equilibrium analysis is used to study the impacts of national and international trade policies on world markets, national policy objectives, and the world food and fiber trade. Topics include demand and supply analysis, price policies, and market stability.

215A. Agriculture and Economic Development (4). I. H. Heaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 204A or Economics 204; Economics 108 or the equivalent. Policies and their role in economic development and the environment. Analytical focus on household farming and international trade. (Same course as Economics 215A.)

215B. Open Macroeconomics of Development (4). I. Kaneda
Lecture—3 hours; discussion—1 hour. Prerequisite: course 204A or Economics 204; Economics 108 or the equivalent. Policies and their role in economic development and the environment. Analytical focus on household farming and international trade. (Same course as Economics 215A.)

215C. Empirical Approaches to Development Analysis (4). I. Taylor
Lecture—3 hours; discussion—1 hour. Prerequisite: course 204A or Economics 204; Economics 108 or the equivalent. Policies and their role in economic development.

220. Economics of Consumer Policy (3). III. The Staff
Lecture—3 hours. Prerequisite: one graduate course in economic theory and one in economics or the equivalent. Policy criteria; sources of market failure; consumer policy alternatives; empirical analysis of economic policies.

221. Agricultural Policy in Developed Countries (4). III. The Staff
Lecture/discussion—4 hours. Economic policy, its nature, formation and analysis: analysis of agricultural production; economic policies; economic policies.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 204B or Economics 204; Economics 108 or the equivalent. Policies and their role in economic development and the environment. Partial equilibrium analysis is used to study the impacts of national and international trade policies on world markets, national policy objectives, and the world food and fiber trade. Topics include demand and supply analysis, price policies, and market stability.

240A. Econometric Methods (4). I. Green
Lecture—4 hours. Prerequisite: Statistics 333 and a course in linear algebra or the equivalent. Least squares estimation, multiple regression, estimation and inference for single equation linear regression model: linear restrictions; heteroskedasticity; autocorrelation: lagged dependent variables. (Same course as Economics 240A.)

240B. Econometrics II (4). J. Chalfant
Lecture—4 hours. Prerequisite: course 240A. Topics include analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regres-
sion, classical hypothesis tests, and identification and estimation of simultaneous equation models. (Same course as Economics 240B.)

240C. Econometric Theory (4). I. Havener
Lecture—4 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 modeling. 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.

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/ Economics 200C. Optimization techniques and methods including linear and nonlinear programming. Applications to household, firm, general equilibrium and economic growth problems.

Lecture—4 hours. Prerequisite: course 253. Dynamic programming, Pontryagin maximum principle, and optimal control problem. Emphasis on methods with selected applications to economic problems.

255. Systems Analysis and Simulation (3). III. The Staff
Lecture—3 hours. Dynamic model formulation and computer simulation of economic systems.

256. Applied Econometrics (4). II. Heilen
Lecture—3 hours; discussion—1 hour. Prerequisite: Master students in agricultural economics or economics, 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 agricultural production processes, e.g., investment, resource allocation, production, labor, and irrigation scheduling. Stacks static and dynamic models under risk and uncertainty and other 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 is on analytical tools for assessing the impacts of changes in government policies and macroeconomic variables.

261. Case Problems in Management (3). III. Carrigan
Lecture—1 hour; discussion—2 hours. Case problem analysis and discussion of business policy and strategy including organization, planning, production, marketing, and financial issues. Emphasis is on problem definition and solution using current examples drawn primarily from agriculturally oriented firms.

276. Institutional and Economic Analysis of Natural Resources (3). I. Larson
Lecture—3 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 and identification of property rights; information and search costs; market externalities; transactions and adjustment costs. Application to land/water policy.

*Course not offered this academic year.
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 132 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 261 Hunt Hall (916-752-1808 or 4369). Since many majors in the College do not offer the minimum preparation necessary for entering the Agricultural 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 Agricultural Sciences offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the Graduate Announcement.


Courses in Agricultural Education (AED)

Questions pertaining to the following courses should be directed to the instructor or to the Agricultural Education Program Office, 132 Hunt Hall.

Lower Division Courses
92. Internship (1-1/2) I, II, III. The Staff (Chairperson in charge).
Internship—3.6 hours. Prerequisite: lower division standing; on completion of the internship required. Internship not included in course, but in campus area of agricultural education. (PANP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge).
Directed Study—3.6 hours. Prerequisite: consent of instructor. (PANP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge).
Special Study—3.6 hours. Prerequisite: consent of instructor. (PANP grading only.)

Upper Division Courses
100. Concepts in Agricultural and Environmental Education (3) I. The Staff
Course—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Philosophy and nature of formal and nonformal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs.

180. Vocational Education (3) II. Leising
Course—3 hours. Philosophy and organization of vocational education programming, with particular reference to educational principles for agriculture, commerce, home economics, and industry.

183. Measurement and Evaluation in Teaching (3) II. The Staff
Course—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. Audio Visual Communications (2) II. The Staff
Course—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Theory and principles of audio-visual communications. Comparison of audio-visual materials such as transparencies, slides, computer-generated graphics, and videos. Operation and use of audio-visual equipment is stressed.

172. Multi-Media Productions (3) III. The Staff
Course—2 hours; laboratory—3 hours. Prerequisite: course 171 recommended. Design and production of educational, technical, and professional multi-media presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics.

190. Seminar in Agricultural Education (2) II. The Staff
Course—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. (PANP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge).
Special Study—3.6 hours. Prerequisite: upper division standing; consent of instructor. Supervised special study off and on campus in areas of agricultural education. (PANP grading only.)

Professional Courses
300. Directed Field Experience in Teaching (2) II. The Staff
Course—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. (PANP grading only.)

301. Planning for Instructional Programs (3) III. Leising
Course—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) III. Leising
Course—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 measurement and evaluation.

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) I. Leising
Course—3 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. Leising
Course—3 hours; field work—6 hours. 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 up to a maximum of 15 units.

307. Teaching in Secondary Schools (5-18) I. The Staff
Course—3 hours; field work—6 hours. Prerequisite: acceptance into the 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.)
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 designed for students who are interested in understanding agricultural systems as they relate to the environment and society. Courses are selected to provide an interdisciplinary background that encourages 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 interconnected 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. Specialization in Agricultural and Environmental Management encompasses agricultural and environmental resource management, agricultural and resource economics, pest management, animal and range management. The Agricultural and Environmental 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 combination of internships and practice. In addition, students may 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; state and federal agencies concerned with land and resource management; Cooperative Extension; international development; teaching; nonfarm education; human resource development; and agricultural and environmental journalism, information and communication. Graduates will also be qualified to pursue graduate studies in the natural and social sciences, such as agroecology, environmental studies, pest management, education, business, management and policy.

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.)

**English Composition/Rhetoric Requirement**

<table>
<thead>
<tr>
<th>Course</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>English 1 or 3 and Rhetoric 1</td>
<td>1-12</td>
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**Preparatory Subject Matter**

<table>
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<tr>
<th>Course</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Biological sciences (biological sciences 1A-1B)</td>
<td>40-43</td>
</tr>
<tr>
<td>General Chemistry 2A-2B</td>
<td>10</td>
</tr>
<tr>
<td>Physics (Physics 1A-1B or Physics 5A-5B; see specializations)</td>
<td>6-8</td>
</tr>
<tr>
<td>Mathematics (Mathematics 16A)</td>
<td>3</td>
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<tr>
<td>Computer skills (Agricultural Systems and the Environment 120 or Statistics 13 or 102)</td>
<td>3-4</td>
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<tr>
<td>Economics (Economics 1A)</td>
<td>5</td>
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**Breadth/General Education Requirement**

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<tr>
<th>Course</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Social, Cultural, or Ethnic Studies (Anthropology 2, 101, 129, 133; American Indian Studies 1, 2, 120; Chicano Studies 130, 132; Native American Studies 10, 70; Sociology 3, 110, 129, 132, 144; Women's Studies 50)</td>
<td>16-24</td>
</tr>
<tr>
<td>History, Policy, and Philosophy of Science (History 130A or 130B, 136, 188A or 188B; History and Philosophy of Science 130A, 130B, 150; Philosophy 108; Political Science 3, 123, 124)</td>
<td>4</td>
</tr>
<tr>
<td>Recommended (to meet the Civilization and Culture general education requirement)</td>
<td>4</td>
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<tr>
<td>Minor in History and Philosophy of Science or a foreign language; courses in anthropology, cultural geography and nutrition (Anthropology 2, 112; Anthropology 2, 50; Nutrition 10, 121, geography and physical geography 1, 20, 50; Geology 1, 20, 50; Geography 1, 3, 3)</td>
<td>4-10</td>
</tr>
<tr>
<td>Atmospheric, soil, or water science (Atmospheric Science 133; Hydrologic Science 100, 110, 124; Soil Science 107, 109, 111)</td>
<td>4</td>
</tr>
<tr>
<td>Pest ecology and management (Plant Biology 120, 121; Entomology 110, 135; Nematology 100; Plant Pathology 120; Viticulture and Enology 110)</td>
<td>6-8</td>
</tr>
<tr>
<td>Agricultural Economics (Agricultural Economics 147, 176; Agricultural Economics 135, 143; Environmental Studies 121; Economics 135, 137, Geography 140; Hydrologic Science 120, Plant Biology 140; Political Science 107)</td>
<td>4</td>
</tr>
<tr>
<td>Unrestricted Electives (Mathematics 189A, Physics 5A-5B; Applied Biological Systems Technology 49; courses listed under Plant, Animal and Environmental Sciences)</td>
<td>3-6</td>
</tr>
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</table>

**Agricultural Systems and Environment**

<table>
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<tr>
<th>Course</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Crop biology and ecology (Agricultural Systems and the Environment 150 or Plant Science 101 or 145)</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural economics (Agricultural Economics 113 or 140)</td>
<td>4-6</td>
</tr>
<tr>
<td>Ecological principles (Plant Biology 117 or Environmental Biology 117)</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural practicum (Agricultural Systems and the Environment 92, 99; Agricultural Economics 49A, 49B, 49C; Animal Science 49A, 49B, 49C; Applied Biological Systems Technology 49, 52, 145)</td>
<td>3</td>
</tr>
<tr>
<td>Internship (Agricultural Systems and the Environment 192, 199)</td>
<td>3</td>
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<tr>
<td>Seminar (Agricultural Systems and the Environment 190)</td>
<td>2</td>
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</tbody>
</table>

**Senior Thesis.** The Senior Honors Thesis 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.

Areas of Specialization (choose one):

- **Sustainable Production Systems.** Includes food and agricultural production, agroecology, crop improvement, propagation, management. Restricted electives allow students to choose between a broad education in sustainable agriculture or to focus on one or two areas of agriculture. (e.g., agronomy, crop improvement, environmental horticulture, pest management, pomology, vegetable crops, viticulture.

- **Ecology of cropping systems (Plant Science 101 and Agricultural Systems and Environment 150).** Restricted elective courses with approval of the academic adviser from the following groups:

- **Agricultural production systems (Plant Science 101 and Agricultural Systems and Environment 150).**
- **Genetics (Plant Science 105 or Biological Science 101).**
- **Soils (Soil Science 100).**
- **Restrictive elective courses with approval of the academic adviser from the following groups:**
  - **Agricultural production systems (Plant Science 101, 107, 110A, 110B, 110C, 112; Animal Science 41; Environmental Horticulture 125, 130, 133; International Agricultural Development 102; Plant Science 115, 116; Pomology 103, Range Science 134, 135; Viticulture and Enology 101A, 101B, 101C, 111, 115, 116) 12-16
  - **Plant improvement and propagation (Plant Science 103, 106, 107, 109, 113, 114; Agricultural Systems and Environment 118).**
  - **Plant physiology or plant nutrition (Plant Biology 111, 135; Plant Science 110, 112, 128, 135; 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 (Plant Biology 120, 121; Entomology 110, 135; Nematology 100; Plant Pathology 120; Viticulture and Enology 110).**
  - **Agricultural Economics 147, 176; Agricultural Systems and Environment 121; Economics 135, 137, Geography 142; Hydrologic Science 120, Plant Biology 140; Political Science 107).**
  - **Unrestricted Electives.**
  - **Computer and quantitative skills (Agricultural Systems and Environment 121).**
  - **Soil Science (Soil Science 100).**
  - **Economics (Economics 13, Management 11A and 11B).**

  Restricted elective courses chosen with approval of the academic adviser from the following groups:
  - **Environmental and resource management (Environmental and Resource Sciences 103, 121, 131; Environmental Sciences 126, 155, 172, 173; Environmental Toxicology 112A, 114A, 113; Landscape Architecture 163, 184; Range Science 134, 135; Soil Science 116; Wildlife, Fish and Conservation Biology 110, 111, 120).**

*Course not offered this academic year.*
Agricultural and Environmental Communication and Information Management

This specialization provides broad preparation in the agricultural and environmental sciences along with an in-depth understanding of communications and information management. The option is intended to prepare individuals for careers in agricultural and environmental science journalism, news casting, information services, and industrial communications.

Soil Science (Soil Science 10 or 100) ....3-4
Management of Information (Agricultural Systems and Environment 102) ....4
Technical Writing (English 104) ....3
Upper Division internships (Agricultural Education 192) ....6-9
Information media (Agricultural Education 171, 172; Rhetoric and Communication 140, 142A, 142B) ...12-13
Communications and information transfer (Applied Behavioral Sciences 170; Rhetoric and Communication 130, 136) ....3-4
Agricultural and environmental communications and information emphasis ...10-15
Courses to be selected in consultation with academic advisor. Students typically will select one area of agriculture to develop a strength by taking three to four courses.

Unrestricted Electives ...10-33
Recommended courses: Mathematics 168, Physics 5A-5B, and courses listed under Plant, Animal and Environmental Sciences.

Minor Program Requirements:

Agricultural Computing and Information Systems

Agricultural Computing and Information Systems

18-19
Agricultural Computing and Information Systems—core courses: Agricultural Systems and Environment 120, Animal Science 129, minimum of 7 units from the three following groups:

(b) Communication and business organization (Agricultural Economics 112, Applied Behavioral Sciences 168, Rhetoric and Communication 130, 136) ....3-4
(c) Instrumentation and control (Food Science and Technology 156, Biological Systems Engineering 169) ....3-4


Advising Center is located in 132 Hunt Hall (916-752-1715).

Courses in Agricultural Systems and Environment (ASE)

Lower Division Courses

Agriculture, Nature and Society (3)
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 role in our search for a productive, lasting, and hospitable environment. Several full-term field trips provide hands-on learning.

Not open for credit to students who have completed Agrarian Studies 2. General Education credit: Nature and Environment.

Botany and Physiology of Cultivated Plants (2)
Saltveit (Vegetable Crops)
Lecture—3 hours; discussion/laboratory—1 hour. 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.

Applications of Microcomputers in Agriculture (3)
Zilbert (Agronomy and Range Science)
Lecture—1 hour; laboratory/discussion—4 hours. Prerequisite: high school algebra. Concepts of computing and applications using personal computers, spreadsheets, database management, word processing, and communications. Not open for credit to students who have completed Agricultural Science and Management 21.

Introduction to Agricultural Ecosystems (4)
Shennan (Vegetable Crops), Van Horn (Agronomy and Range Science)
Lecture—3 hours; laboratory—2 hours. Prerequisite: Chemistry 2A, Chemistry 2B (may be taken concurrently), and course 2 or the equivalent. Role of the biological and physical components of agricultural ecosystems and the structure and management of whole agro-ecosystems. Comparative analysis of important agricultural systems and practices. On- and off-campus field trips.

Agricultural Systems and Environment Seminar (1-4)
Z. T. T. Staff Seminar—1 hour. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

Internship (1-12)
I, II, III. The Staff (Director in charge)
Internship—3-6 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.)

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.)

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

Agriculture and the Environment (3)
Demment
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.

Small Fruit Production (2)
Shaw
Lecture—3 hours; two field trips arranged at mutual convenience. Prerequisite: Biological Sciences 1C or the equivalent. Strawberries (Fragaria), blackberries (Rubus), blueberries (Vaccinium), and currants (Ribes) 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 completed Botany 107. (Former course Botany 107.)

Principles of Agronomy (3)
Travis
Lecture—3 hours. Prerequisite: a course in general botany and/or course 2 or consent of instructor. Fundamental concepts of field crop production and agronomic problem solving using ecological, physiological, and genetic principles. Economic, political, and social problems are considered in relationship to technolo-
logical problems if they either impair or provide the means to promote agricultural development. Not open for credit to students who have completed Agronomy 100L. (Former course Agronomy 100L.)

110L. Principles of Agronomy Laboratory (1) Ill. \textit{Praxis} Laboratory—3 hours. Prerequisite: course 110 (may be taken concurrently). Laboratory concept of principles of agronomic crop production. Offered in alternate years. Not open for credit to students who have completed Agronomy 100L. (Former course Agronomy 100L.)

111L. 

111L. 

112L. Forage Crop Ecology (3) Ill. Teuber (Agronomy and Range Science) Lecture—3 hours. Prerequisite: Biological Sciences 100L or permission of instructor. Introduction to the world of world resources in forage production. Ecological principles governing the adaptation, establishment, growth, and management of perennial and annual forages, including pastures, rangelands, and hay. Effects of forage quality on livestock productivity. Offered in alternate years. Not open for credit to students who have completed Agronomy 112. (Former course Agronomy 112.)

113L. 

117L. 

117L. 

118L. 

119L. 

120L. 

121L. 

122. Management of Information for the Agricultural and Environmental Sciences (4) Ill. Zibert (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 completed course 101.

123L. Rangelands: Ecology, Conservation and Restoration (3) Ill. Rice Lecture—3 hours. Prerequisite: Biological Sciences 1C; introductory ecology course and junior standing recommended. Introduction to the ecological principles and processes important for understanding the dynamics of range ecosystems. Emphasis on ecological and evolutionary concepts underlying management strategies for the production and sustainable use of plant and animal diversity and environmental quality in rangelands. Offered in alternate years.

126L. Cropping Systems of the World (4) Ill. Sherman (Vegetable Crops) Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Biological Sciences 1C, and course 22 or Plant Science 101. World food production systems: concepts and assessment of sustainability; evaluation of methodologies for studies in agriculture and for development and conservation of crop systems and crop diversity. Offered in alternate years. Not open for credit to students who have completed Agronomy 126. (Former course Agronomy 126.)

170A. Fruit and Nut Crop Systems (2) Ill. McGarahan, 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 horticultural crops, analysis of current cultural and environmental problems and concern 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 Crop Systems (2) Ill. De Jong (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 horticultural crops, analysis of current cultural and environmental problems and concern associated with commercial fruit growing. Offered in alternate years. Not open for credit to students who have completed Pomology 170B. (Former course Pomology 170B.)

190. Seminar on Alternatives in Agriculture (2) Ill. Van Horn (Agronomy and Range Science) Seminar—2 hours. Prerequisite: upper division standing. Seminar on topics related to agricultural sciences, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. (PNN grading only.)

195. Internship (1-12) Ill. The Staff (Director-in-Charge) internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship on or off campus in agricultural and environmental sciences. (PNN grading only.)

194H. Senior Honors Thesis (2-6) Ill. The Staff Independent study. Prerequisite: Agricultural Systems and Sciences 400 or equivalent GPA of 3.5 or higher and consent of master advisor. 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. (PNN grading only; Deferred grading only, pending completion of thesis.)

195. Field Study of Vegetable Industry (1-3) Ill. Jackson Field study. Prerequisite: consent of instructor. Field study of different aspects of California agriculture, including research institutions, farm operations, field stations, Extension Service, marketing, processors, equipment, etc. To be given between winter and spring quarters. Considered a special course for pre-enrollment. Not open for credit to students who have completed Vegetable Crops 195. (Former course Vegetable Crops 195.) (PNN grading only.)

198. Directed Group Study (1-5) Ill. The Staff (Director in charge) Prerequisite: consent of instructor. (PNN grading only.)

199. Special Study for Advanced Undergraduates (1-5) Ill. The Staff (Director in charge) Prerequisite: consent of instructor. (PNN grading only.)

Agronomy

(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 Advisor. R. P. Reeder.

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:


Courses in Agronomy (AGR)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 132 Hunt Hall.

Lower Division Courses

92. Agronomy Internship (1-12) Ill, II, III, summer. The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: consent of instructor. Internship on or off campus in subject areas pertaining to agriculture. Internship supervised by a member of the faculty. (PNN grading only.)

Upper Division Courses

108. Internship (1-12) Ill, II, III, summer. The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 44 units and consent of instructor. Internship on or off campus in subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (PNN grading only.)

197T. Tutoring in Agronomy (1-5) Ill, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: course to be tutored or equivalent or written 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. (PNN grading only.)

*Course not offered this academic year.
116 Agronomy and Range Science

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisites: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisites: 15 hours in the division units of agronomy. (P/NP grading only)

Graduate Courses

205. Experimental Design and Analysis (4) II. Gang 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 220A. (Former course 202A.)

206. Multivariate Systems and Modeling (4) III. The Staff 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 2006.)

207. Plant Population Biology (3) II. Rice Lecture—2 hours, laboratory—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Evolution and Ecology 129, Plant Biology 117, or Environmetry 104); an advanced undergraduate course in genetics and evolution (e.g., Biological Sciences 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.)

211. Principles and Practices of HPLC (2) III. Goyal Lecture—1 hour; laboratory—3 hours. Prerequisite: undergraduate physics and chemistry; Biological Science 102; recommended. Principles and theory of HPLC involving various modes of separation and detection. Optimization of separation using isocratic and gradient elution. Development of practical knowledge about the use, maintenance, and troubleshooting of HPLC equipment, including HPLC columns. Development of new HPLC methods.

212. Advanced Plant Breeding (4) III. Teuber Lecture—3 hours; laboratory—3 hours. Prerequisite: course 208; Genetics Graduate Group 251D or Animal Genetics 107; Plant Science 113. Principles, 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 genetic data.

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 in alternate years.

232. Advanced Topics in the Physiology of Crop and Range Plants (3) III. Travis Lecture—3 hours. Prerequisite: Botany 111 or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crop and range plants in relation to nitrogen utilization and photosynthesis.

234. Physiology of Crop Growth and Development (3) I. Jerstad Lecture—3 hours. Prerequisite: Plant Biology 111, 112 or the equivalent. Selected aspects of plant growth and development as they relate to crop productivity. Analysis of current literature on shoot and root growth, function, photosynthesis, senescence, hormonal and environmental controls of development. Offered in alternate years.


291. Seminar in Plant Breeding and Evolution of Cultivated Plants (1-2) III. Gepts Seminar—1 hour. 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 hour. 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. Some course may not be tutored more than one time. (SU 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). (SU grading only)

Agronomy and Range Science

American Studies

(Excluding American Literature, American History and American Culture and Society)

American Studies offers an interdisciplinary approach to the study of American culture and society. Students who feel too limited by departmental approaches lower down, introductory classes that explore the ways in which cultural systems shape and reflect life in the United States. Through their own research experience, students learn to think creatively about the issues facing American society. American Studies majors offer a concentration in American Studies or in American Literature and American Culture. Majors in American Studies or in American Literature and American Culture will be considered for admission to the graduate program in American Studies.

24. 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 in alternate years.

232. Advanced Topics in the Physiology of Crop and Range Plants (3) III. Travis Lecture—3 hours. Prerequisite: Botany 111 or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crop and range plants in relation to nitrogen utilization and photosynthesis.

234. Physiology of Crop Growth and Development (3) I. Jerstad Lecture—3 hours. Prerequisite: Plant Biology 111, 112 or the equivalent. Selected aspects of plant growth and development as they relate to crop productivity. Analysis of current literature on shoot and root growth, function, photosynthesis, senescence, hormonal and environmental controls of development. Offered in alternate years.


291. Seminar in Plant Breeding and Evolution of Cultivated Plants (1-2) III. Gepts Seminar—1 hour. 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 hour. 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. Some course may not be tutored more than one time. (SU 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). (SU grading only)

Agronomy and Range Science

American Studies

(Excluding American Literature, American History and American Culture and Society)

American Studies offers an interdisciplinary approach to the study of American culture and society. Students who feel too limited by departmental approaches lower down, introductory classes that explore the ways in which cultural systems shape and reflect life in the United States. Through their own research experience, students learn to think creatively about the issues facing American society. American Studies majors offer a concentration in American Studies or in American Literature and American Culture. Majors in American Studies or in American Literature and American Culture will be considered for admission to the graduate program in American Studies.

The Major Program

American Studies offers an interdisciplinary approach to the study of American culture and society. Students who feel too limited by departmental approaches lower down, introductory classes that explore the ways in which cultural systems shape and reflect life in the United States. Through their own research experience, students learn to think creatively about the issues facing American society. American Studies majors offer a concentration in American Studies or in American Literature and American Culture. Majors in American Studies or in American Literature and American Culture will be considered for admission to the graduate program in American Studies.

American Studies majors take five upper division, 10-depth classes (plus below) and participate in three minor qualifying examinations that focus on major theories and methods in the study of American culture and society. American Studies majors may also ick courses in other departments to fulfill requirements in areas related to their interests and career goals.

The Program

American Studies majors take five upper division, 10-depth classes (plus below) and participate in three minor qualifying examinations that focus on major theories and methods in the study of American culture and society. American Studies majors may also ick courses in other departments to fulfill requirements in areas related to their interests and career goals.

1. American Studies majors take five upper division, 10-depth classes (plus below) and participate in three minor qualifying examinations that focus on major theories and methods in the study of American culture and society. American Studies majors may also ick courses in other departments to fulfill requirements in areas related to their interests and career goals.

2. The Program

American Studies majors take five upper division, 10-depth classes (plus below) and participate in three minor qualifying examinations that focus on major theories and methods in the study of American culture and society. American Studies majors may also ick courses in other departments to fulfill requirements in areas related to their interests and career goals.

3. Career Opportunities

As an interdisciplinary program, American Studies provides a good liberal arts and sciences undergraduate education. American Studies majors may pursue careers in a variety of fields, including journalism, law, medicine, nursing, law enforcement, environmental planning, public policy, business, science, museum curatorship, and business. Some students discover new career possibilities through their internships in American institutions.

A.B. Major Requirements:

Preparatory Subject Matter

UNITS

24 One course from American Studies 1 series... 4
20 One course from African American Studies 10, Asian American Studies 10, Africana Studies 10 or 20, Native American Studies 10, or Women's Studies 50... 4
8 Two courses chosen from History 17A, 17B, 72A, 72B
1 One course chosen from English 30A, 30B... 4

*Course not offered this academic year.*

Raymond C. Valentine, Ph.D., Professor Emeritus
Barbara D. Webber, Ph.D., Professor Emeritus
William A. Williams, Ph.D., Professor Emeritus

Courses. See the Agricultural Systems and Environment, Agricultural Education, Agronomy, Plant Science, and the Range Science course listings.
One course chosen from Anthropology 2, Sociology 2 ....................4

Depth Subject Matter .................................................46

American Studies core courses ................................12

American Studies 110, 120, and 130 ..........................120

American Cultural Themes .................................8

Choose any two courses from the 150 series ..............6

Three Junior Prossemesters ...................................6

(American Studies 180) .................................20

Emphasis .............................................................20

In consultation with an American Studies advisor, the student designs a program of
20 units of upper division course work around a unifying theme, period, or subj-
ject matter in American civilization. The course work should include 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 com-
position 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 coun-
toward this minor.

Faculty Advisers, R. Frankenberg, J. Mechling, D. S. Wilson.

Teaching Credential Subject Representative. J. Mechling. See also the Teacher Education Program.

Courses in American Studies

AMERICAN STUDIES

Lower Division Courses

1A. Technology, Science, and American Culture (4) I, Mechling
Lecture—3 hours; discussion—1 hour. American sci-
ence and technology as cultural systems, mutual influ-
ence and interaction of those systems with other cul-
tural systems, including religion, social thought, art,
arboriculture, literature, music, and common sense.
General Education credit: Contemporary Societies.

1B. Religion in American Lives (4) I, Mechling
Lecture—2 hours; discussion—2 hours. American reli-
igion and its role in American life. How do Ameri-
cans define their religious beliefs and practices?
General Education credit: American Culture.

1C. American Lives through Autobiography (4)
III, Frankenberg
Lecture—2 hours; discussion—2 hours. American
lives as told through the life stories of Americans,
with attention to the roles of gender, race, ethnicity, social class, and sexual ori-
entation in the individual's life story.

1E. Nature and Culture in America (4) III, Wilson
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 under-
standing ourselves and the natural world; attention to
modern times; history, health, stewardship, ecology in the "rights movement." Offered in alternate years. General Education credit: Civilization and Culture.

1F. The Popular Image of Women in America
(4) II, The Staff
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 pop-
ular feminine image and the demands of the larger Amer-
ican culture and society.

2. Forms of American Wisdom (2) III, Mechling
Lecture—1 hour; discussion—1 hour. Exploration of
the forms of wisdom that takes in America; folk knowl-
edge, popular beliefs; the role of the individual, the public, religion, common sense, science, literature; special attention to the grounding of wisdom in circumstance of race, gender; generation, ethnic identity, and region. (PINF 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 readings, discussions, written assign-
ments, and special activities (such as fieldwork, site
Limited enrollment.

98. Directed Group Study (1–5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. Primary for lower
division students. (PINF grading only.)

99. Individual Study for Undergraduates (1–5) I, II, III. The Staff
Chairperson in charge
(PINF 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 spe-
cial projects. Interdisciplinary group study of special topics in American Culture Studies, designed for nor-
mal majors 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 Au-
tobiography; (F) The Interrelationships Between Arts
and Ideas; (G) New Directions in American Culture Stu-
dies; (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, Wilson
Lecture—2 hours; discussion—2 hours. Prerequisite:
one of courses 1A, 1B, 1C, 1D, 1E, or 1F. Close ex-
amination of a single decade in American civilization; the connections between the history, literature, arts, cus-
toms, and ideas of Americans living in the decade.

120. American Culture and Folklife (4) III, Turner
Lecture—3 hours; fieldwork—1 hour. Theory and
method of the study of American folk traditions,
including oral lore, customs, music, and material
culture; the uses and meanings of those traditions in
various American contexts. (PINF grading only)

130. American Popular Culture (4) II. The Staff
Lecture/discussion—3 hours; fieldwork—1 hour. Pre-
requisite: course 1 or upper division standing. Ameri-
can 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. General Edu-
cation credit: Contemporary Societies.

151. American Landscapes and Places (4) II, Blair
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 1 or upper division stand-
ing. Comparative study of several American cultural
regions inhabiting a region, including their rela-
tions 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.

152. The Lives of Children in America (4) II, 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.

153. The Individual and Community in America
(4) II, Frankenberg
Lecture—2 hours; discussion—2 hours. Interdiscipli-
ary examination of the tensions that exist
between the individual and the community in an American
experience, as those tensions are expressed in such
cultural systems as folklore, public ritual, popular
entertainment, literature, fine arts, architecture, and
social thought.

154. The Lives of Men in America (4) III, Mechling
Lecture—2 hours; discussion—2 hours. Interdiscipli-
ary examination of the lives of men in America,
toward understanding cultural definitions of
masculinity, the ways individuals have accepted or
resisted these definitions, and the broader conse-
quencies of the struggle over the social construction
of gender.

155. Symbols and Rituals in American Life (4)
I. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite:
course 1. Interdisciplinary examination of selected,
richly expressive events (parades, festivals, ceremonies)
and symbols (flags, memorials, temples) which en-
code nationwide values and understandings (Thank-
sing, New Year's, etc.) or which realize more limited,
special meanings (Mardi Gras, rodeo, Kwanza,
graduation, bar mitzvah, etc.). Offered in alternate years.

156. Race, Culture and Society in the United
States (4) III, Frankenberg
Lecture—2 hours; discussion—2 hours. Prerequisite:
course 1. Interdisciplinary examination of the signifi-
cance of race in the making of America; how race
shapes culture, identities and social processes in the
United States; the intertwining of race with gender,
class and nationhood in self and community.

160. Undergraduate Seminar in American
Studies (4) I, II, III, Frankenberg, Mechling, Turner, Wilson
Seminar—3 hours; term paper. Prerequisite: open to
senior students in American Culture Studies. 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 culture.

180. Junior Prossemester (2) I, II, III, Mechling,
Turner, Franklinberg, Wilson
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.

190. Senior Thesis (4–4), I, II, III, Mechling,
Turner, Wilson, Frankenberg
Seminar—2 hours; independent study—2 hours. Pre-
requisite: senior standing in American Studies major.
In consultation with advisor; student contracts to write
an extended research paper on a topic mutually
agreed upon and enunciated in a prospectus re-
viewed 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
priori ty to American Studies majors. Supervised inter-
ship study within an American institution in
American civilization at archives, museums, schools,
historical societies, governmental and social agen-
cies, etc., with attention to the techniques of partici-

*Course not offered this academic year.*
Anatomy, Physiology and Cell Biology

pant 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 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. (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

Anatomy, Physiology, and Cell Biology (Veterinary Medicine, below); Cell Biology and Human Anatomy (Medicine, School of)

Anatomy, Physiology, and Cell Biology
(School of Veterinary Medicine)
Dallas M. Hyde, Ph.D., Chairperson of the Department
Department Office, 1321 Haring Mail (916-752-1174)

Faculty
Howard C. Bailey, Ph.D., Assistant Adjunct Professor
Harry P. Benton, Ph.D., Assistant Professor
Michael L. Bruss, D.V.M., Ph.D., Professor
Jeffrey M. Cheek, Ph.D., Assistant Research Toxicologist
Sharon L. Cummings, Ph. D., Assistant Professor
Leslie J. Faukin, Jr., Ph.D., Professor
Dorothy W. Gieszen, Ph.D., Associate Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
Mary Anne Hickman, Ph.D., Assistant Research Physiologist
David E. Hinton, Ph.D., Professor
Dallas M. Hyde, Ph.D., Professor
Kent Pinkerton, Ph.D., Associate Professor in Residence
Charles G. Popper, Ph.D., Professor
Edward S. Schelegle, Ph.D., Assistant Research Physiologist
Susan M. Stover, D.V.M., Ph.D., Associate Professor
Fern Stover, V.M.D., Ph.D., Associate Professor
William Thurber, M.D., Adjunct Professor
Barbara Washburn, D.V.M., Associate Specialist
Reen Wu, Ph.D., Professor in Residence

Emeriti Faculty
George H. Carden III, D.V.M., Ph.D., Professor Emeritus
Donald L. Curry, Ph.D., Professor Emeritus
Alfred A. Hauser, Docteur-en-Sciences, Professor Emeritus
Ralph L. Kitchell, D.V.M., Ph.D., V.M.D. (Inc), Professor Emeritus, Academic Senate Distinguished Teaching Award
Walter S. Tyler, D.V.M., Ph.D., Professor Emeritus

Courses in Anatomy, Physiology, and Cell Biology (APC)

Upper Division Courses

100. Comparative Organography of Vertebrates (4) I. 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.

185. 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. Organography (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—9 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 (Chairperson 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—6 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 of the Liver (3) I. Bruss
Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: systematics of physiology, biochemistry or physiological chemistry, or consent of instructor. Topics in functional morphology, physiology, intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments, chenodeoxycholic acid and other bile acids, drug and toxin metabolism; circulation; carbohydrate, lipid, and protein metabolism; ion transport; and function tests.

236. The Secretory Process (2) I. The Staff (Chairperson in charge) Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and intracellular secretory cells are involved in secretion with emphasis on physiological initiators and modifiers. All secretory systems, but emphasis placed on the beta cell of the endocrine pancreas as role model. Offered in alternate years.

238. Behavioral Adaptations to Parasites and Pathogens (3) II. Hall
Lecture—2 hours; term paper/discussion—1 hour. Prerequisite: Veterinary Medicine 406; or graduate standing and upper division course in animal behavior, or consent of instructor. Examination of the ways in which animals use behavioral strategies to avoid debilitating viral, bacterial, and parasitic diseases, or to overcome such diseases once they are sick. Main emphasis is on vertebrates, especially wild and domestic mammals.

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 tumor; mechanisms of carcinogenesis; intrinsic and extrinsic euglogic factors. Offered in alternate years.

284. Ruminant Nutrition and Physiology (3) III. Bruss, Morris
Lecture—2 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 101) Biochemistry (e.g., Biological Sciences 102 and 103) or physiological chemistry (e.g., Physiological Chemistry 101A and 101B) or equivalent. Basic 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 determine with 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. (SU grading only.)

291. Topics in Biology of Respiratory System (1) I, II, III. Hyde, Popper, 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 toxics, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (SU 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 underpinning methods, results, interpretation of data, and relevance of studies. Possible topics include: autonomic nervous system, neuroendocrinology, neurotransmitter regulation of gene expression, neuroimmune interactions, stress. (SU 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. (SU 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.
443. Behavior Clinic (2) I, II, III. Hart Laboratory—1 hour; discussion—2 hours. Prerequisite: second year standing in the School of Veterinary Medicine and course 458. Clinical training in behavioral therapy. Students work with clients and animal patients through the Behavioral Services Outpatient Clinic. Case record work-ups with selected presentations of cases during discussion sessions.

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.

464. Ruminant Nutrition and Physiology (3) III. Bruss, Morris Lecture—2.7 hours, laboratory—0.9 hours. Prerequisite: graduate student or graduate student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division systems physiology (e.g., Neurobiology, Physiology and Behavior 110), biochemistry (e.g., Biological Sciences 102 and 103) or equivalent. Basic and applied aspects of ruminant nutrition and physiology; nutritional and metabolic disorders of ruminants. (Same as course 284.)

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Anesthesiology
See Medicine, School of

Animal Behavior
(A Graduate Group)

Benjamin L. Hart, D.V.M., Ph.D., Chairperson of the Group
Group Office, 112 Harris Annex (Animal Behavior Program) (916)-752-4863; FAX: 916-752-6391; e-mail: jnmetcalcularstate.edu

Faculty
The Group includes faculty from fourteen departments in three schools and colleges.

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program which 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 three areas of specialization: (1) ethology and evolutionary bases of animal behavior, (2) physiological basis of animal behavior, and (3) applied animal behavior. All three 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 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 266, 207, Statistics 106, or 110
Scientific approaches to animal behavior research:
Animal Behavior 201
Ethology in animal behavior: Animal Behavior 290
Ecology: Entomology 104, Environmental Studies 100, 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 advisor.

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. Offered in alternate years.

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) III. 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.

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. (SU 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: consent of instructor. (SU grading only.)

*Course not offered this academic year.

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Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Animal Science.

Major Program. See the major in Genetics.

Related Courses. See Agronomy 221, 222, 223; Plant Pathology 215; Plant Science 113; 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, 1250A Meyer Hall.

Upper Division Courses

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, pedigreed traits, categorical traits, and best linear unbiased prediction.

110. 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. Concepts of expected value, estimation of variance components and the simulation of biological data.

111. Molecular Biology Laboratory Techniques (4) II. Murray, Osterbauer 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 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
Animal Science

(Physical Sciences, Biogeochemical Sciences, Department of Biological Sciences, 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, 2222 Meyer Hall (316-752-1250)
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
Rebecca Baldwin, Ph.D., Professor, Professor of Animal Science
Patricia J. Berger, Ph.D., Associate Professor
Christopher Calvert, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor (Biological Sciences, Department of Biological Sciences, College of Agricultural and Environmental Sciences)
Douglas E. Croll, Ph.D., Associate Professor
Fred S. Conte, Ph.D., Lecturer
Edward J. DePeters, Ph.D., Professor
Serge Denison, Ph.D., Professor
James G. Fadel, Ph.D., Associate Professor
Thomas R. Farnum, Ph.D., Professor
Graham A. E. Gall, Ph.D., Professor
Ian Garnett, Ph.D., Senior Lecturer
Denise Hedgecock, Ph.D., Lecturer (Bodega Marine Laboratory)
Silas S. O. Hung, Ph.D., Professor
Yu-Bang Lai, Ph.D., Professor
Joan M. Macy, Ph.D., Professor
Juan F. Medrano, Ph.D., Associate Professor
Gary M. Meiberg, Ph.D., Professor
James D. Murray, Ph.D., Professor
Anita M. Oberheuser, Ph.D., Assistant Professor
James W. Ottinger, Ph.D., Lecturer
Edward O. Price, Ph.D., Professor
Janet F. Roser, Ph.D., Associate Professor
Roberto D. Sanchez, 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. Lanen, Ph.D., Professor Emeritus
Glen P. Logren, Ph.D., Professor Emeritus
James H. Meyer, Ph.D., Professor Emeritus
Chancellor Emeritus
Wayne D. Rollins, Ph.D., Professor Emeritus
Robert W. Touchberry, Ph.D., Professor Emeritus
William C. Weir, Ph.D., Professor Emeritus

The Major Program

The animal science major gives students an understanding of the proper care of animals and their utilization by people for food, fiber, work, research, companionship, and recreation. Aquaculture, companion animals, laboratory species, and domestic animal agriculture are included in animal science. The study of animals is achieved through biological, physical and social sciences, such as chemistry, biochemistry, genetics, nutrition, economics, mathematics, and their integration in the various animal science courses.

The Program. Two options are available in the major: Animal Biology and Aquaculture. The Animal Biology option is designed for students with interests in the biology of domestic animals, covering the range of study from the molecular and cellular levels to the whole animal and populations of animals. Course requirements emphasize domestic animal biology and production. Course requirements in the Aquaculture option emphasize biology and production of fresh- and saltwater aquatic animals. The Aquaculture option is appropriate for students interested in applying principles of animal production to aquatic species.

Internships and Career Alternatives. Animal science offers a wide range of internship opportunities for study both on campus at departmental facilities and off campus at field stations, government agencies, and with private industry. Career opportunities for graduates cover a wide range of options from farming and ranching to all of the industries, institutions, and professions involved with domestic animals and aquaculture. These include positions in management, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research. Preparations for veterinary medicine or other professional schools or graduate study can be achieved by careful planning in the major.

B.S. Major Requirements:

Write/Oral Expression

Preparatory Subject Matter

Animal science (Animal Science 1, and either 15 or 18 or 41 and 41L or 42) 11-12
Chemistry (Chem 1A, 2A, 2B, 2B, 16) 16
Computer science (Agricultural Systems and Environment 21) 3
Mathematics (Mathematics 16A or 16B or more advanced mathematics courses) 8
Statistics (Agricultural Systems and Environment 120 or Statistics 101, or other courses in quantitative skills with prior approval of the major adviser) 4

Breadth/General Education

Depth Subject Matter

Biological Sciences 101, 102, 103, 104, 13 Animal Genetics 107 5
Nutrition 110 5
Animal Biology option 45-39

Physiology, Neurobiology, and Behavior 101 5

Laboratory, one course from the following:

Animal Genetics 111, Animal Science 135, Microbiology 177, 177L (Microbiology 177C must be taken concurrently); Molecular and Cellular Biology 120L; Neurobiology, Physiology and Behavior 101C; Pathology, Microbiology and Immunology 126; and the balance from Animal Sciences 102, 104, 105, 106, 118, 119, 120, 120L, 123, 124, 128, 131, 135 (if not elected above), 141, 145, 147, 148; Animal Genetics 108, 109, 111 (if not elected above); Microbiology 177, 177L (if not elected above); Nutrition 115, 122, 125, 128, 129, 134, 140; Neurobiology, Physiology and Behavior 121, 121L, 130, 142; and the following courses are required in consultation with your faculty adviser and used toward the 28-unit Animal Science requirement:

Wildlife, Fish and Conservation Biology 121, 121L, Population Health and Reproduction 111; Molecular and Cellular Biology 150, 150L; Pathology, Microbiology and Immunology 126; Avian Science 100.

Aquaculture option

Physiology 1A-59 or 1A-59L; Evolution and Ecology 112, 112L 7
Wildlife, Fish and Conservation Biology 120, 120L 3
Nutrition 124 3
Neurobiology, Physiology and Behavior 142, or Biological Sciences 121 and 123, or Wildlife, Fish and Conservation Biology 121 4
Animal Sciences 118 and 119 8
Animal Science 120 12
At least four (4) courses and at least 12 units including one laboratory course (designated with "P" or "L" or Animal Science 135 or Animal Genetics 111) from the following list:


Unrestricted Electives 27-53

Total Units for the Degree 180

Master Adviser: G.A.E. Gall

Graduate Center for the major is located in 1202A Meyer Hall. Students must secure their academic adviser through this office upon entering the major.

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 department.

Graduate Adviser: T.R. Farnum (M.S. degree); I. Gieker (M.A.M. degree).

*Course not offered the academic year.
Courses in Animal Science (ANS)

Lower Division Courses

1. Domestic Animals and People (4) I. Farnum Lecture—3 hours; laboratory—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, clothing, 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. General Education credit. Natural and Environmental, research.

2. Introductory Animal Science (4) I. III. Berger Lecture—3 hours; laboratory—3 hours. Prerequisites: 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 science to animal production. General Education credit. Nature and Environment.

15. Introductory Horse Husbandry (3) I. Frasor 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.


21. Livestock and Dairy Cattle Judging (2) I. II. 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.


41L. Domestic Animal Production Laboratory (2) C. DePeters Laboratory—6 hours. Prerequisite: course 41 may be taken concurrently. Applied domestic production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (P/NP grading only.)


49A-49B. Animal Management Practices (2-2-2) 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 beef and dairy cattle, dairy goats, horses, sheep, swine, and laboratory animals.

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.)

98L. 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

102. Limited Resource Animal Agriculture (4) I. Brown Lecture—3 hours; laboratory—3 hours; one all-day Saturday field trip required. Prerequisite course 2. Environmentally and economically sound methods are presented to meet objectives of limited resource animal agriculture systems. Range systems, small farms, Third World agriculture, and domesticated wildlife enterprises are considered. (Same course as International Agricultural Development 102.)

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 learning in domesticated animals. Social behavior, learning, and physiological mechanisms influencing behavior will be discussed. Offered in alternate years. (Students who have received credit for Zoology 155 may receive credit only 2 units for this course.)

185. Behavioral Adaptations of Domestic Animals (2) II. Price Lecture—2 hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management. Offered in alternate years.

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.

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.

118. Fish Production (4) II. Dorschov Lecture—3 hours; laboratory—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 system, management, economics, and marketing practices utilized. Emphasis on species currently reared in California.

119. Invertebrate Aquaculture (4) I. Conklin Lecture—3 hours; discussion—1 hour. Prerequisite: Evolution and Ecology 112 or Neurobiology, Physiology and Behavior 142, or the equivalent; Applied Biological Systems and Technology 161 recommended. Principles of aquatic invertebrate biology; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food. Emphasis will be on the interaction of species biology and managerial techniques on production efficiencies.

120. Principles of Meat Science (3) III. Bandman (Food Science and Technology) Lecture—3 hours. Prerequisite: Biological Sciences 103, or equivalent; Principles of elementary biological development, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat production. (Same course as Food Science and Technology 120.)

120L. Meat Science Laboratory (2) III. Lee, Bandman (Food Science and Technology) Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103; course 122 (may be taken concurrently). Laboratory exercises and student participation in transformation of live animal to carcass, and meat, smoke and other 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 120.)

123. Animal Growth (4) III. Sainz, Oberbauer. Lecture—4 hours. Prerequisite: Biological Sciences 101, 103; Basic and practical aspects of prenatal and postnatal growth development. Emphasis on genetic, hormonal, and biochemical control of meat protein accumulation.

124. Lactation (4) I. Baldwin Lecture—4 hours; laboratory—4 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.

125. Equine Exercise Physiology (4) I. Roser Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101. Distance learning class broadcast via K��的比赛 Field (P/NP grading only.)

128. Linear Programming in Animal Agriculture (3) I. Fader Lecture—2 hours; laboratory—2 hours. Prerequisite: linear programming. Upper division standing; Nutrition 115, 115 or the equivalent; understanding of animal production, or consent of instructor. Linear programming in animal agriculture emphasizing farm planning and ration formulation. Provides extension tools and well-trained computers (and instructor have two-way communication capabilities).

135. Reproduction and Early Development in Aquatic Animals (4) III. Dorschov Lecture—3 hours; laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 120; 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.

135L. 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 students 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 Biochemistry 101L.)

140. Management of Laboratory Animals (4) I. Weisbrod 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) I. Rodriguez-Garratt 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.

143. Pig and Poultry Care and Management (4) I. Garnett, Ernst, Berg 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 environ-
144. Beef Cattle and Sheep Production (4) I, II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 214, Animal Genetics 107, Animal Nutrition 115, or consent of instructor; a course in Range Science and a course in microcomputer applications. Examination of growth and feed conversion; selection and breeding for growth and feed conversion; meat and mutton production. Factors affecting growth, feed conversion, and meat yield. (SU grading only.)

145. Meat Processing and Marketing (4) II. Lee

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 143 or 144 or consent of instructor. Distribution of meat, processing of meat, and marketing of meat and meat products. Meat and mutton grading and marketing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. (SU grading only.)

146. Dairy Cattle Production (4) III.

DePeters

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 124, Animal Genetics 107, and Animal Nutrition 115, or consent of instructor. Scientific principles from genetics, nutrition, reproduction, 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.

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 practices, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives; and product development.

148. Enterprise Analysis in Animal Industries (3) III.

Garnett

Lecture/discussion—4 hours. Prerequisite: course 141 or 146 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.

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—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, individual, or agency that is concerned with animal enterprises. All requirements of Internship Approval Request Form must be met. (P/NP grading only.)

193. Introduction to Animal Science Research (1) I, II, III.

Gall

Lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A and 1B, course 2 and an upper division Animal Science course. Consideration of ethics in animal research. Topic of a research project, project design, and literature review; preparation of a research proposal. Mid-term report and preparation of a brief research proposal.

194. Research in Animal Science (3) I, II, III.

The Staff

Lecture—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 groups. 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-III.

The Staff (Chairperson in charge)

Lecture—1 hour; laboratory—9 hours. Prerequisites: 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. Maybe repeated for credit for a total of three times. Limited enrollment.

197. 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 coursework; optional conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated once for credit. (P/NP grading only.)

198. Directed Study and Group Study (1-16) 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) IV.

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.

Fadi

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 168; Statistics 102B. Basic model building principles of 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.


Oberbauer

Lecture—3 hours. Prerequisite: Biological Sciences 103 and 104; Molecular and Cellular Biology 102B and 141. Cellular and molecular mechanisms of growth regulation. Topics include cellular proliferation and differentiation in both tissue culture and animal models. Autocrine, paracrine, and transacting factors are discussed. Emphasis on critical reading and writing, including development of an original research proposal.

216. Grant Writing Techniques (1) II.

Obrecht

Lecture—1 hour. Prerequisite: course 215. Introduction to the peer-reviewed grant writing process. Sources of funding, proposal description, budget calculation, and materials that are discussed. Proposals written in course 215 will be revised. (SU grading only.)


The Staff (Chairperson 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 analysis; surgical preparations useful in nutrition research; review of current literature. May be repeated for credit when topics differ. (SU grading only.)

230. 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. (SU 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. (SU 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 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. (SU grading only.)

298. Group Study (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (Sec. 1, 2, 3—letter grading; from Sec. 4—SU grading only.)

299. Research (1-12) I, II, III.

The Staff (Chairperson in charge)

(SU 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 many of the business related to agriculture. Many graduates enter graduate, veterinary and medical schools, while others become teachers and extension personnel.

The Program: The program in animal science and management is designed for students who want a fundamental background in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), as well as courses 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 principles 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. 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. Advances degrees open doors to work as extension specialists, farm advisors, 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.

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 how 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.

*212. Economic Anthropology (4) III. Davia Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies, their social and cultural setting, and its modern changes.

223. Anthropology and Political Economy (4) III. C. Smith 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.

135B, 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, militarized movements, social bandits, Indian "wars," ethnic and regional conflicts, gender and class conflicts.

214. Religion in Society and Culture (4) II. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Discussion of anthropological theories of religion with an emphasis on non-literate societies. Survey of theories of institutional analysis, the role of symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. General Education credit: Contemporary Societies.

125A, Structuralism and Symbolism (4) I. Yengoyan Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The processes that humans develop in order to make sense of their social environment. How symbols and structures are used to organize and interpret the world around them. General Education credit: Contemporary Societies.

125B. Postmodernism(s) and Culture (4) II. Lavel Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theory and methodology of postmodernism. Focus on the critique of modernism and the development of postmodernism. General Education credit: Contemporary Societies.

226. 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.

227. Urban Anthropology (4) II. Walton Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of contemporary urban living: political structures, organization of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies.

128. Kinship and Social Organization (4) II. Davis 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.

129. Psychological Anthropology (4) I. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Comparative exploration of the individual in foraging, horticultural, pastoral, agricultural, and industrial societies. Impact of class and state formation on ruralization, urbanization, economic and political change on the individual. General Education credit: Contemporary Societies.
130. Gender and Sexuality (4) III. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Gender and sexuality in historical and cultural contexts. The biological, social, and cultural aspects of gender and sexuality in the development of human societies.

139. Race, Class, Gender Systems (4) III. C.A. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Critical examination of the interrelatedness of race, class, and gender in historical and contemporary societies. The impact of these systems on social, economic, and political structures.

140A. Cultures and Societies of West and Central Africa (4) I. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of Western and Central African cultures with a focus on the diverse social, political, and economic systems found in these regions.

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 African cultures with a focus on the diversity of social, political, and economic systems found in these regions.

134A. Ethnology (4) I. Ferguson Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic analysis of selected societies, focusing on the diversity of social, political, and economic systems found in these regions.

135. Peasant Society and Culture (4) I. C.A. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities, focusing on the diversity of social, political, and economic systems found in these regions.

136. Ethnographic Film (4) I. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An introduction to the study of film in anthropology, focusing on the diversity of social, political, and economic systems found in these regions.

137. Theory in Social-Cultural Anthropology (4) I. C.A. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An introduction to the diversity of social, political, and economic systems found in these regions.
Anthropology

captive primates and local birds with quantitative analysis of observations.

155. Comparative Primate Anatomy (4) II.
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.

156. Introduction to Osteology (3) 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, age.

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.

158. An introduction to 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 (hemoglobination), general electrophoresis on starch, cellulose acetate and polyacrylamide gels, isoelectrofocussing on agarose. (P/N grade only)

159. The Evolution of Females and Males: Biological Perspective (3) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Current theoretical frameworks explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles.

(c) Archaeology and Prehistory

170. Archaeological Theory and Method (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Introduction to the basic principles of archaeological interpretation, emphasizing methodological perspectives.

171. Geochronology (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Introduction to the theory, methods and techniques for studying the geomorphic history of the Earth. Special attention will be given to the geological evidence of human evolution.

172. New World Prehistory: The First Arrivals (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Survey of data relating to the peopling of the New World. Cultural adaptation and development in the Americas.

173. New World Prehistory: Archæological Adapation (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Introductory survey of the prehistoric cultures of the Americas.

174. Prehistory of California and the Great Basin (4) II
Lecture—2 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact.

175. Hunter-Gatherers (4) III. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Study and interpretation of the ancient and modern lifeways in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. Offered in alternate years. General Education credit: Contemporary Societies.

176. Ethnoarchaeology (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Concepts and methods in the study of contemporary cultural systems. Case studies from different parts of the world as a means of introducing students to the research process in archaeology.

177. Field Course in Archaeological Method (9) Sumner, The Staff
Lecture—6 hours; daily field investigation. Prerequisite: course 3. On-site course in archaeological methods and techniques held at a field school in the western United States, generally California or Nevada. Introduces basic methods of archaeological survey, mapping, and excavation.

178. Laboratory in Archaeological 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 for publication. May be repeated for credit with consent of instructor. Limited enrollment.

179. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4) II. The Staff
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 placed on the significance of material resources as factors in prehistoric adaptation, settlement pattern, and culture change are discussed.

(e) Special Study Courses

180. Topics in Anthropology (4) I. Bettinger
Lecture/discussion—3 hours; term paper. Prerequisite: junior standing in anthropology; intensive treatment of a special anthropological topic or problem. May be repeated once for credit when topic differs.

181. Internship in Anthropology (1-12) I. I. III. The Staff
Internship—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. May be repeated for credit. (P/N grade only)

194H. Special Study for Honors Students: (1-5) I. I. III. The Staff (Chairperson in charge)
Prerequisite: open only to majors in senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. (P/N grade only)

187. Tutoring in Anthropology (1-5) I. I. III. The Staff
Tutoring—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/N grade only)

188. Directed Group Study (1-5) I. I. III. The Staff (Chairperson in charge)
(P/N grade only)

199. Special Study for Advanced Undergraduates (1-5) II. III. The Staff (Chairperson in charge)
(P/N grade only)

Graduate Courses

201. History of Anthropological Thought (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/Rodman
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 will be on the critical examination of major contemporary debates over the next generation of competing theories.

205. History and Theory in Anthropological Linguistics (4) I. J.S. Smith
Seminar—3 hours; term paper. History of thought in anthropological linguistics. Consideration of the historical development of major ideas in anthropological linguistics, of major theoretical issues, and of research methodology.

206. Research Design and Method in Social Anthropology (3) III. Boyd
Seminar—3 hours; term paper. Prerequisite: student-instructor session (in-depth work on proposal writing). Prerequisite: consent of instructor. Formulation of research problems and preparation of research proposals; relationship between theory and method, funding, pre-fieldwork 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) I. Laurie
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 procedural aspects of the fieldwork and its written representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated once for credit. Limited enrollment.

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) I. Walton
Seminar—3 hours; term paper. Analysis of various phases of culture, such as religious, economic, 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 seek to understand the human 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)

212. Problems in Archaeological Method (4) II. Beaton
Seminar—3 hours; term paper. Techniques for analyzing and interpreting archaeological 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.

*Course not offered this academic year.
218. Topics in North American Prehistory (4). I. Betzigger 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) II. 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. Callender Seminar—3 hours; term paper. Prerequisite: courses 221, 265, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between native and rural and urban populations in varying conditions are considered.

222. Problems in African Society and Culture (4) I. Curley Seminar—3 hours; term paper. Prerequisite: knowledge of one African language. Comparative study of selected Black communities in the New World.

241. Topics in North American Ethnology (4) I. 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. C.A. Smith Seminar—3 hours; term paper. Prerequisite: knowledge of one or more of the major languages of the region.

252. Human Behavior Seminar (4) II. McHenry Seminar—3 hours; term paper. Prerequisite: course 132 or consent of instructor. Study of selected topics in human evolution.

253. Seminar in Human Biology (4) II. Staff Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study on current problems in human biology.

254. Current Issues in Primate Sociobiology (4) III. Rustman Seminar—3 hours; term paper. Prerequisite: course 154B or equivalent. Analysis of primate behavior, with particular emphasis on the role of social organization.

258. Evolution and Human Behavior (4) II. Hruby Seminar—3 hours; term paper. Prerequisite: consent of instructor. Study of human evolution and behavior, with particular emphasis on the role of social organization.

268. Concepts and Problems in Applied Anthropology (4) II. Staff Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study in cultural anthropology; problems of planning and evaluation; use of anthropological theory and practice in professional fields such as agronomy, human behavior, administration, and international technical assistance.

700. 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. (SU grading only.)
Field of concentration........................................37
Additional upper division courses related to the major, determined in consultation with faculty adviser. (Up to 5 units of variable-unit course work may be counted toward this requirement, e.g., Applied Behavioral Sciences 159, 192, 196, 197, 198.)

Unrestricted Electives......................................41-52
Total Units for the Degree................................180

Other Requirements
In consultation with a faculty member, Majors must design a program of study which will include an area of specialization. Students must submit a written proposal for the major to be reviewed by a faculty committee.

Advising Center for the major is located in 1303 Hart Hall (915-752-2244).

Minor in Community Development
Minor Program Requirements:
The Applied Behavioral Sciences faculty offers the following minor program:

Community Development................................44
Applied Behavioral Sciences 1, 151, 152, 164 ...........16
Two courses from the following:
Applied Behavioral Sciences 140, 157, 158, 162, 168, 171, 172, 173, 175, 176, 178, 179 ...........8

Graduate Study: Refer to the Graduate Studies section in this catalog for details.

Related Courses: See Environmental Studies 101, 103, 105, 113.

Courses in Applied Behavioral Sciences (ABS)

Lower Division Courses
1. The Community (4) I. MacCannell; III. The Staff
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 ghettos, suburban mainline, and California farm workers.

2. Ethnicity and American Communities (4) II. Guarnaccia; 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. General Education credit: Contemporary Societies.

17. Population and Community (2) I. The Staff
Lecture—2 hours. Dynamics and challenges posed 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.N.P. grading only.)

47. Orientation to Community Resources (2) II. Thompson; III. Fujimoto
Field trips—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.N.P. grading only.)

92. Internship (1-12) I, II, III. The Staff
(Chairperson in charge)
Internship:
Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P.N.P. grading only.)

98. Directed Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P.N.P. grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P.N.P. grading only.)

Upper Division Courses
118. Technology and Society (4) II. Kennery
Lecture—3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Analysis of the impact of new technology on labor relations, employment, industrial development and international relations. The internal relations of technology and development.

140. Political Economy of Regional Development (4) I. The Staff
Lecture—4 hours. Prerequisite: one undergraduate economics, agricultural economics or political 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.

151. Community Field Research: Theory and Analysis (3) I. Smith; II. The Staff
Lecture—3 hours. Prerequisite: course 151 may be taken concurrently; course 1 and any upper division Applied Behavioral Science 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 a structural analytic, elite interviewing, ethnographic research, and comparative community studies.

152. Community Development (4) II. The Staff
Lecture—4 hours. Prerequisite: courses 1 and 2, or consent of instructor. Introduction to community organizing, participatory development and the role of change agents in the development process. Students work in teams and conduct fieldwork in local communities.

153. International Community Development (4) II. 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 local control. General Education credit: Contemporary Societies.

154. Social Theory and Community Change (4) I. Hirtz
Lecture—4 hours. Prerequisite: course 1, Sociology 1, or Anthropology 2. A comparative overview of the dominant social science paradigm for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory, structuralism, and methodological individualism. General Education credit: Contemporary Societies.

157. Politics and Community Development (4) I. Smith
Lecture—4 hours. Prerequisite: prior course work in sociology or political science recommended. Analysis of political, economic and social forces shaping the form and function of local communities in the United States. Consideration of the state, the community and social change and case studies of actual
community development in comparative historical perspective.

158. Small Community Governance (4) II. Sokolow
Leisure/entertainment—3 hours; fieldwork—3 hours. Prerequisite: course 251 or 160 or Political Science 100. Governing institutions and political processes in rural and small urban places. Local government organization and authority; leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in selected communities. Offered in alternate years.

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 experience in urban or rural communities. Focuses on design, sampling, measurement and analysis.

160. Ethnographic Research in America (4) II, III. The Staff
Leisure—4 hours; discussion—1 hour. Prerequisite: completion of 8 units of course work in Anthropology, Sociology, or Applied Behavioral Sciences. Methodologies, ethics and goals of qualitative research. Emphasis on analyzing and conducting ethnographic research in American communities; problem formulation, analytic modes, data collection and interpretation. Offered in alternate years.

162. People, Work and Technology (4) II, III. Wells
Leisure—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-related communities, education and the labor market, work and the economic system and the future of work.

163. Behavior of Community Organizations (4) II, III. Hirtz
Leisure—4 hours. Prerequisite: introductory social sciences course. How community organizations function and how members of organizations interact with each other in 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, III. Hirtz
Leisure—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) I. Goldman
Leisure—4 hours. Prerequisite: courses 160, 161. Role of program evaluation in organizational and program management. Concept of "management by evaluation." Program planning, improvement, and accountability.

171. Housing and Social Policy (4) III. The Staff
Leisure—4 hours. Social impact, economics, and politics of housing in the United States. Special attention given to alternative policies at state and local levels.

172. Social Inequality: Issues and Innovations (4) I. Wells
Leisure—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 structure and historical explanations, prejudice and discrimination, the "culture of poverty," and situations concerning race, sex, and genetic potential.

173. The Continuing Learner (4) II. The Staff
Leisure—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of experiential education in the community. Designing of adult education programs.

174. Communication for Community Change (4) III. The Staff
Leisure—4 hours. Prerequisite: course 1. Communication as a medium 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) II. The Staff
Leisure—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. Guarino
Leisure—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Social comparison of the development and function of 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.

190. Current Issues in Applied Behavioral Sciences (1-4) 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—Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

193. Applied Behavioral Sciences Seminar: Major Proposal (2) I, II, III. The Staff Seminar—1 hour; discussion—1 hour. Prerequisite: course 1. Open to Applied Behavioral Science majors only. Designing an Applied Behavioral Sciences major, including identification of course work and personal experience. Required of all Applied Behavioral Science majors. (Deferred grading only, pending completion of sequence.) (P/NP grading only.)

196. Senior Project in Applied Behavioral Sciences (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: major in Applied Behavioral Sciences, and consent of instructor. Guided research leading to completion of senior thesis. May be repeated for credit. (P/NP grading only.)

197. Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Leading a small voluntary discussion group. (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 (1-6) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Planning Processes in Applied Behavioral Sciences (4) I. The Staff
Leisure—5 hours; supervised practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, including new concepts, theories, and methods for planning with application to educational institutions, agencies and the community at large.

202. Systems Approach for Organizational Change (4) III. Hirtz
Leisure—4 hours. Prerequisite: course 201 or consent of instructor. Organizational structure and processes from systems perspective. Interorganizational environment, network organization, the concept of networking, and the design of organizational structure and processes.

203. Evaluation and Decision Making (4) II. Goldman
Leisure—4 hours. Prerequisite: graduate standing; knowledge of social science research methods. Focuses on theoretical formulations and methodological considerations when designing evaluation research studies for social programs. Includes examination of relationship between organizational planning, measurement and evaluation research; value conflicts; multiple information requirements; social and political environment influencing evaluation studies.

240. Community Theory (4) I. The Staff Seminar—15 hours. Prerequisite: two or more upper division courses in sociology, anthropology, philosophy or critical theory. Classic and current theories of community with an emphasis on the comparative community traditions from France. Redfield’s Yucatan studies to Macro-social Accounting. Readings include Rousseau, Marx, Levi-Strauss, the Cornell School, Postmodernists accounts of community and critical theory.

241. The Economics of Community Development (4) II, Kenney
Leisure—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. The Staff Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or regional level.

243. Professional Skills for Human Service and Community Development (4) I, III. The Staff Seminar—4 hours. Prerequisite: course 243. Examination of the politics and institutions affecting the economic growth of regions. Theories of development and change examined with specific reference to case study material.

245. The Political Economy of Urban and Regional Development (4) III. Smith
Leisure—4 hours. Prerequisite: course 157, 244, or the equivalent. How global politics and economic restructuring and national and state policies are mediated 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.

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)

297. Practicum in Community Development (2) I, II. The Staff Seminar—2 hours. Prerequisite: course 243 and field placement in community human service agency. Application of theories and approaches of community development through field placement in a community or human service agency. Further development of
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 designed for non-engineering students interested in becoming familiar with engineering terminology and procedures. Coursework provides knowledge of material properties, design procedures, fabrication principles, and hardware practices.

Minor Program Requirements:

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<tr>
<th>UNITS</th>
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<tr>
<td>Materials requirement</td>
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<tr>
<td>Choose one from Applied Biological Systems Technology 15, 16, or 17</td>
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<tr>
<td>Design requirement</td>
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<tr>
<td>Applied Biological Systems Technology 170</td>
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<tr>
<td>Principles and Practices requirement</td>
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<tr>
<td>Total Units for the Minor (minimum)</td>
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<tr>
<td>Minor Advisor: R.H. Pedraha.</td>
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Courses in Applied Biological Systems Technology (ABT)

Lower Division Courses

15. Wood Properties and Fabrication (2) III. Grimm
   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. Open not for credit to students who have completed Consumer Technology 15. (P/NP grading only.)

16. Metal Properties and Fabrication (2) I, J. Rumsay
   Lecture—1 hour; laboratory—3 hours. Study of metal properties and of techniques for fabricating in metal. Basic principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working with metal. Open not for credit to students who have completed Consumer Technology 16. (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.)

Field Equipment Operation (2) I, III.
J. Rumsay
Lecture—1 hour: laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment, terminology and use of tillage, cultivating, thinning, and planting equipment. Typical sequences in crop production. Not open for credit to students who have completed Agricultural Practices 45. (P/NP grading only.)

52. Field Equipment Maintenance (2) II.
J. Rumsay
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 16 or consent of instructor. Trouble-shooting and major repair of field equipment. Intermediate welding to include hardfacing and inert gas welding. Class projects on maintenance, repair and fabrication. Not open to students who have completed Agricultural Practices 45. (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. Upadhayya
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction and operation. Ideal Otto and Diesel cycle. Engine efficiencies and power measurements. Study of values, fuels, combustion, and exhaust emissions. Operation and maintenance of fuel systems. Discussion of fuel systems. (P/NP grading only.)

102A. Food Science and Technology (3) II.
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. Not open for credit to students who have completed Consumer Technology 17.

105. Computer Application for Measurement and Control (3) III. Slaughter
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing, introductory course in computer programming. Introduction to computer systems for measurement and control of biological systems. Basic computer hardware and software concepts, programming, and input/output systems. Sensor fundamentals and applications. Computer control of biological processes and environments. (P/NP grading only.)

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 food, refrigeration, freezing, concentration and dehydration of foods. Not open for credit to students who have completed Agricultural Engineering Technology 110L.

121. Structures and Environmental Control (2) II. The Staff
Lecture—2 hours. Prerequisite: Plant Science 2 or Animal Science 1 or 2, or Environmental Horticulture. 6. Optimal structures and environments for plants and animals; animal energetics; psychometrics; heat and vapor transmission. Not in buildings; temperature and humidity control; greenhouse design; energy conservation; lighting systems; heating, cooling, ventilating principles and equipment. Not open for credit to students who have completed Agricultural Engineering Technology 112.

134. Pest Control Practices (2) II.
Giles
Lecture—2 hours. Prerequisite: Botany 120 or Environmental Toxicology 101 or Plant Pathology 125 or the equivalent. Physical aspects of agricultural pest control. Mechanical systems for effective and specific 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.

141. Technology for Agriculture in Developing Regions (3) I. The Staff
Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture: animal-, man-, and engine-powered devices. Energy requirements, size scale, costs, support infrastructure development, and productivity potentials. (Same course as International Agricultural Development 141.)

141A. Equipment Technology for Developing Agriculture (1) I, II, III. J. Rumsay
Autotutorial—1 hour. Prerequisite: course 141 or International Agricultural Development 141 (may be taken concurrently). Autotutorial (slide-tape) presentation of machinery, irrigation, and marine equipment technology applications, operation, and maintenance. (P/NP grading only.)

145. Field Equipment Technology (2) III.
J. Rumsay
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. Rumsay
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 standpoint, scheduling, acquisition options, and trade-in considerations. Evaluation of operating costs of field machinery. Not open for credit to students who have completed Agricultural Engineering Technology 145.

161. Water Quality Management for Aquaculture (3) III. Pedraha
Lecture—3 hours. Prerequisite: Biological Sciences 1B, Mathematics 168, Chemistry 2B. Basic principles of water chemistry, biological treatment processes as they relate to aquacultural systems. Not open for credit to students who have completed Agricultural Engineering Technology 161A.

163. Aquaculture Systems Engineering (3) III. Pedraha
Lecture—3 hours. Prerequisite: course 161. Design of aquacultural systems: design methodology, principles of aquatic mechanics, site selection and facility planning, management operations, computer modeling. Not open for credit to students who have completed Agricultural Engineering Technology 161B.

185. 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 turf and landscape: golf courses, parks, highways, public buildings, etc. Emphasis on hardware and systems: sprinkler and drip/tub systems. Not open for credit to students who have completed Agricultural Engineering Technology 143.

170. Design in Biological Systems Technology (3) III. Milne, Stenhouse
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 material. Coding and handbook utilization, government safety regulations, and environmental considerations are discussed.

*Course not offered this academic year.*
Applied Mathematics
(A Graduate Group)

Art History

The Major Program

A.B. Major Requirements:

Preparatory Subject Matter

Depth Subject Matter

Minor Program Requirements:

Aquaculture

See Animal Science; Applied Biological Systems Technology; and Wildlife, Fish, and Conservation Biology

Art History

Preparatory Subject Matter

Depth Subject Matter

Minor Program Requirements:

Aquaculture

See Animal Science; Applied Biological Systems Technology; and Wildlife, Fish, and Conservation Biology

Art History

Preparatory Subject Matter

Depth Subject Matter

Minor Program Requirements:

Applied Physics

See Physics
Courses in Art History (AHI)

Lower Division Courses

1A. Ancient Art (4) I. The Staff Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric cultures of the ancient Near East to the fall of the Roman Empire. General Education credit with concurrent enrollment in course 1AG: Civilization and Culture.

1AG. Writing: On Ancient Art (I) I. The Staff Discussion—1 hour; short papers. Prerequisite: course 1A (concurrently). Small group discussions and preparation of short papers for course 1A. General Education credit with concurrent enrollment in course 1A: Civilization and Culture.

1B. Medieval and Renaissance Art (4) II. Grigg Lecture—3 hours; discussion—1 hour. Major styles and movements of art from the Middle Ages to the early modern period. General Education credit with concurrent enrollment in course 1B: Civilization and Culture.

1C. Baroque and Modern Art (4) II. The Staff Lecture—3 hours; discussion—1 hour. Major styles and movements of art from the Baroque period to the present. General Education credit with concurrent enrollment in course 1C: Civilization and Culture.

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, folklore art in Japan, Korean art, Chinese ceramics, Japanese prints, and art in Mao's China. General Education credit with concurrent enrollment in course 1D: Civilization and Culture.

1DG. Writing: On Asian Art (I) I. The Staff Discussion—1 hour; short papers. Prerequisite: course 1D (concurrently). Small group discussions and preparation of short papers for course 1D. General Education credit with concurrent enrollment in course 1D: Civilization and Culture.

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.

156. 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.

175A. Art of the Middle Ages: Byzantine Art (4) I. The Staff Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian and Byzantine Empire through the later Roman Empire in the West and to the final capture of Constantinople in the East.

176B. Art of the Middle Ages: Romanesque Art (4) I. Grigg 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.

176C. Art of the Middle Ages: Gothic (4) II. 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 sixteenth century in Germany, France and the Lowlands, including such artists as Jan van Eyck and Hieronymus Bosch.

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 Duerer and Peter Bruegel.

178A. Italian Renaissance Art (4) I. Ruda Lecture—3 hours; term paper or gallery studies and review. Giottos and the origins of the Renaissance; painting and sculpture in Italy from Nicola Pisano through Lorenzo Monaco, Duccio, Giotto, and other leading artists of the early fourteenth century.

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.


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 Velazquez. Offered in alternate years.

182. British Art (1750-1914) (4) II. 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.

183A. Art in the Age of Revolution (4) I. 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.

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, Gau-
guin, van Gogh, Cezanne, and Redon.

183C. Modern Art: 1900-1945 (4). III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisi-
tes: at least one course in art or consent of instructor. Exam-
ation of modern movement in European art from
Fauvism and Cubism to Surrealism and Abstract
Expressionism from 1900-1945. Artists studied include
Picasso, Matisse, Kandinsky, Malevich, and Pollock.

183D. Modern Sculpture (4) III. The Staff
Lecture—3 hours; term paper and 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. Prerequisi-
tes: at least one course in art or consent of instructor. Paint-
ing 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.

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.

188A. Architecture of the United States (4) II.
The Staff Lecture—3 hours; term paper. Prerequisite: course 25
recommended. American architecture from the first
European settlers to Postmodernism. Technological and
social development are examined within the
social, political, and economic context in which they
emerged. Issues include ideas of domesticity and the
development of the architectural profession.

188C. Painting of the United States (4) I.
The Staff Lecture—3 hours; discussion—1 hour. Prerequisi-
tes: term paper or gallery studio and review. American pictorial
development from 1650 to the present, with emphasis on
twentieth-century developments.

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, dis-
cussions, 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 only 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 includ-
ing collections of slides and photographs. May be
repeated once for credit. (PINP 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
advisor. 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) PINP grading only.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program
Director in charge) PINP grading only.

Graduate Courses

200. Introduction to Art Historical Research (4)
I. The Staff 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 his-
torical 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.

255. Seminar in Chinese Art (4) II. Fong
Seminar—3 hours; term paper. Selected areas of
special study in Chinese Art. May be repeated for credit
with consent of instructor.

256. 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.

257. Seminar in Italian Renaissance Art (4) II.
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) III.
Maclay 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.

298. Seminar in European and American
Architecture (4) II. The Staff Seminar—3 hours; term paper. Exploration of
selected topics in European and American architect-
ural history with concentration on the Modern Period.
May be repeated only for credit with consent of
instructor.

299. Individual Study (1-6) I, II, III. The Staff
(Program Director in charge) (SU 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 philosophy and procedures encour-
ted by teachers of undergraduates in art history. (SU
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 differ-
ent types of museums and their exhibition problems.
Lighting and techniques of display with emphasis on
actual design. Experimentation with unusual presen-
tation forms.

Note: Various of the above courses are not offered
each year; please check the quarterly Class Sched-
ule and Room Directory.

*Course not offered this academic year.
Major Advisers. See the Class Schedule and Room Directory.

Minor Program Requirements:

UNITS

Art Studio .................................................. 20
Upper division art studio courses chosen in consultation with a faculty adviser (one lower division course per semester).......................... 20
Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

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. Painting (I) (4) I, II, III. Henderson, Hollowell and staff
Laboratory—8 hours; to be arranged—4 hours. Form and composition and in black and white.

Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form and composition in color.

4. Life Drawing (4) II, III. Hollowell, Zhang
Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form and composition in the human figure as subject.

5. Sculpture (4) I, II, III. Puls, Zhang
Laboratory—8 hours; to be arranged—4 hours. Form in space using plaster and other media.

10. Introduction to Art Appreciation (4) III.
The Studio
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. (PANP grading only)

16. Descriptive Drawing (4) II, III. Schulz
Laboratory—8 hours; to be arranged—4 hours. Objetive drawing and rendering, representations of space.

30. Introduction to Contemporary Visual Culture (4) II. 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.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. Restricted to lower division students. (PANP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (PANP 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.

Prenrollment 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.

Group A: Practice of Art

Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, 5, or consent of instructor. Experimentation in medium and their support.

102. Painting (I) I, II, III. Henderson, Hollowell and staff
Laboratory—8 hours; to be arranged—4 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 (II) II, III. Schulz, Carnwath
Laboratory—8 hours; to be arranged—4 hours. Prerequisites: course 2, 3, 4, 5, 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) II, III. Zhang, Hollowell for laboratory—12 hours. Prerequisites: 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) I, II, III. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with camera and light sensitive materials.

111. Photography (II) III. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 110 or consent of instructor. Art of cameras and light sensitive materials: tonal control, multiple exposure, symmetrical and negative, positives. May be repeated once for credit with consent of instructor.

113. Interdisciplinarity (4) II. Hershman Studio—8 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; the 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—8 hours; independent study—1 hour. 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 beauty's individuals and society. Hands-on projects plus theoretical analysis of media.

115. Film-making (I) I. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, or consent of instructor. Filmmaking as an art form. Filmmaking and sound track. May be repeated once for credit with consent of instructor.

116. Video Practice and Theory (4) III. Hershman Studio—8 hours; independent study—1 hour. 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) II. Hershman Studio—8 hours; independent study—1 hour. Prerequisite: upper division standing. Study of the documentary form with particular attention to hybrid forms of film, video and computer media. May be repeated once for credit with consent of instructor when topic differs.

120. Intermedia Art (4) III. Zhang Studio—8 hours; independent study—1 hour. 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 with consent of instructor.

125. Printmaking: Relief (4) III. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, complete relief and experimental uses of other materials.

126. Printmaking: Intaglio (4) I. Atkinson Laboratory—8 hours; to be arranged—1 hour. Prerequisites: 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) IV. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, 5, or consent of instructor. Stone and metal-plate lithography and other photo- graphic methods. May be repeated once for credit with consent of instructor.

128. Printmaking: Serigraphy (4) III. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, 5, or consent of instructor. Silk screen and related stencil methods. May be repeated once for credit in different subject area with consent of instructor.

141. Sculpture: Figure Explorations (4) II. Puls Studio—8 hours; independent study—1 hour. 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. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, 5, or consent of instructor. Introduction to ceramic forms and processes.

143. Sculpture: Ceramics II (4) II. The Staff
Laboratory—8 hours; to be arranged—1 hour. 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 Modelling (4) III. Zhang Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, 5, or consent of instructor. Scuplure in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

145. Sculpture: Conceptual (4) III. Puls Studio—8 hours; independent study—1 hour. 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
Laboratory—8 hours; to be arranged—1 hour. Prerequisites: course 141, 142, or consent of instructor. Introduction to color and form. Clay sculpture in relief and round. May be repeated once for credit with consent of instructor.

Group B: Theory and Criticism

147. Theory and Criticism of Photography (4) III. Hershman Laboratory—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.

148. Theory and Criticism of Electronic Media (4) III. Hershman Laboratory—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Study of forms and symbols in Historic and contemporary masterpieces.

149. Introduction to Critical Theory (I) I. Rogoff Lecture—3 hours; discussion—1 hour. Prerequisite: two of Art History 18, 1C, or 18F. An overview of 20th century critical theories of culture and their relation to visual art and mass media.

150. Theory and Criticism of Electronic Media (4) III. Hershman Lecture—3 hours; term paper. Prerequisite: course 116 or 117. The history of electronic media, stressing both critique, application and development to art practices. Analysis of the conceptual biases of electronic media as an artistic mode of expression.

Group C: Special Study Courses

192. Internship (2-12) I, II, III. The Staff (Chairperson in charge).
Independent study; term paper or catalog. Supervised program of internships at professional art institutions

*Course not offered this academic year.
Asian American Studies
(College of Letters and Science)
Isao Fujimoto, M.A., Director
Program Office, 3102 Hart Hall (916-752-3625)

Committee in Charge
Angela Y. Chee, Ph.D., (Mathematics)
Roy H. Ooi, Ph.D., (Molecular and Cellular Biology)
Isao Fujimoto, M.A., (Applied Behavioral Sciences, Asian American Studies)
Wendy A. Ho, Ph.D., (Asian American Studies, Women's Studies)
Cari C. Jorgensen, Ph.D., (Sociology)
Peter C. Young, M.S., (Asian American Studies)
Kent Ono, Ph.D., (Rhetoric and Communication)
Stefano Pellise, Ph.D., (Native American Studies)

Faculty
Wendy A. Ho, Ph.D., Assistant Professor
Peter C. Young, M.S., Senior Lecturer
Keith H. Okiyama, Ph.D., Assistant Professor
Program of Study. Currently, Asian American Studies does not offer a major. A minor program, Asian American Studies is available to students interested in this field of study.

American History and Institutions. The University requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2. (See also under University requirement.)

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 course 20
Asian American Studies 100, 110, 120, 130, 140, 150, 155, 192 (No more than 4 units of 192 may be counted toward this total)...........12


Courses in Asian American Studies (ASA)

Direct questions pertaining to the following courses to the director of the Asian American Studies Program, 3102 Hart Hall (916-752-3625).

Lower Division Courses

1. Historical Experience of Asian Americans

2. Contemporary Experience of Asian Americans

20. Calligraphic Expression in Asian American Culture

*Course not offered this academic year.

Lecture/discussion—4 hours. 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

111. Ethnic Self and Identity

112. Asian/Pacific American Women

113. Asian American Literature

114. Asian American Drama

115. Filipino American Experience

*As an AMP student, you are entitled to these courses at no cost.

Lecture/discussion—4 hours. Prerequisite: course 1 or 2, or consent of instructor. Examination of Asian American writings as expressions of various cultural themes, psychological issues, interpersonal relationships and sociopolitical influences on the Asian American experience.

116. Asian American Drama

Lecture/discussion—4 hours. Prerequisite: course 1 or 2; 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 theatrical contexts.

117. Filipino American Experience

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 internship position with priority to Asian American Studies minors. Supervised internship in community and institutional settings related to Asian American concerns. (P.N.P. 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.N.P. 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.N.P. grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge). Prerequisite: consent of instructor. (P.N.P. grading only)

Courses in Cantonese (CANT)

Lower Division Courses
1-3. Elementary Cantonese (5-5-5) I–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. (Open to native speakers.)

4-5. Intermediate Cantonese (3-3-3) I–III. Leung Lecture—2 hours; recitation—2 hours. Prerequisite course 1-2 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 tornados. 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 tropical and polar weather events, the program deals with fundamental physical processes that involve the general circulation of the atmosphere, mass and energy transfer 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. In addition, 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 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 academia. 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. Almost all 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 both requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

English Composition Requirement

See College requirement

Preparatory Subject Matter

62 Biological sciences (Biological Sciences 1A, plus one other course selected with advisor's approval)

Chemistry

(Chemistry 2A, 2B)

Computer science (Engineering 5 or the equivalent in FORTRAN programming)

Mathematics

(Mathematics 21A, 21B, 21C, 21D, 22A, 22B)

Physics

(Physics 9A, 9B, 9C)

Statistics (Statistics 32)

Breadth/General Education Requirement

28 Satisfaction of Cultural 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...

Upper division Atmospheric Science courses selected with advisor'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 116, 117, Geology 105, 113, 115, Environmental and Resource Sciences 103, Soil Science 100, Water Science 100, 141, or courses approved by advisor)

Coordinated group of courses (not to be chosen with advisor's approval from mathematics, computer science, environmental studies, resource management, or biological science)

Unrestricted Electives

20-37 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, Land, Air and Water Resources Teaching Center (916-752-1668).

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 preparation course-work in calculus and physics (Mathematics 16A-16B, Physics 5A). Some upper division courses in Atmospheric Science have as prerequisites the Mathematics 21 and 22 series and the Physics 9 series.

UNITs

Atmospheric Science

30-24 Atmospheric Science 60, 110...

Four courses selected with the approval of the minor program adviser from the following:

Upper Division Atmospheric Science courses excluding 100, 192 or 199...

Environmental and Resource Science 131...

Minor Adviser. S. 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 Program in Atmospheric Science. See also the Graduate Studies section in this catalog.

Related Courses. See Environmental Studies 150A; Geography 3, 115, 116; Physics 10A, 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

30. Issues in Atmospheric Science (2) II. Grothahn Lecture—1 hour; discussion—1 hour. Prerequisite: high school physics and 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 satellite remote sensing, and modern meteorological instrumentation. (P.N.P. grading only)

60. Atmospheric Physics and Dynamics (4) I. Shaw 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 standing and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P.N.P. grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (P.N.P. grading only)

99. Special Study for Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge). (P.N.P. grading only)

Upper Division Courses

100. Severe and Unusual Weather (3) I, II. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10, high school physics. Extreme or unusual weather events, e.g., floods, blizzards, hurricanes, tornadoes, and desertification. Emphasis on scientific
110. Weather Observation and Analysis (Lecture) 3 hours. Laboratory—3 hours. Prerequisite: course 60. Acquisition, distribution, and analysis of meteorological data; vertical sounding analysis; stability measurements; and use of local weather service products. Laboratory makes use of computer-generated analyses.

111. Weather Analysis and Prediction (5) I. Grojahn 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. Qualitative-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 rainfall and on evaporation-evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic fluctuations.

118. Climate Change (3) III. 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, thermophysical properties of dry and moist air; atmospheric stability; cloud nucleation, cloud growth by condensation and coalescence, and cloud models.

121A. Atmospheric Dynamics (3) II. Nathan Lecture—3 hours. Prerequisite: course 120, Mathematics 21C, Physics 9A. Theoretical foundation of meteorology in the form of equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere; vorticity and 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; convection plumes; cumulus mass transfers.

124. Meteorological Instruments and Observations (3). I. Paw U Lecture—discussion—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. 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.

132. Biometeorology (4) II. Paw U Lecture—3 hours. Discussion—1 hour. Prerequisite: two courses in a biological discipline, Mathematics 15B and consent of instructor. Atmospheric and biophysical interactions. Physical and biological basis for water vapor, carbon dioxide, and other exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks.

194. Introduction to Air Pollution (3) I. Carroll, Chang, Raabe (Civil Engineering) Lecture—3 hours. Prerequisite: Mathematics 22B, 21C; Chemistry 1B, 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 Engineering 140.)

195. Computer Methods in Meteorology (4) II. Grojahn Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Engineering 5, Mathematics 22B, and a course in fluid dynamics (courses 121A, Physics 104A or Engineering 103A), or consent of instructor. Numerical techniques and their applications to meteorological problems. Finite differencing and spectral (Fourier transform) method; simulation; 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. 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.

192. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—30 hours, maximum of 90 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/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff Internship—30 hours. Prerequisite: three upper division units in Atmospheric Science. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Internship—30 hours. Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/N grading only.)

Graduate Courses

200. Atmospheric Processes (4) I. Grojahn 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 major topics covered in courses 60, 110A, 105A, 120, 128. Credit not allowed to students having completed any two of these courses.


221B. Advanced Atmospheric Dynamics II (3) III. Nathan Lecture—3 hours. Prerequisite: course 221A. Quasi-geostrophic potential vorticity equation for a rotating stratified atmosphere in a spherical coordinate. For instability in stratified atmosphere; baroclinic instability. Wave-zonal flow interaction theory. Forced waves in the atmosphere. Nonlinear theory of baroclinic instability. Offered in alternate years.


230. Atmospheric Turbulence (3) III. Shaw Lecture—3 hours. Prerequisite: course 212B 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; transport and diffusion and second-order methods. Offered in alternate years.

231. Advanced Air Pollution Meteorology (3) III. Carroll Lecture—3 hours. Prerequisite: course 149, and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of turbulence, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems are examined. Offered in alternate years.

233. Advanced Biometeorology (3) I. Paw U Lecture—discussion—3 hours. Prerequisite: course 133. Management of the interaction of atmospheric science and meteorology with biological and physical systems. Introduction to the general principles of biometeorology and physical and biological basis for water vapor, carbon dioxide, and other exchanges with the atmosphere. Topics include modeling and measuring transport from the ground surface to mesoscale atmospheres; dependence of the atmosphere and various biomes on surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Offered in alternate years.

240. General Circulation of the Atmosphere (3) II. Grojahn Lecture—3 hours. Prerequisite: course 112B. Large-scale, observed atmospheric circulations. Energy and momentum balances derived and computed with observations. Theoretical framework developed to synthesize observational 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 observation. Conservation of mass, energy and momentum. Introduction to the range of climate simulations.

250. Meso-Scale Meteorology (3) I. Soong Lecture—3 hours. Laboratory—3 hours. Prerequisite: course 121A. Introduction to the theory and practice of modeling mesoscale weather processes. Offered in alternate years.

274A. 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) Aerological and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.

283. Senior Seminar (1-11) I, II, III. Chairperson in charge Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research.
Atmospheric Science (A Graduate Group)  
John J. Carroll, Ph.D., Chairperson of the Group  
(916-752-2945)  
Group Office, 515 Hoagland Hall (916-752-1406)  
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 choose major emphasis on graduate work in one or more of the following fields: air quality meteorology, biometeorology, climatology, 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. Pew U (Land, Air and Water Resources, 752-1510).
Graduate Admissions Officer. T.R. Nathan (Land, Air and Water Resources, 752-1609).

Avian Sciences (College of Agricultural and Environmental Sciences)  
Barry W. Wilson, Ph.D., Chairperson of the Department  
Department Office, 2203 Meyer Hall (916-752-1300)  
Faculty.  
Franca A. Bradley, Ph.D., Lecturer  
Annette J. Fischnel, Ph.D., Lecturer  
Annalise J. Kroll, Ph.D., Associate Professor  
Kirk C. Kasting, Ph.D., Professor  
James M. Hill, Ph.D., Associate Professor  
Aida Morzenti, M.S., Lecturer  
Kathryn Radke, Ph.D., Associate Professor  
Wesley W. Weathers, Ph.D., Professor  
Barry W. Wilson, Ph.D., Professor  
Emeritus Faculty.  
Ursula K. Abbott, Ph.D., Professor Emeritus  
Hans Ablinger, Ph.D., Professor Emeritus  
C. Richard Grau, Ph.D., Professor Emeritus  
H. Howard Kratzer, Ph.D., Professor Emeritus  
Frank X. Ogata, Ph.D., Professor Emeritus  
Pamela K. Votora, Ph.D., Professor Emeritus  
Wilbur O. Wilson, Ph.D., Professor Emeritus

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 disease of the 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 choose a major'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 research and internships are features emphasized in the avian science programs. There are birds available for laboratory or specialty studies from the various avian communities within the city as well as at the research facilities. An experienced avian student may gain a variety of career options: health-oriented research, teaching, avian-care and avian-careraditional, and environmental services, governmental agencies, or the exotic or exotic avian industries. A recent survey has shown that the majority of avian science graduates enter graduate school or are employed by the domestic bird industry. The remainder of the graduates were usually distributed in the categories of female professionals, 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.)

English Composition Requirement. 0-6  
College requirement.

Preparatory Subject Matter. 50-54  
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 18A, 18B, 18C). 9  
Statistics (Statistics 13). 3

Avian Medicine  
See Medicine and Epidemiology

Breadth Subject Matter. 24  
Satisfaction of General Education requirement. 24

Depth Subject Matter. 55  
Physiological chemistry or biochemistry (Physiological Sciences 101A, 101B, or Biological Science 101A, 101B). 6  
Genetics (Biological Sciences 101). 4  
Nutrition (Avian Sciences 150-150L or Nutrition 110). 5  
Physics (Physics 110). 6  
Laboratory units in above listed subjects. 4  
(Recommended courses include Animal Science 135, Avian Sciences 150L, Biochemistry 101L, or Neurobiology, Physiology and Behavior 101.)  
Specialized courses related to avian species. 25

Restricted Electives. 31  
To supplement or expand depth subject matter courses.

Unrestricted Electives. 13-19  
Total Units for the Degree. 160

Major Adviser. A.J. King.
Advising Center for the major is located in 202D Meyer Hall (916-752-1321).

Minor Program Requirements:  
UNITS

Avian Sciences. 18  
Choose 18 units from Avian Sciences 100, 101, 102, 116, 121, 123, 149, 150, 150L, Food Science and Technology 121, Animal Science 143, Physiology 111. One lower division course (Avian Sciences 11, 111, or 13) can be used to satisfy part of the 18-unit requirement.

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 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; field trip—1 hour. Prerequisites: consent of instructor. Recommended courses prior to study include poultry management (poultry husbandry).
15L. Captive Raptor Management (2, 1, 1) I, II, III.
Mortzeni
Laboratory—3 hours: Indispensable 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, breeding, field aspects, tagging, and rehabilitation. Laboratory and field trips.

16LA-16LB-16LC. Raptor Migration and Population Fluctuations (2-2-2) II-III, Mortzeni
Fieldwork—4 hours; laboratory—1 hour; one Saturday field trip. Prerequisite: consent of instructor. Identification of raptors; study effects of weather, crops, agricultural practices on fluctuating raptor species and numbers. Familiarity with literature, design, project; survey, study, collect, compute, 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. (PINP 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. (PINP grading only)

Upper Division Courses

100. Principles of Avian Sciences (5) I. Racine
Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A. Aspects of biology (anatomy, physiology, behavior, nutrition, reproduction and genetics) that govern the life of birds. Emphasis on features of domestic, wild and experimental animals, which are distinctive.

109VM. Principles of Avian Science (3) II.
Racine
Lecture—4 hours; laboratory—3 hours. Prerequisite: open only to students in veterinary medicine. Same material as is taught in the first six weeks of Avian Sciences 100. Offered to veterinary students as an alternative to the complete course 100.

101. Patterns in Avian Biology (5) I. H. Racine
Lecture—3 hours. Prerequisite: Biological Sciences 1A or equivalent. Patterns of reproduction, locomotion, foraging, growth and development, energetics, and temperature regulation exhibited by birds. Ecological and evolutionary adaptations and allometric analyses of life history traits. Offered in alternate years.

102. Fertility and Hatchability (4) I. Abbott
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Biological Sciences 111, Zoology 100. Normal adult avian reproduction, reproductive failures resulting from disease, nutritional or genetic causes. Use of avian embryos in biomedical research.

115. Raptor Biology (3) I. Mortzeni
Lecture—3 hours; 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, and captive breeding and handling. Raptors are important components of ecological processes, conservation, legal considerations, rehabilitation, and falconry.

121. Avian Reproduction (2) II. Milliam
Lecture—2 hours. Prerequisite: Biological Sciences 1A, 1B. Breeding cycles and reproductive strategies, egg and sperm production, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation.

123. Management of Companion Birds (3) III.
Milliam
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. Breeding trade and smuggling. Emphasis on parrot species and the role of captive propagation in conservation.

130. Poultry Breeding and Genetics (3) I. Applanat
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 100. Applications of genetic principles in poultry. Action of major genes in the control of morphology, reproduction and disease resistance. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance.

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 replacement pullets. Offered in alternate years.

150. Nutrition of Birds (1) II. Kisting
Lecture—1 hour. Prerequisite: Nutrition 110 (may be taken concurrently). Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutritional requirements, and the impact of 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) II. Kisting
Laboratory—4 hours; lecture—2 hours. Prerequisite: courses 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.

190. Seminar in Avian Sciences (1-1) I, II, III.
The Staff
Seminar—1 hour. Prerequisite: upper division standing in Avian Sciences. Open to seniors. May be repeated three times for credit. (PINP grading only)

192. Internship in Avian Sciences (1-1) I, II, III.
The Staff (Chairperson in charge)
Internship—3–36 hours. Prerequisite: completion of a minimum of 64 units; consent of instructor. Internship on and/or 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. (PINP grading only)

195. Topics in Current Research (1-3) I, II, III.
The Staff (Chairperson in charge)
Lectures/discussions. 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)
Tutoring—4 hours. Prerequisite: 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. (PINP grading only)

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PINP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PINP grading only)

Graduate Courses

200. Cellular Proliferation and Oncogenes (4) I.
Radke
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.

230. Avian Endocrinology (2) II. Milliam
Lecture—2 hours. Prerequisite: coursework in endocrinology or biology of reproductive physiology. Examination of current issues in avian endocrinology with emphasis on endocrine aspects of reproductive physiology. Offered in alternate years.

260. Advanced Poultry Nutrition (3) I. Kisting
Lecture—2 hours; discussion—1 hour. Prerequisite: Nutrition 110. Metabolic basis for nutrient requirements in avian species including energy, amino acids, vitamins, and minerals. Discussions on dietary and analysis of nutrition trials, hormonal control of metabolism, nutritional and metabolic control of nutrient partitioning and gene expression. Offered in alternate years.

260. Topics in Avian Physiological Ecology (2) I. Weathers
Lecture—1 hour; seminar—1 hour. Prerequisite: course 100; Physiology 110 or Physiological Sciences 101A-101B, senior or graduate standing. Energy and water requirements of avian reproduction. Metabolic requirements for growth, maintenance, reproduction, and thermoregulation. Emphasis given to diversity of patterns found in birds and their endocrine systems. Offered in alternate years.

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 presented. Papers are presented and evaluated. Format will combine seminar and discussion. (SU 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. (SU grading only)

298. Group Study (1-6) 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. (SU grading only)

Avian Sciences (A Graduate Group)

J.R. Milliam, Ph.D., Chairperson of the Group
Graduate Office, 2036 Meyer Hall (650) 336-1901

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 for graduate 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, physiological reproduction, avian disease and avian behavior. Offered in alternate years. (SU grading only.)
Biochemistry and Molecular Biology

See Biological Sciences: Section of Molecular and Cellular Biology

Biological and Agricultural Engineering

( College of Agricultural and Environmental Sciences )
David J. Hills, Ph.D., Chairperson of the Department
Department Office, 2030 Rainier Hall (916-752-2010)

Faculty
Pctaw (Paul) Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Professor
D. Ken Giles, Ph.D., Associate Professor
Mark E. Girman, Ph.D., Associate Professor
Bruce R. Harkness, Ph.D., Associate Professor
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
John M. Kretchmer, Ph.D., Professor
Miguel A. Marfo, Ph.D., Professor
Kathrin McCarthy, Ph.D., Assistant Professor
Michael J. McCarthy, Ph.D., Associate Professor
John A. Mike, Ph.D., Professor
Ning Pan, Ph.D., Associate Professor
Marc B. Parfance, Ph.D., Associate Professor
Raul H. Pietrafitta, Ph.D., Associate Professor
Richard E. Plant, Ph.D., Professor
James W. Runsey, M.S., Lecturer
Thomas R. Runsey, Ph.D., Professor
Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Associate Professor
Sanjiv B. Udupa, Ph.D., Associate Professor
Seth D. Vihan, Ph.D., Professor
Wesley W. Wallender, Ph.D., Professor

Emeriti Faculty
Norman B. Allesson, M.S., Professor Emeritus
William J. Blandine, Ph.D., Professor Emeritus
Robert B. Freeland, Ph.D., Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
John R. Goche, M.S., Professor Emeritus
George F. Hanna, M.D., Lecturer Emeritus
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
Robert A. Keiper, B.S., Professor Emeritus
Joyo Lorence, M.S., Professor Emeritus
Larry L. Merson, Ph.D., Professor Emeritus
Stanley M. Morrison, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor Emeritus
Henry E. Swider, M.S., Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

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 Program. The Department of Biological and Agricultural Engineering offers a minor program 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 designed for non-engineering students interested in engineering terminology and procedures. Coursework provides knowledge of material properties, design procedures, fabrication principles, and engineering applications. The minor is available to students interested in information processing of spatial data related to remote sensing for geographic and environmental planning and related areas.

*Course not offered this academic year.

Biological Sciences

( College of Agricultural and Environmental Sciences and College of Letters and Science )
Mark G. McNamee, Ph.D., Dean of Biological Sciences

Mark F. Sanford, Ph.D., Associate Dean—Graduate Academic Programs
Division Office, Administration, 355 Briggs Hall (916-752-6764)
Division Office, Graduate Academic Programs, 66 Briggs Hall (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; Neurobiology; Physiology, and Behavior; Molecular and Cellular Biology; and Plant Biology. For some of its programs (e.g., core courses, the divisionwide Biological Sciences major), the division functions as a single academic department; other programs (e.g., courses and majors in the various core disciplines of biology) are the responsibility of individual sections of the division.

The present organizational structure of the division was established on July 1, 1993, replacing the six departments that previously comprised the division: Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology, and Zoology. The revision of the curriculum that accompanies this reorganization will occur over several years. A number of the previous majors will continue, and new courses and majors will be added. Most courses have been renumbered or relocated in new sections to reflect the new organizational structure; these changes are listed in a concordance table at the back of this catalog. Students who elect a given major are entitled to complete that major according to the degree requirements listed in the catalog at the time the major is declared.

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" below for a list of faculty in each section.

Programs of Study

Seven majors are offered leading to a B.S. degree in:

- Biotechnology
- Biological Sciences
- Genetics
- Evolution and Ecology
- Microbiology
- Physiology
- 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 appropriate college sections in the front of this catalog for more information.

Courses. See "Divisionwide Programs and Courses" (following "The Major Programs") for descriptions of Biological Sciences courses offered jointly by the sections of the division. See "Sections of the Division" below for descriptions of courses offered by the individual sections.
Note: Most courses have been renumbered or relocated to new sections as a result of the reorganization. A consultant used a computer-identifying the previous course number and the new course number or section location appears at the back of this catalog following the last department/course description.

**Student Services.** Students affairs officers at the division's Information Services Office, Bill Briggs Hall, and advising staff in section offices provide information and counseling on the major programs and courses offered by the sections of the division.

The **Major Programs**

The division offers two categories of majors. One is the Biological Sciences major, which is offered by the entire division. 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 the molecular to the population level. While emphasizing breadth, the Biological Sciences 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 core disciplines. More specialized majors that focus on one of the core disciplines are offered through individual sections of the division and listed under "Majors In the Core Disciplines of Biology."

**Divisionwide 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 programs include mathematics, general and organic chemistry, and courses in biology that emphasize breadth as well as depth. The Bachelor of Arts program emphasizes organization, 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.

**B.S. Major Requirements:**

| Units | Preparatory Subject Matter | Calculus MA 16B-16C | Chemistry 2A-2B-2C | Chemistry BA 8B or 11BA-11BS-11BC | Biological Sciences 1A-1B-1C | Statistics 13, 32, 100, or 102 | Physics 5A-5B-5C | Depth Subject Matter | 45 units | Biological Sciences 103, 104 | Restricted Electives | 32 | Breadth in the major | 60-67 |
|-------|---------------------------|---------------------|-------------------|-----------------------------------|-----------------------------|-----------------------------|----------------|-------------------|-----------------|----------------|----------------|----------------|-----------------|----------------|----------------|

**Field Requirement Course List**

(a) Evolution: Anthropology 151, 154A; Evolution and Ecology 100; Geology 107; Plant Science 103...3-5

(b) Ecology: Anthropology 154B; Biological Sciences 122; Entomology 104, 156; Environmental Studies 100, 121; Evolution and Ecology 100; Geobiology 120; Wildlife, Fish and Conservation Biology 151...3-4

(c) Microbiology: Food Science 104; Microbiology 102, 130A, 162; Pathology; Microbiology and Immunology 127, 126; 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 105; Evolution and Ecology 121, 140; Plant Biology 111, 112; 117, 118, 119, 120, 121; Plant Pathology 120; 130; Plant Science 103; Range Science 100...3-5

**Areas of Emphasis:**

1. **Evolution and Ecology emphasis.**

2. **Molecular and Cellular Biology emphasis.**

3. **Neurobiology, Physiology, and Behavior emphasis.**

4. **Plant Biology emphasis.**

**Microbiology emphasis** (four options, a through d, below)...

- **Field requirement:** Students must take Microbiology 102 to satisfy Field requirement (a). Evolution and Ecology 101 to satisfy Field requirement (b).

- **Laboratory requirement:** Students must take Microbiology 102L to satisfy restricted elective lab requirement.

- **Options:** Complete one of the four clusters (a through d) below; complete individual cluster with approval from your faculty advisor.

- **Microbial Physiology and Molecular Genetics option** in the Microbiology emphasis...

- **Microbial Diversity and Ecology option** in the Microbiology emphasis...

**Total Units for the Major**

- **Field requirement:** 3-5
- **Laboratory requirement:** 3-4
- **Options:** 3-4
- **Microbiology emphasis:** 3-5
- **Microbial Diversity and Ecology option:** 5
- **Microbiology 102:** 4

*Course not offered this academic year.*
A.B. Major Requirements:

Preparatory Subject Matter

- Biological Sciences 1A-1B-1C ........................................ 15
- Chemistry 2A-2B .............................................................. 10
- Chemistry 8A-8B or 118A-118B ...................................... 6-12
- Physics 1A-1B or 5A-5B .................................................. 6-12
- Statistics 13, 32, 100, or 102 .......................................... 3-4
- Recommended: Chemistry 2C and Mathematics 16A-16B

Depth Subject Matter

- Biological Sciences 101 and 102 ..................................... 7
- One course in evolution and Ecology 100, 140; Geology 107, 144, Plant biology 116 .................................................. 4
- One course in ecology from Environmental Studies 100; Evolution and Ecology 101; Evolution and Ecology/Plant Biology 117; Plant Biology 101 .................................................. 3-4
- One course in philosophy from History and Philosophy of Science 130A, 130B, Philosophy 108 .................................................. 4
- One course in Environmental Horticulture 102; Entomology 101, 102; Neurobiology, Physiology and Behavior 101; Plant Biology 111, 112 .................................................. 3-5
- One course in diversity, microbial and plant diversity (see "Diversity List" below) .................................................. 9-15

Additional upper division coursework in biological sciences may be taken for a total of 58 or more units (see "Approved Biology Electives" list below). Upper division coursework 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

Diversity Lists

(a) Animal diversity: Avian Sciences 101; Entomology 100, 107, 109; Evolution and Ecology 105, 112, 133, 134, 136, 137; Nematology 110; Wildlife, Fish and Conservation Biology 112, 113, 128
(b) Microbial diversity: Microbiology 105, 162; Plant Biology 118, 119; Soil Science 111; Pathology, Microbiology and Immunology 127, 128, 132
(c) Plant diversity: Evolution and Ecology 121, 146; Plant Biology 102, 106, 116, 121.

Approved Biology Electives

These are courses which are accepted without petition for upper division units in the Biological Sciences major; many other biologically related courses may be substituted with consent of your adviser.

Anatomy, Physiology and Cell Biology 100
- Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157
- Avian Sciences 100, 102, 130, 150
- Biological Sciences—All upper division courses
- Cell Biology and Human Anatomy 101, 101L
- Chemistry 107A, 107B, 111, 150
- Entomology—All upper division courses
- Environmental Horticulture 162, 167
- Environmental Studies 100, 110, 121, 123, 124, 129, 129L, 130C, 151, 151L
- Evolution and Ecology—All upper division courses
- Exercising Science 101, 110, 111, 113
- Geology 106, 107, 110L, 111B, 112L, 145, 146, 150C
- Medical Microbiology 107, 115
- Microbial diversity—upper division courses
- Molecular and Cellular Biology—All upper division courses
- Nematology, 110, 110
- Neurobiology, Physiology and Behavior—All upper division courses
- Nutrition 101, 110L, 111
- Pathology, Microbiology and Immunology 101, 101L, 102, 126L, 127, 128, 122
- Philosophy 108
- Plant Biology—All upper division courses
- Plant Pathology 120, 150
- Plant Science 101, 102, 103, 109
- Psychology 106, 150
- Range Science 100, 133, 135
- Vegetable Crops 105, 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 credit may be counted, and no units of 192 or 197T courses may be counted.

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 Biological Sciences Honors Program. The program entails completion of a research project and Honors thesis through enrollment in course 194H. Complete details must be obtained from the 5th Graduate Academic Programs Office, 66 Briggs Hall, before starting in the Honors Program.

The Division of Biological Sciences also confers Certificates 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 certificate must first meet all graduation requirements and participate in an appropriate research project.

The division additionally recommends students in the Biological Sciences major to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation. For further details on the above programs and awards, contact the Undergraduate Academic Programs Office, 66 Briggs Hall.

The Minor Program

The minor in Biological Sciences is designed to acquaint 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, ecologic, evolutionary, physiological, and cellular 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 equivalent preparatory work; substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

Information on certification of completion of the minor program can be obtained from the division's Undergraduate Academic Programs Office, 66 Briggs Hall.

Minor Program Requirements:

Biological Sciences .................................................. 24

- 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, 154, 155, 156, 157; Botany 101, 105; Biological Sciences 123, 122; Cell Biology and Human Anatomy 101; Entomology 101, 102, 103, 104, 109, 116, 119, 153; Environmental Studies 128; Evolution and Ecology 100, 101, 105, 112, 133, 134, 136, 137, 138, 147, 149, 150; Genetics 111A; Microbiology and Cellular Biology 150; Nematology 110; Neurobiology, Physiology and Behavior 102; Wildlife, Fish and Conservation Biology 110, 111, 120, 140, 151.

(b) Microbiology: Entomology 106; Genetics 111B; Medical Microbiology 107; all upper division Microbiology courses (excluding 192-199); Plant Biology 118, 119, 187, Plant Pathology 120, 130; Veterinary Microbiology and Immunology 126, 127, 128, 132.

(c) Plant biology: Environmental Horticulture 104, 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 121 may be used for either microbiology or plant biology (not both).

Group Requirement: at least one course or sequence from four of the five group requirements below:

(a) Organismal biology: Evolution and Ecology 112, 136; Microbiology 150; 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 major and group requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a tie are required.

Advisers and Advising: Information on the Biological Sciences major or minor can be obtained from the Undergraduate Academic Programs Office, 66 Briggs Hall.

Teaching Credential Subject Representative: Associate Dean (Biological Sciences). See also the Teacher Education Program.

Majors in the Core Disciplines of Biology

The Biochemistry Major Program

(Sectio 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 adaptable with a wide array of 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 designed 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 as a full foundation in cell and molecular biology.

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:

Preparatory Subject Matter ........................................... 64-88

- Biological Sciences 1A-1B-1C ........................................ 15
- Chemistry 2A-2B-2C .................................................. 15
Mathematics 16A-16B-16C or 21A-21B-21C .............................................. 9-12
Physics 5A-5B-SC .................................................. 12
Statistics 13, 32, 100 or 102 .................................................. 3-4

Depth Subject Matter .............................................. 53-54

Biological Sciences 101, 102, 103, 104 ............................................. 13
Chemistry 119A-119B-119C or 129A-129B-129C .................................. 12-13
Chemistry 107A-107B-107C .................................................. 8
Molecular and Cellular Biology 120L, 121, 125, 123, 127, 135 .................................................. 15
Restricted Electives .................................................. 4

Upper division courses in biological sciences or chemistry. Students are encouraged to obtain additional laboratory experience, including 199 research; however, no more than 3 units of 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 (916-752-3001).

Graduate Study: Biochemistry and Molecular Biology (A Graduate Group); and the Graduate Studies section in this catalog.

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.

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 designed to develop a more specialized course of study. The major program includes 124 additional units that allow the student to focus his or her studies to evolution and ecology majors may earn either a Bachelor of Science or Bachelor of Arts degree. The requirements for the B.S. degree program include more science courses, 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 illustrating.

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:

Preparatory Subject Matter .............................................. 51-55

Biological Sciences 1A-1B-1C .................................................. 15
Chemistry 2A-2B, 8A-8B .................................................. 16
Mathematics 16A-16B or Statistics 102 .................................. 6-12
Physics 1A-1B or 5A-5B .................................................. 6-12

Depth Subject Matter .................................................. 38

Biological Sciences 101 .................................................. 13
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 courses in biology are required to achieve a total of 36 or more units .................................................. 20-25
Include at least: (a) 15 units in Evolution and Ecology (or Zoology); and (b) one course from two of the four areas of study shown below.

Total Units for the Major .................................. 77-81

Recommended

Biological Sciences 102-103; Geology 3; Physics 5B.

Areas of Study:

1. Ecology and behavior: Environmental Studies 100; Evolution and Ecology 101, 147, 149; Neurobiology, Physiology and Behavior 102.

2. Systematics, morphology, and natural history: Entomology 100; Evolution and Ecology 105, 112, 133, 134, 134L, 136L, 137, 137L.

3. Developmental biology: Molecular and Cellular Biology 150, 150L, 150C.

4. 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 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 197 are not applicable to the upper division elective unit requirement.

B.S. Major Requirements:

Preparatory Subject Matter .............................................. 57-68

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 5A-5B-107 .................................................. 12

Depth Subject Matter .................................................. 48


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 197 are not applicable to the upper division elective unit requirement.

Biological Sciences Electives: The following courses are acceptable toward the fulfillment of the upper division biological sciences requirements in the A.B. and B.S. major programs and may be selected without advisor approval. Other elective courses are approved on an individual basis by petition through an advisor.

Anatomy 100

Biology 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, 153

Geology 106, 107, 107L, 111A, 118B, 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, 132

Pharmacology 108

Plant Biology, all upper division courses

Psychology 108, 129, 134, 150

Wildlife, Fish and Conservation Biology 120, 120L, 120L

Total Units for the Major .................................. 106-115

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 (916-752-5023). Pre-professional students should establish contact with the Health Sciences Advising Office, 227 Vocelles 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 is designed to provide 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.

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 choose 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:

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 5A-5B-107 .................................................. 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, 170L

Evolution and Ecology 100 .................................................. 4
One course from the following: Molecular and Cellular Biology 121, 141, 161 or 107, 107L.
The Microbiology Major Program

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, 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 analytical and 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 sound basis 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 advisor.

Career Alternatives: A bachelor's degree in microbiology is excellent preparation for a career in biotechnology, where the knowledge of cell and molecular biology is critical. It also provides a strong background for students wishing to continue to professional studies in medicine and the other health sciences.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>47-61</th>
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<tbody>
<tr>
<td>Biological Sciences A1-A1-B1-C1</td>
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<tr>
<td>Chemistry 2A-2B</td>
<td>10</td>
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<tr>
<td>Chemistry 2A-2B or 2A-2B-1</td>
<td>15</td>
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<tr>
<td>Chemistry 2A-2B or 2A-2B-1</td>
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<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
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<td>Physics 1A-1B or 5A-5B-S-5C</td>
<td>6-12</td>
</tr>
<tr>
<td>Statistics 13</td>
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B.S. Major Requirements:

<table>
<thead>
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<th>Preparatory Subject Matter</th>
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<tbody>
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<td>Biological Sciences A1-A1-B1-C1</td>
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<td>Chemistry 2A-2B-1</td>
<td>15</td>
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<tr>
<td>Chemistry 2A-2B-1 or 2A-2B-1</td>
<td>15</td>
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<tr>
<td>Mathematics 16A-16B-16C</td>
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<td>Physics 5A-5B-5C</td>
<td>12</td>
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<td>Statistics 13, 14, 15, 104</td>
<td>3</td>
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</tbody>
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The Physiology Major Program

The study of physiology is concerned with understanding the mechanisms that control and carry out the vital functions of living organisms. From the single cell and its parts, through the various organ systems, to the whole animal and its relationship to its environment—the entire range of function of living matter is investigated.

The Program: An understanding of physiology must be built on a broad background. In the freshman and sophomore years, physiology majors take courses in chemistry, biology, physics, and mathematics. As juniors or seniors, majors can enroll in a variety of physiology courses along with upper division courses in related sciences. With this background, 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 physiology major provides the foundations for a challenging career in physiology and also serves as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacology, optometry, and other health sciences. Students interested in research and advanced teaching may use the program as preparation for continued study leading to advanced degrees.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>60-70</th>
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<tbody>
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<td>Biological Sciences A1-A1-B1-C1</td>
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<tr>
<td>Chemistry 2A-2B-1</td>
<td>15</td>
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<td>Chemistry 2A-2B-1 or 2A-2B-1</td>
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<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C</td>
<td>9-12</td>
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<tr>
<td>Physics 5A-5B-5C</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 13, 14, 104 (recommended)</td>
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</table>

Graduate Study: The Graduate Group in Genetics

The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in genetics. The offering of the Section of Genetics are augmented by courses and faculty of the Departments and Sections of the College of 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 the Division of Biological Sciences and departments of Medicine and Epidemiology, Food Science and Technology, Plant Biology, and Water Resources. See also the College of Agricultural and Environmental Sciences, Plant Physiology, and Plant Science.

Faculty of the Section of Microbiology also teach or participate in the following courses: Biological Sciences 1A, 10, and 19.
A.B. Major Requirements:  

- **Preparatory Subject Matter**  
  - Biological Sciences 1C  
  - Chemistry 2A-2B  
  - Agricultural Systems and Environment 120 or Statistics 13 or 100 or 102  
  - Depth Subject Matter  
  - Biological Sciences 125, 111, 127  
  - Plant Biology 102 or 108  
  - Evolution and Ecology 140 or Plant Biology 116  
  - Plant Biology 117  
  - Additional upper division units in Plant Biology or related natural science courses  
  - **Total Units for the Major**: 76-77

**Recommended**  

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 advisor.

B.S. Major Requirements:  

- **Preparatory Subject Matter**  
  - Biological Sciences 1A-1B-1C  
  - Chemistry 2A-2B-2C  
  - Chemistry 4A-6A or course 4B  
  - Mathematics 19A-19B-19C  
  - Physics 5A-5B-5C  
  - Agricultural Systems and Environment 120 or Statistics 12, 22, 100, or 102  
  - **Depth Subject Matter**  
  - Biological Sciences 101 or Plant Science 105 (Students completing the Applied Plant Biology option should take Plant Science 105)  
  - Biological Sciences 102, 103, 104  
  - Plant Biology 105, 111  
  - Completion of one Option listed below  
  - Research experience through internships or special studies is recommended.

**General Plant Biology option**  
- Evolution and Ecology 100, Plant Biology 112  
- Plant Biology 117 or Plant Science 101  
- One course from the Applied Plant Biology course list (Plant Science 145 recommended)  
- One course from the Evolution and Diversity course list  
- Additional upper division coursework from any of the four course lists, chosen in consultation with an advisor, to achieve a total of 24 or more units  
- **Total Units for the Major**: 156-166

**Master Adviser**: Contact A. Stienstra, Plant Biology Section Office, 143 Robbins Hall.

**Minor Program Requirements:**

- **Plant Biology**: To satisfy the requirements for a Plant Biology minor, a student must complete Biological Sciences 1C (or equivalent introductory plant biology course)...

- **Upper division units**: including at least one course from each of the following groups:  
  - (a) Anatomy and morphology: Evolution and Ecology 140, Plant Biology 105, 116, 118
  - (b) Physiology and development: Plant Biology 111, 125, Plant Pathology 130
  - (c) Evolution and ecology: Evolution and Ecology 100, Plant Biology 102, 117, Plant Science 103
  - (d) Applied plant biology: Agronomy 100, Plant Science 112, 113, 140, 145

**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 high-excellence honors are not dependent on the concentration of 194H. Refer to the Academic Information section and the appropriate College section for Dead Honors List information.

**Teaching Credential Subject Requirements**: R. M. Thornton (Section of Plant Biology). 210 Robbins Hall also the Teacher Education Program.

**Graduate Study**: Contill the Plant Biology Graduate Group listing.

**Divisionwide Programs and Courses**

**Boodega Marine Laboratory Program**

A full program of undergraduate coursework in marine biology is available each Spring quarter at the Boodega Marine Laboratory (BML) located in Boodega Bay, California. Course offerings include lecture and laboratory instruction in the development of marine invertebrate, physiological adaptation of marine organisms, and population biology and ecology, and field work, and selected research studies under the direction of marine faculty. (Biological Sciences courses 120, 120P, 122, 122P, 122T, 122U, 128, 128T, 128U, and 134. The program is resident, with students housed on the laboratory grounds. Participation is assessed at a normal rate.)

**Application**: Forms can be obtained from the Division of Biological Sciences, Applications are due on or before the pre-registration deadline for spring quarter. Additional information on the Boodega Marine Laboratory Program is available from the Undergraduate Academic Programs-Division of Biological Sciences Office, 66 Briggs, BML directly, (707) 875-2211, P.O. Box 247, Boodega Bay, CA 94923.

**Courses in Biological Sciences (BIS)**

**Lower Division Courses**

1. **Introductory Biology** (5) I, II, III. The Staff  
   - Lecture—4 hours laboratory—3 hours discussion—1 hour (laboratory and discussion scheduled on alternate weeks). Prerequisite: Chemistry 2B (may be taken concurrently). Introduction to biological molecules, biochemistry, cell structure and function, elements of molecular biology, and viruses. Interdisciplinary course for majors in the biological sciences.

2. **Introductory Biology** (5) I, II, III. The Staff  
   - Lecture—4 hours laboratory—3 hours discussion—1 hour. Prerequisite: course continued in Biological Sciences 1A. Topics covered include cell biology, genetics, cell structure, and function of different tissues, organ systems, and evolution and development of animals. Population ecology, ecosystems and evolution of animal species.

3. **General Biology** (4) I. Crowe, II. Keizer, III. The Staff  
   - 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, ecology, and the behavior of biology in animals. Designed for students not specializing in biology. Not for credit for those who have had course 1A. General Education credit: Nature and Environment.

4. **Issues in the Life Sciences** (2-2) 
   - Velez, II, I, II. The Staff  
   - Lecture—1 hour discussion—1 hour. Prerequisite: enrollment limited to BISP 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.

119. Biology of Cancer (3) III. The Staff Labcourse: 3 hours total: course 1A or 10, or Molecular and Cellular Biology 10 or Neurobiology, Physiology and Behavior 11. Interdisciplinary course offers an introduction to the biological, clinical, and psychological aspects of cancer, and emphasizes basic understanding of biological principles with a focus on the disease process. Designed for students with little scientific background. Offered in alternate years.

92. Internship in Biological Sciences (1-12) 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. Genetics and Gene Expression (4) Dvorak (Agronomy and Range Science), Gottlieb, II, Morin, Shen, II, Quiring (Vegetable Crops), Rodrigue Lecture—4 hours. Prerequisite: course 1B, Chemistry 88, or 118B or 128B. (May be taken concurrently.) Nucleic acid structure and function; gene expression and its regulation; replication; transcription and translation; restriction and modification; 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. Gersch, Schroder, II, Sprecher Thog (Plant Biology), III, Helft, III. Lecture—3 hours. Prerequisite: Chemistry 88 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. Dott, Mitchell, II, Segal, III, Canton, III. Lecture—3 hours. Prerequisite: course 102. Fundamentals of metabolism including glycolysis and oxidative pathways, pyruvate oxidation, biosynthesis of amino acids, and protein structure and function. 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) Di Donato, II. Crow, III. (Neurobiology, Physiology and Behavior), III. Ezell, McNally Lecture—3 hours. Prerequisite: course 101 and 102; course 103 recommended. Membrane receptors and signal transduction, cell tumor, 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 Biology/Zoology 130, Physiology 100A or Zoology 121A. (Former course Botany/Zoology 130, Physiology 100A, Zoology 121A.)

120. Developmental Biology of Marine Invertebrates (4) III. Jeffery (Molecular and Cellular Biology)
Lecture—3 hours total: laboratory—3 hours total. Prerequisite: Molecular and Cellular Biology 150-150L, Biological Sciences 102 and 103, course 124 concurrently. Phylogenetic patterns of reorganization and development among the marine invertebrates. Emphasis on developmental and comparative approaches to understanding embryogenesis, gene expression, and development. Course offered at Bodega Marine Laboratory.

(See above description for Bodega Marine Laboratory Program.)

105. Developmental Biology of Marine Invertebrates/Advanced Laboratory Topics (6) III. Jeffery. (Molecular and Cellular Biology)
Laboratory—150 hours total; discussion—15 hours total. Prerequisite: course 124 concurrently. Students pair up for a research topic for advanced study. Research will be related to a topic covered in course 124 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) I, II. Strong (Evolution and Ecology)
Lecture—30 hours total; laboratory—30 hours total. Prerequisite: lower division core in biological sciences; course 124 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. Modeling 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—15 hours total. Prerequisite: course 124 concurrently. Students pair up for a research topic for advanced study. Research will be related to a topic covered in course 124 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 (1-15) I, II, III. The Staff (Associate Dean in charge)
Seminar—1 hour. Seminar: enrolled students enrolled 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 offered at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)

192. Internship in Biological Sciences (1-15) II, III. The Staff (Associate Dean in charge)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Internship. (P/NP grading only.)

194H. Research Honors (2) I, II, III. The Staff (Associate Dean in charge)
Independent study—10 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 advisors. (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

286. Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. Division of Biological Sciences graduate students may offer group study courses under this number.

Sections of the Division of Biological Sciences

Biological Sciences: Evolution and Ecology

Thomas W. Schoener, Ph.D., Chairperson of the Section

Office, 2200 Storer Hall (916-792-1277)

Faculty

Primary Section Members

James A. Doyle, Ph.D., Professor
Olaf W. J. Ellers, Ph.D., Assistant Professor
John H. Gillespie, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
Richard K. Giesberg, Ph.D., Associate Professor
Charles H. Langley, Ph.D., Professor
Marc Magdel, Ph.D., Professor
Marcel Rejmanek, Ph.D., Professor
Thomas W. Schoener, Ph.D., Professor
H. Bradley Shaffer, Ph.D., Professor
Artur M. Shapiro, Ph.D., Professor, Academic Senate Distinctive Teaching Award
Judy A. Stams, Ph.D., Professor
Maeve L. Sint, Ph.D., Professor
Sharon Y. Strauss, Ph.D., Assistant Professor
Donald R. Strong, Ph.D., Professor
Catharina A. Toft, Ph.D., Professor
Michael Turelli, Ph.D., Professor

Secondary Section Members

Peter R. Marz, Ph.D., Professor
Robert W. Peary, Ph.D., Professor

Emeriti Faculty

Daniel I. Anker, Ph.D., Professor Emeritus
Milton Hildebrand, Ph.D., Professor Emeritus
Academic Senate Distinctive Teaching Award
Everett W. Jameson, Ph.D., Professor Emeritus
Jack Major, Ph.D., Professor Emeritus
Miller A. Miller, Ph.D., Professor Emeritus
Timothy Prou, Ph.D., Professor Emeritus
Robert L. Rudd, Ph.D., Professor Emeritus
George W. Stet, Ph.D., Professor Emeritus
G. Ledyard Stebbins, Ph.D., Professor Emeritus
Kenneth E. W. Watt, Ph.D., LL.D., Professor Emeritus
Grady L. Webster, Ph.D., Professor Emeritus
Stephen L. Wolfe, Ph.D., Lecturer Emeritus

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 awarded at 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.)

*Course not offered this academic year.
101. Introduction to Ecology (4) I. Toft; II. Mangell; III. Strauss
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C; 101; Mathematics 11A, 11B, 11C or 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, or former courses Botany 100, Genetics 103, Zoology 148.

102. Advanced Evolution (4) II. Gillespie
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Advanced topics and current issues in microevolution and macroevolution, including population genetics, speciation, biogeography, comparative anatomy, paleontology, and evolutionary mechanisms and principles. Not open to students who have completed Genetecics 105 or 106 (former course Genetics 105, 106).

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 to students who have completed Zoology 105. (Former course Zoology 105).

112. Invertebrate Zoology (4) II. Ellers, Grosberg
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 to students who have completed Zoology 112. (Former course Zoology 112L).

112L. Laboratory for Invertebrate Zoology (3) II. Ellers, Grosberg
Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B. course 112L concurrently; field 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 to students who have completed Zoology 112L. (Former course Zoology 112L).

117. Plant Ecology (4) I. Pears and staff
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 is given to California plant ecology. Students taking course 117 cannot receive credit for Plant Biology 101. (Same course as Plant Biology 117.) Not open to students who have completed Botany 117. (Former course Botany 117.)

121. Survey of Plant Communities of California (4) II. Barbour
Lecture—2 hours; fieldwork—1 hour; term paper—1 hour. 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. General Education credit: Nature and Environment. Not open to students who have completed Plant Biology 101 or Botany 101. (Former courses Plant Biology 101, Botany 101.)

133. Patterns in Vertebrate Biology (3) II. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Vertebrate thermoregulation and water balance, circadian and circannual activity, communication, breathing, movements and feeding patterns. Not open to students who have completed Zoology 133. (Former course Zoology 133.)

134. Herpetology (3) III. Shaffer
Lecture—2 hours; term paper. 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 habitats in the San Francisco Bay area. Not open to students who have completed Zoology 134, former course Zoology 134L. (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. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural habitats in the San Francisco Bay area. Not open to students who have completed Zoology 134L. (Former course Zoology 134L.)

136. Mammalogy (2) I. The Staff
Lecture—2 hours. Prerequisite: course 101 or equivalent. General anatomy, behavior, life history, reproduction, and distribution of wild mammals. Not open to students who have completed Zoology 136. (Former course Zoology 136.)

136L. Mammalogy Laboratory (3) I. The Staff
Laboratory—6 hours; two weekend field trips. Prerequisite: course 136 or 101, and consent of instructor. Systematics of California mammals; techniques of study in professional mammalogy. May be taken concurrently with course 136. Not open to students who have completed Zoology 136L. (Former course Zoology 136L.)

137. Ornithology (2) II. The Staff
Lecture—2 hours. Prerequisite: course 101 or the equivalent. Avian 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 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. Field experience in bird identification. Systematics, behavior, population dynamics, and reproduction of California birds. Not open to students who have completed Zoology 137L. (Former course Zoology 137L.)

138. Ecology of Tropical Latitudes (3) II. Shapiro
Lecture—3 hours. Prerequisite: any one of the following: Biological Sciences 1A, 1B, or 10, Plant Biology 10, Geography 2 or 23, 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. Prerequisites: Permission for registration in the context of ecological and evolutionary theory. Offered in alternate years. Not open to students who have completed Zoology 138. (Former course Zoology 138L.) General Education credit: Nature and Environment.

140. Paleobotany (4) I. Doyle
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B. Introduction to plant fossil records, with emphasis on the flora found 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 to students who have completed Botany 140. (Former course Botany 140.)

141. Principles of Systematic Zoology (3) II. Doyle, Shapiro
Lecture—2 hours; biweekly research projects. Prerequisite: Biological Sciences 1B or 10C; course 100 required. Historical background, philosophical rationales, contemporary approaches, and working rules of animal biologists. Introduction to the International Code of Zoological Nomenclature. Offered in alternate years. Not open to students who have completed Zoology 141. (Former course Zoology 141.)

147. Plant Geography (4) II. Elliot-Flask
(Geography)
Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division course in plant ecology or taxonomy, i.e., course 117 or 101. course 101, 102, 108, 121. The worldwide distribution of the major plant communities and taxa is reviewed with respect to the historical background and the theoretical principles of biogeography. Laboratory studies introduce students to the interpretation of data and testing of biogeographical hypotheses. Offered in alternate years. Not open to students who have completed Botany 144. (Former course Botany 144.)

147L. Plant Geography Laboratory (I) II. Shapiro
Laboratory—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial animals. The role of geologic, climatic, and biological changes in the geographic distribution of animals. Offered in alternate years. Not open to students who have completed Botany 147. (Former course Botany 147.)

149. Evolution of Ecological Systems (4) I. Shapiro
Lecture—3 hours; term paper. Prerequisite: course 101 or Environmental Studies 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 to students who have completed Zoology 149. (Former course Zoology 149.)

170. Comparative Biomechanics (3) III. Ellers
Lecture—3 hours; term paper. Prerequisite: Physics 5A, 5B, 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 to students who have completed Zoology 170. (Former course Zoology 170.)

170L. Comparative Biomechanics Laboratory (3) III. Ellers
Laboratory—6 hours; term paper. Prerequisite: Physics 5A, 5B, Mathematics 16A, 16B, 16C, Biological Sciences 1B; course 170 recommended to be taken concurrently. Experimental techniques for measuring physical quantities relevant to organismal design. Demonstrations 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 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) II. 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)
Biological Sciences: Microbiology

Stephen C. Kowalczykowski, Ph.D., Chairperson of the Section

Faculty
Primary Section Members
Stanley W. Arzt, Ph.D., Professor
Paul Baumann, Ph.D., Professor
Michele M. Igo, Ph.D., Assistant Professor
Daniel J. Klionsky, Ph.D., Associate Professor
Stephen C. Kowalczykowski, Ph.D., Professor
 Jews S. Manning, Ph.D., Professor
John C. Meeks, Ph.D., Professor
Doug C. Nelson, Ph.D., Associate Professor
Mark L. Wheels, Ph.D., Senior Lecturer

Secondary Section Members
Irwin H. Siegel, Ph.D., Professor

Emeriti Faculty
Robert E. Hungate, Ph.D., Professor Emeritus
John L. Ingraham, Ph.D., Professor Emeritus
Allen G. Merri, Ph.D., Professor Emeritus
Harman J. Phelps, Ph.D., Professor Emeritus
David Pratt, Ph.D., Professor Emeritus

Courses in Microbiology (MIC)

Lower Division Courses


98. Directed Group Study (1-5). I, II. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/N grading only)

Upper Division Courses

102. General Microbiology (4). I, II. Prerequisites: Biological Sciences 1A, 2A. Integrated presentation of the nature of animal, bacterial, and plant viruses, including structure, replication and genetics.

177. Metabolism of Anaerobic Bacteria (3). II. M. (Animal Science)
Lecture—4 hours. Prerequisite: course 102; Biological

*Course not offered this academic year.
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 credits). Laboratory—6 hours. Prerequisite: course 102L; course 177 may be taken concurrently. Isolation of anaerobic bacteria from a number of different natural environments and 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. (PINF grading only)

192. Internship (1-12) I, II, III. The Staff Internship—3-36 hours. Technical and/or professional experience on off campus. Supervised by a member of the Microbiology Section faculty. (PINF 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 198 in microbiology; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under the faculty direction. (PINF grading only)

197T. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (PINF grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (PINF 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 in any branch of 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-week assignments in microbiology research laboratories. Individual research programs with emphasis on methodological/procedural experience and experimental design. Graded pass/credit.

210. Molecular Mechanisms in Microbial Pathogenesis (3) I. 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 pathogenesis of higher eukaryotic organisms. Emphasis on the alteration of host defense and 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 130L; 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, Wheeler Lecture/discussion—3 hours. Prerequisite: Biological Sciences 103. Biochemistry and ecology of photosynthetic bacteria and of methanogenic bacteria, with special emphasis on the mechanisms of ATP and reduced carbon generation. Offered in alternate years.

250. Biology of Yeasts (5) I. Bisson (Viticulture and Enology), C. Price (Food Science and Technology) Lecture—3 hours; laboratory—6 hours. Prerequisite: consent of instructor. Survey of the genetics, physiology, regulatory mechanisms, structure, ecology, and diversity of yeasts and related organisms. Offered in alternate years.

260. Bacterial Genetic Regulatory Mechanisms (3) I. Azur 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 control, RNA modification effects; autoregulation; control circuits in bacterial viruses; superantigens. Offered in alternate years.

262. Advanced General and Molecular Virology (3) III. Manning, Luciw (Medical Pathology) Bunning (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.

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, 2) I, II, III. Kowalczykowski in charge Seminar—1 hour. Current progress in microbiology and cellular and molecular biology. (S/U grading only)

292. Seminar in Bacterial Physiology, Genetics and Virology (1) I, 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 presentation by individuals. (S/U grading only)

293. Seminar in Protein Sorting (1) I, II. Klionsky Seminar—1 hour. Prerequisite: consent of instructor. Reading, presentation and discussion of current research in the field of organelle biogenesis, protein sorting and secretion. (S/U grading only)

296. Seminar in Animal Virology (1) I, II. 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)

**Course not offered this academic year.**

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**Biological Sciences: Molecular and Cellular Biology**

Carli 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
Ronald J. Baskin, Ph.D., Professor
Kenneth C. Burton, Ph.D., Associate Professor
Judy Callis, Ph.D., Associate Professor
Don M. Carlton, Ph.D., Professor
Walls L. Clark, Jr., Ph.D., Professor (Animal Science)
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
Marllyn E. Etzel, Ph.D., Professor
Charles S. Gasser, Ph.D., Associate Professor
Robert D. Grey, Ph.D., Professor, Academic Senate Distinguished Teaching Award
R. Scott Hawley, Ph.D., Professor
J. Jerry L. Hedrick, Ph.D., Professor
Leonard M. Hjelmeland, Ph.D., Professor (Biological Chemistry)
William R. Jeffrey, Ph.D., Professor
John A. Kilgore, Ph.D., Professor
J. Clark Lagarias, Ph.D., Professor
R. Marc Learned, Ph.D., Assistant Professor
Francis J. McAlilly, Ph.D., Assistant Professor
Mark G. McNamara, Ph.D., Professor
Gregg B. Morin, Ph.D., Assistant Professor
Jeanette E. Nazlet, Ph.D., Associate Professor
Richard L. Nuccitelli, Ph.D., Professor
Raymond L. Rodriguez, Ph.D., Professor
Mark F. Sanders, Ph.D., Lecturer
Carl W. Schmid, Ph.D., Professor (Chemistry)
Jonathan M. Scholey, Ph.D., Assistant Professor
Irwin H. Segel, Ph.D., Professor
Che-Kun J. Shen, Ph.D., Professor
Larry R. Spires, Ph.D., Lecturer

**Secondary Section Members**

Ernest S. Chang, Ph.D., Professor (Animal Science)
Richard H. Falk, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
John H. Harada, Ph.D., Associate Professor
Daniel J. Klionsky, Ph.D., Assistant Professor
Stephen C. Kowalczykowski, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Brian Mulloney, Ph.D., Professor
Sharan O’Neill, Ph.D., Assistant Professor
Pamela A. Pappone, Ph.D., Associate Professor
Martin L. Privalsky, Ph.D., Professor
Courses in Molecular and Cellular Biology (MCB)

Lower Division Courses
10. Introduction to Human Heredity (4) I. Sanders; III. 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 birth, and human lengths and heights. Not open to students who have received credit for Genetics 10. (Former course Genetics 10.)

19. Special Study (1-5) I, II, III. The Staff

Independent study—5—15 hours. Prerequisite: consent of instructor (Former course Genetics 99.) (P/NC grading only.)

Upper Division Courses
120L. Biochemistry Laboratory (6) I. Fairclough (Neurology); II, III. Nativie; IV. Spremachen; V. Hilt, Spremachen; VI. Segel; VII. Cricci, Dool; VIII. Spremachen Laboratory—10 hours; lecture—2 hours; laboratory-discussion—1 hour. Prerequisite: Biochemistry 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 to students who have received credit for Biochemistry and Biophysics 101L. (Former course Biochemistry and Biophysics 101L.)

121. Molecular Biology of Eukaryotic Cells (3) I. Dahmms

Lecture—3 hours. Prerequisite: Biological Sciences 101, 103, course 120L. Structure, expression and regulation of genes in eukaryotes. Chromosome structure and replication; gene structure, transcription and RNA processing; protein synthesis and translation control; development, immune system and oncogenes. Not open to students who have received credit for Biochemistry and Biophysics 153, Zoology 121B, or course 141. (Former course Biochemistry and Biophysics 153.)

122. Structure and Function of Proteins (3) I. Cricci

Lecture—3 hours. Prerequisite: course 120L, Biological Sciences 103. Correlation of structure with biological function. Molecular models of enzymes that explain their physiological function. 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 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) I. 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, multireaction systems, enzyme regulation and computer-assisted simulations and analysis. Not open to students who have received credit for Biochemistry and Biophysics 133. (Former course Biochemistry and Biophysics 133.)

126. Plant Biochemistry (3) III. Callis, Lagaritas Lecture—3 hours. Prerequisite: Biological Sciences 103. The chemistry of important plant processes and constituents in photosynthesis and respiration; carbohydrate, fat, and amino acid metabolism. Not open to students who have received credit for Biophysics 122. (Former course Biochemistry and Biophysics 122.)

138. Undergraduate Seminar in Biochemistry (1) I. Carlson, Hasetti; II. Etzler, Gasser, III. Callis, Dahms Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. Not open to students who have received credit for Biochemistry and Biophysics 190. (Former course Biochemistry and Biophysics 190.) (P/NC grading only.)

140L. Cell Biology Laboratory (3) I. Raskin 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 to students who have received credit for Zoology 121L. (Former course Zoology 121L.)

141. Cellular Regulation of Gene Expression (4) I. Nativie 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 to students who have received credit for Biochemistry and Biophysics 153, Zoology 121B, or course 121. (Former course Zoology 121B.)

142. Advanced Cell Biology: Contractile and Motile Systems (4) I. Raskin

Lecture—3 hours; term paper. Prerequisite: Biological Science 110; Mathematics 163. Advanced cell biology with emphasis on molecular, cellular and cellular properties of contractile and motile systems. Not open to students who have received credit for Zoology 121C. (Former course Zoology 121C.)

146. Histology (4) I. II. The Staff

Lecture—3 hours; laboratory—2 hours. Prerequisite: Biological Science 104. Forma and morphology of normal. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes. Not open 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/NC grading only.)

150. Embryology (4) I. Armstrong; II; Edwards; 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 to students who have received credit for Zoology 100. (Former course Zoology 100.)

150L. Laboratory in Vertebrate Embryology (1) Armstrong; II; Edwards; III. Erickson Laboratory—3 hours. Prerequisite: concurrent enrollment in course 150. The comparative analysis of the embryonic development and anatomy of vertebrates. Not open to students who have received credit for Zoology 100L. (Former course Zoology 100L.) (P/NC grading only.)

151L. Advanced Developmental Biology (4) I. Erickson, Natzie, Jeffery, Nuccitelli Lecture—2 hours; laboratory—6 hours; written report. Prerequisite: courses 150, 150L; Biological Sciences 103. Modern topics in developmental biology followed by sophisticated laboratory exercises that demonstrate the logic of the lecture topics. Students conduct independent studies during the final weeks of quarter. A written report required. Not open to students who have received credit for Zoology 101.

158. Undergraduate Seminar in Developmental Biology (2) I. II. The Staff

Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in developmental 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/NC 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, development, morphogenesis, cell differentiation, and pattern formation. Limited enrollment. Not open to students who have received credit for Zoology 102. (Former course Zoology 102.)

160L. Principles of Genetics Laboratory (4) I. Burk, Learned; II. Kiger; III. Sanders Laboratory—6 hours; lecture—1 hour; laboratory-discussion—4 hours. Prerequisite: Biological Sciences 101. Laboratory work in basic and molecular genetics including gene mapping and isolation of mutants. Not open to students who have received credit for Genetics 100L. (Former course Genetics 100L.)

161. Molecular Genetics (3) I. 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 to students who have received credit for Genetics 102A, 102B, Zoology 121B, Biochemistry and Biophysics 153, or course 121 or 141. (Former course Genetics 102A and 102B.)

162. Human Genetics (3) III. Sanders Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Human molecular genetic variability: molecular basis of conditions, chromosomal aberrations and consequences, diseases associated with the immune system, and statistical techniques for estimating genetic and environmental effects. Not open to students who have received credit for Genetics 107. (Former course Genetics 107.)

163. Developmental Genetics (3) II. Natzie 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 to students who have received credit for Genetics 104. (Former course Genetics 104.)

164. Advanced Eukaryotic Genetics (3) I. Hawley Lecture—3 hours. Prerequisite: Biological Sciences 101. Concentration on the five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and linkage. 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. Course 161, 163. Topics of current interest in the area of genetic control of development. Focus on the
291. Current Progress in Molecular and Cellular Biology (3) I, II, III. 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. (Offered course Biochemistry and Biophysics 291.) (SU graded only.)

*292. Literature in Molecular and Cellular Biology (1) I, II, III. The Staff 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. (SU graded 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.) (SU graded only.)

298. Research (1-12) I, II, III. The Staff Independent study—3-36 hours. (Former courses Biochemistry and Biophysics 298, Genetics 289.) (SU graded only.)

Professional Course

300. 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 teaching, class discussions, and laboratory sessions. May be repeated for credit. (Former courses Biochemistry and Biophysics 290, Genetics 300.) (SU graded only.)

Courses in Neurobiology, Physiology and Behavior (NPB)

Lower Division Course

10. Elementary Physiology (4) I. The Staff Lecture—3 hours, discussion—1 hour. Introductory course in physiology for nonscience majors. Not open for credit to students who have had Biological Sciences 18.

Upper Division Courses

100. Neurobiology (4) I, III. Mulloney Lecture—3 hours, discussion—1 hour. Prerequisite: Biological Sciences 18A. 1B (or 5A strongly recommended). Systems physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of these 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, III. 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. Marler Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Basic principles of behavior in vertebrate and invertebrate animals. Underlying phylogenetic 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 156 or Zoology 155. (Former courses Neuroscience, Physiology and Behavior 156, Zoology 155.)

103. Cellular Physiology/Neurobiology (3) Pappone Lecture—3 hours. Prerequisite: Biological Sciences 103 and 104; Physics 5C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal pharmacology. Experimental 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 102B or Physiology 100B. (Former course Neurobiology, Physiology, and Behavior 100B.)

104L. Cellular Physiology/Neurobiology Laboratory (3) [II, Horvitz] Lecture—3 hours; laboratory—1 hour. Prerequisite: Biological Sciences 104 or the equivalent; and course 103 (may be taken concurrently). Experiments in the physical and chemical processes of cellular tissues. Not open for credit to students who have completed course 100L or Physiology 100L. (Former course 100L, Physiology 100L.)

105. Introduction to Computer Models (4) [III, Keizer] Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: Mathematics 16C or the equivalent; Physics 5C; 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, Ca2+ oscillations, respiration, and muscle contraction alternate years.

106. Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3) [II, III] The Staff Lecture—2 hours; laboratory—3 hours. Prerequisites: course 101, 102, or 103, and consent of instructor. Experiments in current physiological, neurobiological, or animal behavior problems. Discussion of experimental design. Students choose a project and, independently, design a protocol, do the project and report their findings. May be repeated once for credit with consent of instructor. (P/NP grading only)

111A. Advanced Systemic Physiology Laboratory (3) [I, Adler] Lecture—1 hour; laboratory—2 hours. Prerequisites: courses 101, 101L, and 102B; courses 113, 114 recommended. Selected comprehensive experiments on the cardiovascular, respiratory, digestive, and endocrine 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 Physiology 111A. (Former course Physiology 111A.)

111B. Advanced Systemic Physiology Laboratory (3) [II, Adler] Lecture—1 hour; laboratory—2 hours. Prerequisites: courses 101, 101L, and 102B; courses 113, 114 recommended. Selected comprehensive experiments on the nervous and muscular 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 Physiology 111B. (Former course Physiology 111B.)

111C. Advanced Systemic Physiology Laboratory (3) [III, Adler] Lecture—1 hour; laboratory—2 hours. Prerequisites: courses 101, 101L, and 102B; courses 113, 114 recommended. Interface physiological recording equipment with microcomputers; data acquisition and analysis (use of microcomputer); data interpretation within the framework of physiological concepts. Not open for credit to students who have completed Physiology 111C. (Former course Physiology 111C.)

112. Neuroscience (3) [I, II, Carstens, Gray, Britten] Lecture—3 hours; laboratory—1 hour. 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, Weidner] Lecture—4 hours. Prerequisite: course 101; Chemistry 6B, Physics 5B recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiology students, grad students, or others interested in allied inter- means. Not open for credit to students who have completed Physiology 113. (Former course Physiology 113.)

114. Gastrointestinal Physiology (3) [III, Johnson] Lecture—3 hours; term paper. Prerequisite: course 101; Biological Sciences 103 recommended. Advanced gastrointestinal physiology covering absorption, motility, secretion, and special emphasis on enteroendocrine and innervation. Emphasis will be on the physiology of the gastrointestinal tract; some pathophysiology and normal pathophysiology will be covered. Not open for credit to students who have completed Physiology 114. (Former course Physiology 114.)

117. Avian Physiology (3) [I, Frey, Wilson] Lecture—3 hours; prerequisites: 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 5C; Biological Sciences 102 and 103 recommended. Comparative physiology of invertebrate organ systems. Not open for credit to students who have completed Zoology 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 (3) [II, Anderson] Laboratory—3 hours. Prerequisite: course 121 recommended. Students will be expected to be familiar with 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.)

125. Comparative Physiology: Neurointegrative Mechanisms (3) [II, Woolley] Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photoreceptive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Not open for credit to students who have completed course 125L or Physiology 125L. (Former course 125L, Physiology 125L.)

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 mechanosensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photoreceptive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Not open for credit to students who have completed course 126L or Physiology 126L. (Former course 126L, Physiology 126L.)

127. Comparative Physiology: Circulation (3) [III, Goldberg] 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 127B or Physiology 127B. (Former course 127B, Physiology 127B.)

128. Comparative Physiology: Endocrinology (3) [II, Chang, Moberg] Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: animal hormones and their functions. Not open for credit to students who have completed course 128D or Physiology 128D. (Former course 128D, Physiology 128D.)

*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 129D or Physiology 129D. (Former course 129D, Physiology 129D.)

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, Furlong] Lecture—3 hours; laboratory—10 hours. Prerequisite: course 101 and Biological Sciences 104, or Biological Sciences 102 or the equivalent. Physiological aspects of interactions of organisms and environment at cellular, organismal, and ecological levels. Emphasis on regulatory responses/ mechanisms to thermal, pressure, and osmotic environmental variables. Not open for credit to students who have completed courses 148 or Physiology 149. (Former courses 148, Physiology 149.)

141. Physiological Adaptation of Marine Organisms (4) [III, Clegg (Molecular and Cellular Biology), Chang] Lecture—3 hours; laboratory—30 hours total. Prerequisite: Biological Sciences 102 and 103; Biological Sciences 123 (concurrently); Physics 5A-5B-5C. Physiological adaptation to the environment among organisms in marine and estuarine habitats. Course offered during Bodega Marine Laboratory Programs. (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, Mendoza] Lecture—3 hours. Prerequisite: course 101 and 102 or Psychology 108. Endocrine physiology with an emphasis on the principal 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) [I, Mullaney and Wilson] Lecture—3 hours; independent study—1 hour. Prerequisite: Biological Sciences 101, 102, 104, course
Biological Sciences: Plant Biology

Thomas L. Roit, Ph.D., Acting Chairperson of the Section

Section Office, 143 Robbins Hall (916-752-0617)

Committee in Charge

John J. Harada, Ph.D. (Plant Biology), Chairperson
Judith L. Sarno, Ph.D. (Agriculture and Range Science)

Cayuop Napolll, Ph.D. (Environmental Horticulture)
Alan Stemler, Ph.D. (Plant Biology)
Robert M. Thornton, Ph.D. (Plant Biology)
John Yoder, Ph.D. (Vegetable Crops)

Faculty

Faculty includes members of the Departments of Agriculture 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

Anne Britt, Ph.D., Assistant Professor
Richard H. Falt, Ph.D., Professor
John J. Harada, Ph.D., Chairperson
William J. Lucas, Ph.D., Professor
Terence M. Murphy, Ph.D., Professor
Sharon O'Neill, Ph.D., Associate Professor
Robert W. Poore, Ph.D., Professor
Steven M. Thieg, Ph.D., Associate Professor
Robert M. Thornton, Ph.D., Senior Lecturer, Academic Senate Distinguished Teaching Award
Larry N. Vandermote, Ph.D., Professor

Secondary Section Members

Judy N. Callahan, Ph.D., Associate Professor
Richard S. Criddle, Ph.D., Professor
James A. Doyle, Ph.D., Professor (Geology)
Marjory E. Ezler, Ph.D., Professor
Charles S. Gerst, Ph.D., Associate Professor
R. Marc L. Leckie, Ph.D., Associate Professor
Marcel Renault, Ph.D., Associate Professor
Raymond L. Rodriguez, Ph.D., Professor
Irving H. Segal, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Doug R. Strong, Ph.D., Professor

Emeriti Faculty

Fredrick T. Albright, Ph.D., Professor Emeritus
Floyd M. Ashton, Ph.D., Professor Emeritus
Bruce A. Barner, Ph.D., Professor Emeritus

Herbert B. Currier, Ph.D., Professor Emeritus
Emanuel Epstein, Ph.D., Professor Emeritus
Emmet M. Gifford, Ph.D., Professor Emeritus
Robert W. Holz, Ph.D., Professor Emeritus
Hendrick J. Kellner, Ph.D., Professor Emeritus
Donald W. Krohn, Ph.D., Professor Emeritus
Norma L. 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

Courses in Plant Biology (PLB)

Lower Division Courses

10. Plants, People and the Biosphere (3)
Lecture—3 hours; one weekly 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. Non-science majors are encouraged to enroll. General Education credit: Nature and Environment. Not open for credit to students who have completed Botany 10. (Former course Botany 10. )

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-6 hours. Prerequisite: consent of instructor; Technical and professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. (Former course Botany 92.) (PNP 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.) (PNP 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.) (PNP grading only.)

Upper Division Courses

102. California Floristics (5) I, II, III. Dean Lecture—2 hours; laboratory—8 hours; includes three one-day weekend field trips.
Prerequisite: Biological Sciences 1A, 1B, 1C or 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 Biological Sciences 102. (Former course Botany 102.)

105. Developmental Plant Anatomy (5) I. Post 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.)

106. Systematic Botany of Flowering Plants (5) I, II, III. The Staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Laboratory and field studies of the families and orders of flowering plants. Principles of taxonomy. Practice in identification of species by means of keys. Not open for credit to students who have completed Botany 106. (Former course Botany 106.)

111. Plant Physiology (3) I. O'Neill Lecture—3 hours. Prerequisite: Biological Sciences 1C, Chemistry 8B. May be taken concurrently; Physics 5A, 5B, 5C recommended. Fundamental activities of plants: the plant cell as a functional 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. O’Neill 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 the 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. Stemler Lecture/discussion—1 hour; laboratory—9 hours; extensive writing. Prerequisite: course 111 (may be taken concurrently) or course 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. Thorton Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B; course 111 and Biological Sciences 102 recommended. Processes, dynamics, and control of growth and development. Not open for credit to students who have completed Botany 112. (Former course Botany 112.)

112D. Problems in Plant Growth and Development (1) II. Thorton 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 the class period. Not open for credit to students who have completed Botany 112D. (Former course Botany 112D.) (P/NP grading only).

116. Risk, Development and Evolution (4) II. Leerstedt Lecture—2 hours; laboratory—6 hours. Prerequisite: course 116. Introduction to the evolutionary history of vascular plants. Evolution is the evolution of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Structure-function relationships are explained in the context of changing environments. Not open for credit to students who have completed Botany 116. (Former course Botany 116.)

117. Plant Ecology (4) I. Pearcy Lecture—5 hours; field trips. Prerequisite: Biological Sciences 1A, 1B; course 112; course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis is given to development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Structure-function relationships are explained in the context of changing environments. Not open for credit to students who have completed Botany 117. (Former course Botany 117.)

118. Introduction to Phyology (4) II. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Comparative morphology, physiology, and reproduction of the major algal groups, including cyanobacteria. Focus is on phylology through serial endosymbioses. Laboratory study living organisms and have identified exercises. Ecological factors and commercial uses are considered. Not open for credit to students who have completed Botany 118. (Former course Botany 118.)

119. Introductory Mycology (5) I. MacDonald (Plant Pathology) Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to structure, ontogeny, and taxonomy of selected phyla, and major divisions of the fungi. Not open for credit to students who have completed Botany 119. (Former course Botany 119.)

120. 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 crops, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Not open for credit to students who have completed Botany 120. (Former course Botany 120) (P/NP grading only).

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, and weed management. Not open for credit to students who have completed Botany 121. (Former course Botany 121.)

122. Action of Herbicides (3) III. Bayer Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 111, 112, 113 recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants, persistence of weed killers on plant populations. Physical and physical fate of herbicides in soils. Not open for credit to students who have completed Botany 122. (Former course Botany 122.)

125. Molecular Biology of Plant Development (3) III. Harbaugh 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.)

135. Mineral Nutrition of Plants (4) III. J. Richards (Water and Resource) and Brown (Plant Biology) Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111 or the equivalent. Plant nutrition and the soil microbiota: microbial metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. Not open for credit to students who have completed Botany 135. (Former course Botany 135.)

150. Biology and Management of Freshwater Macrophytes (3) I. Anderson Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C. Chemical and biological factors that control the growth and distribution of submerged aquatic plants. Not open for credit to students who have completed Botany 150. (Former course Botany 150.)

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 course in plant biology. Design and conduct of the instructor provides an opportunity for 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.) (P/NP grading only)

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)

*Course not offered this academic year.*
Courses in Biomedical Engineering (BIM)

Graduate Courses

200. Introduction to Biomedical Engineering (2) I. Hull Lecture—2 hours. Prerequisite: Biological Sciences 1A and 1B, Engineering 17, 36, and 45, and consent of instructor. Introduction to several primary fields of specialization in biomedical engineering. Fields include the following: 1) sensors, instrumentation, and signal processing; 2) orthopedic biomechanics; 3) whole body biomechanics, 4) imaging, and 5) transport.

210. Introduction to Biomatirials (4) II. Shackelford Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymers, implant materials, corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood coagulation; properties of bone, joints, and blood vessels; biocompatibility of orthopedic and cardiovascular materials. Offered in alternate years.

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 22S.)

225. Spatial Kinematics and Robotics (3) II. Cheng Lecture—3 hours. Prerequisite: Mechanical Engineering 222: Spatial kinematics: Point and line coordinates and their transformation 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.

227. Research Techniques in Biomechanics (4) II. Williams, Hawkins Lecture—2 hours; laboratory—4 hours. Prerequisite: consent of instructor, Mathematics 226, 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, position parameter determination, electromyography, and biomechanical modeling. (Same course as Mechanical Engineering 227/Exercise Science 227.)

231. Musculo-Skeletal System Biomechanics (3) III. Hull Lecture—3 hours. Prerequisite: Engineering 102, Mechanical Engineering 176. Mechanics of musculoskeletal system and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, compituation of intersegmental load and muscle forces, applications to gait analysis and sport biomechanics. Offered in alternate years. (Same course as Mechanical Engineering 231.)

232. Skeletal Tissue Mechanics (3) III. Martin Lecture—4 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 anatomical 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 Mechanical Engineering 232.)

241. Introduction to Magnetic Resonance Imaging (2) III. Buonocore Lecture—2 hours. Prerequisite: Physics 90D, Mathematics 228. Introduction to equipment, methods, and 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 248, which may be taken concurrently.

242. Survey of Medical Imaging Technology (2) II. Boone, Sexton Lecture—2 hours; term paper. Prerequisite: graduate standing 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, magnetic resonance imaging, and nuclear medicine imaging. Offered in alternate years.

246. Magnetic Resonance Technology (3) III. Buonocore Lecture—3 hours. Prerequisite: Physics 90D, Mathematics 228. 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, biological basis of T1, T2, RF; gradient coil design, signal to noise, image artifacts.

252. Advanced Information Systems (3) III. Waters Lecture—2 hours; laboratory—2 hours. Prerequisite: experience in initial phases of data preparation, editing and sorting. Computer Science Engineering 158 or the equivalent; must be able to perform at graduate level. To increase, through examples, projects and discussions, understanding of the components of information systems, including hardware, software, economics and people, and to prepare students to apply this understanding in the solution of specific problems in the creation, design and implementation of information systems.

280. Seminar (1) I, II, III. Hull Seminar—1 hour, Seminar in biomedical engineering. (SU grading only.)

287. Group Study (1-5) I, II, III. The Staff Group study (SU grading only.)

289. Research (1-12) I, II, III. The Staff (SU grading only.)

Electives

290. Graduate Research (1-9) I, II, III. The Staff (SU grading only.)

295. Advanced Electives (1-10) I, II, III. The Staff (SU grading only.)

300. Advanced Research (1-12) I, II, III. The Staff (SU grading only.)

Botany

See Biological Sciences: Section of Plant Biology; Plant Biology; Plant Biology (A Graduate Group); and Plant Science

Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group

Research Group Office, 188 Briggs Hall (617-752-9091)

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 interdisciplinary 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 specially selected courses related to research interests.

Biophysics (A Graduate Group)

Specific program requirements are decided upon by a curriculum committee consisting of a research advisor, the graduate adviser, and a group member. The Committee meets to consider individual educational needs with the student.

Graduate Advisor, R. J. Baskin (Molecular and Cellular Biology)

Courses in Biophysics (BPH)

Graduate Courses

200. Current Techniques in Biophysics (2) II. The Staff Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 112 or 114 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.) (SU grading only)

200A. Biophysics Laboratory (3) I, II, III. The Staff (Chairperson in charge) Laboratory—18 hours (5 weeks). Prerequisite: course 200 (may be taken concurrently). 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.

200B. Biophysics Laboratory (4) II, III. The Staff (Chairperson in charge) Laboratory—two 18-hour rotations (5 weeks each). 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.

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. (SU grading only.)

299. Group Study (1-5) I, II, III. The Staff Group study (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Cantonese

See Asian American Studies
Cell and Developmental Biology
(A Graduate Group)

Carol A. Erickson, Ph.D., Chairperson of the Group
(916-752-8310)
Group Office, 188 Briggs Hall (916-752-9011)

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 School 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 advisor, 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. Naito (Molecular and Cellular Biology), S. Mezoff (Cell Biology and Human Anatomy).

Courses in Cell and Developmental Biology (CDB)

Graduate Courses

200. Current Techniques in Cell Biology (2) II. I. II, III. The Staff
Lecture—2 hours. Prerequisite: graduate standing.
Biological Sciences 104 and Molecular and Cellular Biology 14.
Course covers techniques used in cell biology research including microscopy, spectroscopy, electrophoresis, immunocytochemistry, histology, organellar isolation, calorimetry, tissue culture, and cell cycle analyses. Lectures are presented by experts on each technique, with an emphasis on pitfalls to avoid when using the technique.

200LA. Cell and Developmental Biology Laboratory (6) II. I. II, III. The Staff
Lecture—15 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 experimental design and experience.

200LL. Cell and Developmental Biology Laboratory (6) II. I. II, III. The Staff
Lecture—15 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 experimental design and experience.

205. Cell Biology of the Cytoskeleton (2) II. III. Tablin
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. (SU grading only.) Offered in alternate years.

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. (SU 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 290 concurrently. Presentation and discussion of faculty and graduate student research in cell and developmental biology. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I. II, III. The Staff (Chairperson in charge)
(SU grading only.)

299. Research (1-12) I. II, III. The Staff (Chairperson in charge)
(SU grading only.)

Chemistry

(Chair of Letters and Science)

Alan Balch, Ph.D., Professor of the Department
Dino S. Tinli, Ph.D., Vice-Chairperson of the Department

Department Office, 108 Chemistry Building
(916-752-0503/0605; FAX 916-752-8995)

Faculty

Alan Balch, Ph.D., Professor
R. David Brit, Ph.D., Associate Professor
Constantine Tsiroglou, Ph.D., Lecturer
Timothy C. Donnelly, Ph.D., Lecturer
W. Ronald Fawcett, Ph.D., Professor
William H. Fris, Ph.D., Professor
William H. Raub, Ph.D., Professor
Susan M. Kautz, Ph.D., Associate Professor
Joel E. Keizer, Ph.D., Professor
Peter B. Koli, Ph.D., Associate Professor
Mark J. Kurth, Ph.D., Professor
Gerd N. LaMar, Ph.D., Professor
Donald P. Land, Ph.D., Assistant Professor
Carillo B. Lebrilla, Ph.D., Assistant Professor
Claude F. Meares, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor
Tadeusz F. Molinski, Ph.D., Assistant Professor
W. Kenneth Musker, Ph.D., Professor
Kristina P. Nambudiri, Ph.D., Associate Professor
Michael H. Nantz, Ph.D., Assistant Professor
C. Taylor R. Rainmore, Ph.D., Assistant Professor
Alexei P. Sinelshchikov, 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
Dino S. Tinli, Ph.D., Professor
Nancy B. Tuin, Ph.D., Professor
Susan C. Tucker, Ph.D., Assistant 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
Robert K. Brint, Ph.D., Professor Emeritus
Helen Hope, Ph.D., Emeritus, in Honors
Edwin C. Friedrich, Ph.D., Professor Emeritus
Raymond M. Keeler, Ph.D., Professor Emeritus
Nicholas E. Kepner, Ph.D., Professor Emeritus
George S. Zweifel, Sc.D., Professor Emeritus

The Major Programs

Chemistry studies the composition of matter, its structure, and the methods 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 preparation for a B.S. degree will generally 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 major goal such as professional school preparation or secondary school teaching.

Career Alternatives: Chemistry graduates with bachelor's degrees are employed extensively throughout the 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:

Preparatory Subject Matter: 36-39
Chemistry 2A-2B-2C or 2A-2B-2CH... 15
Physics 5A-5B-5C or 5A-7B-7C... 12
Mathematics 21A-21B-21C or 16A-16B-16C... 15

Depth Subject Matter: 39-43
Chemistry 110A, 110B, 110C, 124A, 128A,
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:

Preparatory Subject Matter: 53
Chemistry 2A-2B-2C or 2A-2B-2CH... 15
Physics 9A, 9B, 9C... 12
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


*Course not offered this academic year.
Courses in Chemistry (CHE)

Lower Division Courses

2A. General Chemistry (5) I. Donnelly, Nash — II. La Mar, Wood.
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics strongly recommended; satisfactory score on diagnostic examination or course 9 with grade of C or better. Periodic table, stoichiometry, chemical equations, physical properties and kinetic 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. General Education credit for non-GE course sequence (2A-2B) which will satisfy one GE course.

2AH. Honors General Chemistry (5) I. Tinti Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: 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 and staff; III. Donnelly and staff.
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A or 2AH. Continuation of course 2A. Condened phases and intermolecular forces, chemical thermodynamics, chemical equilibrium, acids and bases, solubility. Laboratory experiments in thermodynamics, equilibria, and quantitative analysis using volumetric methods. General Education credit for non-GE course sequence (2A-2B) which will satisfy one GE course.

2BH. Honors General Chemistry (5) II. The Staff
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A with consent of instructor or course 2B with a grade of C or better; and Mathematics 21B (may be 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. Kelly; Jackson; III. Donnelly and staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B with consent of instructor or course 2CH with a grade of C or better; and Mathematics 21B (may be 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)

1. Musculus.
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 chemistry.

8B. Organic Chemistry: Brief Course (4)

II. S. Friedrich; III. Musker
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 8A or 118A. Continuation of course 8A. Laboratory concerned with organic laboratory techniques and the chemistry of the common classes of organic compounds. Students who have completed course 118A will be exempted from the laboratory and will receive only 3 units of credit for course 8B.

9. Introduction to General Chemistry (2)

II. Donnelly
Lecture—3 hours; discussion—4 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 and earn units credit for course 2A. Course 9 must be taken for a letter grade and may not be repeated. For some offerings of this course, instruction may be by video.

10. Concepts of Chemistry (4)

I. The Staff
Lecture—3 hours; laboratory-discussion—4 hours. Prerequisite: chemistry diagnostic examination; not open for credit to students who have passed the exam or completed course 1A. Course not open to students who have taken course 1A but who have their own chemistry credit for course 10 and are enrolled in Chemistry 2A for full credit. General Education credit: Nature and Environment.

98. Directed Group Study (1-5) I, II, III. The Staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: chemistry diagnostic examination; not open for credit to students who have passed the exam or completed course 1A. Course not open to students who have taken course 1A but who have their own chemistry credit for course 10 and are enrolled in Chemistry 2A for full credit. General Education credit: Nature and Environment.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: consent of instructor. (P&R grading only)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3)

III. 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 colloidal systems. Considerations on bioreversible processes.

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 colloidal systems. Considerations on bioreversible processes.

108. Physical Chemistry of Macromolecules (3)

III. Schmid
Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties of macromolecules with emphasis upon those of biological interest. Structural thermodynamics, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyethylene/teix systems.

110A. Physical Chemistry: Thermodynamics

I. Lebrilla; III. Kelly
Lecture—3 hours. Prerequisite: course 5 or 4C, Mathematics 16C or 21C; one year of college physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry: Quantum Mechanics

I. LaMar; III. Britt
Lecture—3 hours. Prerequisite: course 110A. Atomic, molecular and nuclear structure and spectra.

110C. Physical Chemistry: Kinetics

II. Stuchberykov; III. Tucker
Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

111. Physical Chemistry: Methods and Applications (4)

II. 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 system design, laboratory experiments from the areas of thermodynamics, spectroscopy, and kinetics.

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 importance.

118A. Organic Chemistry for Health and Life Sciences

I. Schoe; II. Pema; III. Takaahasi
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1Cor 4C with a grade of C- or higher. The 118A, 118B, 118C series is designed to fulfill the requirements of students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and on preparation and reactions of some aromatic hydrocarbons, alkylic halides, alcohols and amines.

118B. Organic Chemistry for Health and Life Sciences

I. isaidou; II. E. Frieden; III. Lardinois
Lecture—3 hours; laboratory—6 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

I. Nambar; II. Molinski
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 118B. Continuation of course 118B, with emphasis on the preparation, reactions, and identification of carboxylic acids and their derivatives, alkyl, acyl amines, 8-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds.

120. Physical Chemistry Laboratory: Advanced Methods (3) II. The Staff
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 and analysis.

121. Introduction to Molecular Structure and Spectra (3) III. The Staff
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. Kazuichiar
Lecture—3 hours. Prerequisite: course 1C or 4C. 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. Kazuichiar
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and heteroatomic molecules containing the main group elements.

124C. Inorganic Chemistry: d and f Block Elements (3) II. The Staff
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. Nantz; II. Schore
Lecture—3 hours. Prerequisite: course 1C or 4C with a grade of C- or higher, chemistry majors should enroll in course 128A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry.

"Course not offered this academic year."
128B. Organic Chemistry (3) II. Shen; III. Nantz
Lecture—3 hours. Prerequisite: course 126A or consent of instructor; course 126A 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 carbon-14. Introduction to the application of spectroscopic methods to organic chemistry.

128C. Organic Chemistry (3) I. E. Friedich; III. Nantz
Lecture—3 hours. Prerequisite: course 126B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, alcohols, and sugars; selected biologically important compounds.

129A. Organic Chemistry Laboratory (2) I. E. Friedich; II. Isidoreides
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; course 126A (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. Nantz; III. The Staff
Laboratory—6 hours. Prerequisite: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and separation of organic compounds.

129C. Organic Chemistry Laboratory (2) I. E. Friedich; III. The Staff
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 5, 126C, 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 stereo-selective reactions and application to multistep syntheses of organic molecules containing multifunctionality.

140. Synthetic Methods (4) III.
Lecture—3 hours; laboratory—9 hours. Prerequisite: course 124A, 124C, 126C. Introduction to organic course in the preparation, purification, and characterization of multifunctional organic, organometallic, and transition metal compounds using a wider variety of methods.

150. Chemistry of Natural Products (3) I. Miller
Lecture—3 hours. Prerequisite: course 126C. Chemistry of terpenes, steroids, and alkaloids; isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.

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. (PINP grading only.)

194A-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 this program. Original research under the guidance of a faculty advisor, culminating in the writing of a complete report. (Deferred grading only, pending completion of requirements.)

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. (PINP grading only.)

197. Protein and 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, and tutorial models or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (PINP 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. (PINP 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. (PINP grading only.)

Graduate Courses

201. Basic Chemical Uses of Symmetry and Group Theory (3) I, Kauzlarich
Lecture—2 hours. Prerequisite: graduate standing in chemistry. Symmetry elements, operations and point group, molecular symmetry. Representations of groups. Applications to molecular orbitals and molecular vibrations.

205. Symmetry, Spectroscopy, and Structure (3) II. Kelly
Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra; central-field spectroscopy; magnetic, electron spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

210A. Quantum Chemistry: Introduction and Stationary-State Chemistry (3) I-II. Tret
Lecture—3 hours. Prerequisite: course 110B and 110C or consent of instructor. Stationary-state quantum chemistry; postulates of quantum mechanics, simple solution problems; angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules.

210B. Quantum Chemistry: Time-Dependent Systems (3) III. Stuchebrukhov
Lecture—2 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry; matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, and atomic and molecular properties.

210C. Quantum Chemistry: Molecular Spectroscopy (3) I. True
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. Tucker
Lecture—3 hours. Prerequisite: course 211A. Statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibria.

211B. Statistical Mechanics (3) III.
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. Jackson
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 211B. 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 ionen, theory of Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. 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 ionen, theory of Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Offered in alternate years.

217. X-Ray Structure Determination (3) II.
The Staff
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 212C 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. Molinski
Lecture—3 hours. Prerequisite: course 126C or the equivalent. Identification of organic compounds and interpretation of spectroscopic and reaction mechanisms phenomena using spectroscopic methods—principally NMR, IR, and MS.

221A-H. Special Topics in Organic Chemistry (3) I. Smith
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. Power
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. (Next offering: Spring 1999.)

228B. Main Group Chemistry (3) III. Power
Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of applications of electrochemistry, hypervalency, and non-classical bonding. Chemistry of the main group elements will be treated systematically. 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 framework, 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 126A-128B, 128C 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.
Lecture—3 hours. Prerequisite: course 128C. Current trends in use of organometallics for organic synthesis; prepartions, 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. Miller
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. Biologically oriented organic reactions will be emphasized.

237. Bio-organic Chemistry (3) I. Shen
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biopolymers; molecular recognition; enzyme reaction mechanisms; design of enzymes and 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: course 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; acid-base equilibria in aqueous and non-aqueous solutions; potentialometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of gas separation, including columns, vacuum, and liquid chromatography.

241A-D. Special Topics in Analytical Chemistry (3) I, II, III.
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.

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—4 hours. Prerequisite: course 250 and graduate standing in Chemistry or 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 topics differ. (SU grading only.)

The Staff
Laboratory/discussion—18 hours. Prerequisite: course 250 and graduate standing in Chemistry 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 a reading program or student preparation for publication. May be repeated for credit when topics differ. (SU grading only.)

290. Seminar (2) I, II, III.
Lecture—2 hours. Prerequisite: consent of instructor. (SU grading only.)

293. Introduction to Chemistry Research (1).
The Staff (Balch in charge)
Laboratory-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. (SU 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. (SU grading only.)

298. Group Study (1-5) I, II, III.
The Staff
Facilities—3 hours. 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. (SU grading only.)

Professional Courses

390. Methods of Teaching Chemistry (2), I, II, III.
The Staff
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in Chemistry and consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting materials, discussion of teaching techniques, preparation 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. (SU 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, curricular 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
Beatriz Pesquera, Ph.D., Program Director
Program Office, Hart Hall, 2nd Floor (916)-752-2421
George Singh, Program Coordinator/Student Affairs (916)-752-2492

Committee in Charge
Rina Alcayde, Ph.D. (Rhetoric and Communication)
Richard Bertaux, Ph.D. (Environmental Design)
Angie C. Chabam-Derensesiano, Ph.D. (Chicana's Studies)
Veteto Flores-Oritz, Ph.D. (Chicana's Studies)
Rosa Linda Frongo, Ph.D. (Chicana's Studies, Women's Studies)
Malquias Montoya, B.F.A. (Chicana's Studies)
Beatriz Pesquera, Ph.D. (Chicana's Studies, Women's Studies)
Adalicia Sosa-Ridell, Ph.D. (Chicana's Studies, Women's Studies)

Faculty
Angie C. Chabam-Derensesiano, Ph.D., Associate Professor
Veteto Flores-Oritz, Ph.D., Assistant Professor
Rosa Linda Frongo, Ph.D., Associate Professor (Chicana's Studies, Women's Studies)
Malquias Montoya, Professor
Beatriz Pesquera, Associate Professor
Adalicia Sosa-Ridell, Ph.D., Senior Lecturer

The Major Program

The Chicana/Chicano Program offers an interdisciplinary curriculum which focuses on 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 analysis is within the historical and contemporary experiences of Chicanas/os in the Americas. The Chicana/Chicano Studies (Mexican-American) 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 Latin/o settings. There are no language requirements for the minor. Minors must complete 24 units from courses specified below and must register for the minor at the Chicana/Chicano Studies Program Office. All Chicana/Chicano Studies courses are open to program minors and non-minors. Some upper division courses require prerequisites.

The Program. The lower division level, the curriculum for the major provides an interdisciplinary overview of various topics. Students are advised to take lower division courses that will fulfill requirements for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary coursework in both the humanities and the social sciences. At this level, several courses in Chicana/Chicano history, theory, and method; and several courses taught from a variety of disciplinary perspectives. The upper division courses give majors the opportunity to specialize in one of two emphases for the B.A. degree. Each emphasis has a different focus and each requires completion of different sets of courses. 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 Sciences emphasis incorporates social theory, research methods, and 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 prepares students towards professional work in social work, human service delivery, community development, legal services, assistance to minority communities, 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:

<table>
<thead>
<tr>
<th>Humanities/Arts Emphasis:</th>
<th>UNITS</th>
</tr>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>16-28</td>
</tr>
<tr>
<td>Chicana's Studies 10</td>
<td>4</td>
</tr>
<tr>
<td>Chicana's Studies 50</td>
<td>4</td>
</tr>
<tr>
<td>One course from Chicana's Studies 21, 30, or 40</td>
<td>4</td>
</tr>
<tr>
<td>One course from Chicana's Studies 70 or 73</td>
<td>4</td>
</tr>
<tr>
<td>Spanish 1, 2, 3, or 31, 32 and 33 or the equivalent</td>
<td>1-3</td>
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</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Chicana's Studies</th>
<th>48</th>
</tr>
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<tbody>
<tr>
<td>Two courses from History 166B, 169A, 169B</td>
<td>8</td>
</tr>
<tr>
<td>Two courses from Chicana's Studies 110, 120, 132, or 140</td>
<td>8</td>
</tr>
</tbody>
</table>

Comparative ethnicity/gender: two upper division courses selected from two of the following areas:

<table>
<thead>
<tr>
<th>African American Studies</th>
<th>Asian American Studies, Native American Studies, or Women's Studies</th>
<th>8</th>
</tr>
</thead>
</table>
Electives. A minimum of 20 units from the following areas, at least 12 of which must be selected from within the major: Area 1—Creative arts/esthetic representation: Chicano/o Studies 156, 160, 171, 172
Area 2—Literature and cultural studies: Chicano/o Studies 130, 154, 155; Linguistics 116, 116; Education 151; Women's Studies 170. (Linguistics 1 is recommended for students selecting Linguistics as a major.)
Total Units for the Major: 64-76

Social Science Emphasis:

Preparatory Subject Matter: 16-28
Chicano/o Studies 10
Chicano/o Studies 50
One course from Chicano/o Studies 21, 30, or 40
Sociology 46A
Spanish 1, 2, 3, or 31, 32, and 33 or the equivalent

Depth Subject Matter: 46
Chicano/o Studies 100
Two courses from History 168B, 169A, 169B
Two courses from Chicano/o Studies 154, 155, or 160
Comparative ethnicity/gender: upper division courses selected from two of the following areas
African American Studies, Asian American Studies, Native American Studies, 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: Area 1—Community and political economy: Chicano/o Studies 110, 111, 130, 132, 140, 152, 160. Area 2—Family and society/health issues: Chicano/o Studies 120, 121, 122, 131.
Total Units for the Major: 64-76

Master Adviser: A. Sosa-Riddell.

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 coursework in Spanish.

UNITS
Chicano/o (Mexican-American) Studies: 24
Chicano/o Studies 10
History 169A or 169B
Chicano/o Studies 110 or 120
Chicano/o Studies 130, 132, or 140
Chicano/o Studies 154, 155, or 171
Chicano/o Studies 111, 131, or Women's Studies 160

Minor Adviser:

Chicano/o Studies (CHI)

Lower Division Courses

Introduction to Chicano/o Studies (4)
I. Sosa-Riddell, II. Montoya
Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, and related areas.

21. Chicano/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.

30. United States Political Institutions and Chicanas/os (4)
I. Rosa-Riddell
Lecture/discussion—3 hours; presentation—1 hour. Prerequisite: course 10. Overview of the political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, and responses to, them. The methods and strategies of the Chicana/o movement.

40. Chicano/o and Latina/o Economy (4)
I. The Staff
Lecture—4 hours. Introduction to the political and economic issues of the Chicana/o community. Special emphasis on issues of ethnic identity development, bilingualism, and development and self-esteem. Impact of minority experience, migration, acculturation are examined.

121. Chicano/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 health service policy and the economic context of mental health programs.

122. Psychology Perspectives Chicano/o and Latina/o Family (4)
I. Flores-Ortiz
Lecture—4 hours; discussion—1 hour. Prerequisite: course 10. Introduc- tory psychology course recommended. Introduction to the field of Chicano/o psychology. Analysis of cultural and historical context of Chicano/o and Latina/o families. Special attention to issues of ethnic identity development, bilingualism, and development and self-esteem. Impact of minority experience, migration, acculturation are examined.

131. Chicana and Chicano Politics and Public Policy (4)
I. Sosa-Riddell
Lecture/discussion—4 hours. Prerequisite: course 30 of Political Science 1. Historical and political analysis of Chicana/Latina political participation and activities in the general political system, women's movement, Chicana/o movement, and Chicana/o studies. Course also examines the public policies and the relationship of Chicanas/Latinas to public policy formation. Offered in alternate years.

132. Political Economy of Chicano/o Communities (4)
I. Sosa-Riddell
Lecture—3 hours; term paper. Prerequisite: upper division standing. History and contemporary study of political and economic forces which define and influence the development of Chicana/o communities. Includes critiques of traditional and Marxist theories and concepts applicable to Chicano/o and Latina/o communities. Case studies of Chicano/o communities, especially in California and Texas. General Education credit: Contemporary Societies.

140. Chicano/o Ethnicity and Socio-Economic Inequalities (4)
I. The Staff
Lecture/discussion—4 hours. Prerequisite: upper division standing. Cross-sectional comparison of socio-economic inequalities facing ethnic minority and, in particular, Chicanas/os in the economy. Sub-topics include theories and concepts for studying ethnic and class inequalities coupled with data on Mexican-American cultural and social attributes, immigration, education, labor markets, employment, occupations, and housing.

154. The Chicano/o Novel (4)
I. Chadhram-Darmer
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicano/o novel with special attention to issues of ethnic identity development, bilingualism, and development and self-esteem. Impact of minority experience, migration, acculturation are examined.
to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana and Chicanos. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126A).

155. Chicana/o Theatre (4) III 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 Chicanas Feminist Theatre. 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).

171. Mexican and Chicana/o River Walker (4) III. Monteoya Studio—8 hours: independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The Murals: a collective art form that empowers students and people through the design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated once for credit.

172. Chicana/o Video/Poster Silk Screen Workshop (4) II. Monteoya Studio—8 hours: independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The Poster as a video art form used by Chicana/o artists and other people of color to point to the social and political and the possibility for change from the Chicana/o artists' perspective. May be repeated once for credit.

192. Internship in Chicana/o and Latino/a Community (4) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour: internship—11 hours. Prerequisite: one course from 10, 21, 50, or Spanish 3, or the equivalent. Combines academic guidance with internship in community agencies serving Mexican/Latino/Chicana/o clients. Utilization of bilingual skills, knowledge of history, culture, and social issues and work experience. Internship project required. May be repeated twice for 12-unit maximum. (P/NP grade only)

194H-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.

198. Directed Study Group (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grade 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 grade only)

Graduate Courses

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 topics differ. (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)

Keith Barton, Ph.D., Chairperson of the Group
Group Office, 1303 Hart Hall (916-752-1928)
Faculty. Includes faculty members from the division of Human Development and the departments of Anthropology, Behavioral Biology, Education, Psychology, and the Schools of Law and of Medicine.

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to the M.S. degree. The aim of the program is to provide students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Opportunities are provided to work with children and families in the community including the University's Family and Child Study Center. Recipients of the degree gain sufficient background in the biological and social sciences to engage in professions that directly (e.g., preschool) 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 Sciences)

Robert Borgen, Ph.D., Chairperson of the Department
Department Office, 184 Kerr Hall (916-752-4995)
Faculty
Robert Borgen, Ph.D., Professor (Japanese)
Chia-ning Chang, Ph.D., Associate Professor (Japanese)
Suein Graywold, Ph.D., Assistant Professor (Japanese)
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
Related Courses. See East Asian Studies course list.

The Major Program
The department offers the student in two ways: it offers a core language program in both Chinese and Japanese, and it offers courses in literature and cinema. The core program is designed for students who have no background whatsoever in Japanese or Chinese. Students with prior language background can improve their skills in separate, specially designated sequences of courses.

The Program. A student elects to major in either Chinese or Japanese. 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 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: Japanese 10, Linguistics 1, History 9A.

Depth Subject Matter: 36
Chinese 106, 107, 111, 112, 113, 114, or 24
Three courses selected from: Chinese 104, 105, 109, 109A-I, 110, 115, 116, 120, 130, 131, 132, 140, 160...
Recommended: Japanese 101, 102, 103, 104, 105, 106; Anthropology 149A-149B; Art History 163A-163B; East Asian Studies 113; History 199A-199B; 199C; Religious Studies 172; or other advanced literature 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, Linguistics 1, History 9B.

Depth Subject Matter: 40
Japanese 101, 102, 103, 111, 112, 113...
Eight units selected from: Japanese 104, 105, 106, 107, 108, 110, 131, 132, 133, 134, 135, 136, 142, 144, 150, 201...
Eight units selected from: Chinese 104, 105, 106, 107, 109A-I, 110; Anthropology 149A-149B; Art History 164; Comparative Literature 153; History 194A-194B-194C; Religious Studies 172; or other advanced literature courses selected in consultation with the undergraduate adviser.

Total Units for the Japanese Major: 55/70

Minor Program Requirements:

Minors are offered in Chinese and in Japanese for students wishing to follow a formally recognized program of study in these 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,
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.

8. Accelerated Written Chinese I (5). The Staff Lecture—5 hours. Prerequisite: ability to speak and listen to Mandarin Chinese. Designed for students who already have some degree of fluency in spoken Mandarin, but who cannot read Chinese characters. This course orientation is on developing reading ability and accelerates progress to the upper division.

9. Modern Chinese Literature (In English) (4). The Staff Lecture—2 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.

10. Great Books of China (In English) (4). The Staff Lecture—3 hours. Discussion—1 hour. Selected readings in English translation are supplemented with background material by various authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussion. General Education credit: Civilization and Culture.

17. Mandarin for Cantonese Speakers (5). The Staff Lecture—5 hours, discussion—5 hours. Prerequisite: course 1 and 2. Designed to accelerate the progress of students who already know spoken Mandarin but cannot read or write Chinese characters.

27. Mandarin for Cantonese Speakers (5). The Staff Lecture—5 hours. Prerequisite: course 17. Preparation of student for entering upper division courses in Chinese.

18. Accelerated Written Chinese II (5). The Staff Lecture—5 hours. Prerequisite: course 8. Continuation of course 8. Designed to accelerate the progress of students who already know spoken Mandarin but cannot read or write Chinese characters.


50. Introduction to the Literature of China and Japan (3). The Staff 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 fiction, East Asian cultural traditions will also be introduced. (Same course as Japanese 50.)

98. Directed Group Study (1-5). The Staff (Chairperson in charge) (P/NP grading only)

99. Special Study for Undergraduates (1-5). The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

104. Twentieth-Century Chinese Fiction (In English) (4). 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 major influential writers and genres.

105. Western Influences on Twentieth-Century Chinese Literature (In English) (4). 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 writings.

106. Chinese Poetry (In English) (4). The Staff Lecture—3 hours. Discussion—1 hour. Prerequisite: History 9A or any course on traditional Chinese recommended. Organized topically and chronologically, the lyric tradition is explored, followed by a discussion down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English.

107. Traditional Chinese Fiction (In English) (4). 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.

108. Poetry of China and Japan (In English) (4). The Staff 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, the nature of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. Offered in alternate years. (Same course as Japanese 108.)

109A-4. Topics in Chinese Literature (In English) (4). 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 novel and the court novel. Offered in alternate years.

110. Great Writers of China: Texts and Context (In English) (4). The Staff 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, authors, and culture. General Education credit: Civilization and Culture.

111. Modern Chinese: Reading and Discussion (4). The Staff Lecture—3 hours. Discussion—1 hour. Prerequisite: course 10 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). 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). The Staff Lecture—3 hours. Discussion—1 hour. Prerequisite: course 112. Readings in modern Chinese newspapers, popular articles, essays, and short stories, based on language skills developed in course 112.

114. Introduction to Classical Chinese: Confucius (4). 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 student also experience the most influential works in the history of China in their original texts.

115. Introduction to Classical Chinese: Mencius (4). The Staff Lecture—3 hours. Discussion—1 hour. Prerequisite: course 114. Continued course 114 by reading selections from the text of the Mencius.

Course not offered this academic year.
116. Introduction to Classical Chinese: Narrative Styles (4) III. The Staff Lecture—5 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—5 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from all genres to develop advanced skills in reading, writing, oral comprehension, and translation. May be repeated one time for credit.

130. Readings in Traditional Chinese Fiction (4) II. The Staff Lecture—5 hours; discussion—1 hour. Prerequisite: course 112 or the equivalent, course 124 recommended. Course readings in Chinese of representative works from the Tang and Song dynasties (618-907) to modern times. May be repeated once for credit when content varies.

131. Readings in Traditional Chinese Poetry (4) I, II. 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, surveys forms and poets best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry.

132. Readings in Modern Chinese Poetry (4) II, III. The Staff 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 broadly 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 Chinese literature. May be repeated twice for credit.

150. 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 Chinese language fields, with analytic term paper on a topic approved by instructor. (P/N 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/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Course

299. Research (1-12) I, II, III. The Staff (5U 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. Students 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 Petition is filed.)

2. Intensive Elementary Japanese (15) I. Summer session. The Staff Lecture/discussion—15 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

3. Intermediate Japanese (5) I. 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) II. The Staff Lecture/discussion—5 hours. Prerequisite: course 3 or the equivalent. Continuation of training in basic spoken and written skills.

5. Intermediate Japanese (5) III. 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 5.

6. Intermediate Japanese (5) IV. The Staff Lecture/discussion—5 hours. Prerequisite: course 5 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5.

7. Advanced Japanese for Bilingual Students (5) I. The Staff Lecture—5 hours. Prerequisite: bilingual background in Japanese. 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.

8. Masterworks of Japanese Literature (In English) (4) I. 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.

9. Introduction to Traditional Japanese Culture (3) I. The Staff Lecture—2 hours; discussion—1 hour. General introduction to Japanese culture from its beginnings through 1600, 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. (P/N grading only.)

10. Japanese Language and Culture (In English) (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Linguistics 1 or Anthropology 2 recommended. Classification and communication of experience in Japanese culture: principles of language use in Japanese, the role of language and honorific language, language and gender, minority languages, and sociolinguistic and cultural diversity. Role of Japanese in artificial intelligence and computer science. Offered in alternate years, 2008.

26. Accelerated Japanese for Bilingual Students (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, discusses 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) I. The Staff Lecture—3 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (translation, including film. East Asian cultural traditions will also be introduced. (Same course as Chinese 50.)

90. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Upper Division Courses

101. Japanese Literature in Translation: The Early Period (4) I. The Staff Lecture—3 hours; discussion—1 hour. Early Japanese literature from the 7th to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, novels, plays, and the classical Chinese rubaiyat.

102. Japanese Literature in Translation: The Middle Period (4) I. The Staff Lecture—3 hours; discussion—1 hour. Major literary periods from the twelfth century to the second half of the nineteenth century including poetry, novel, military chronicles, no drama, Buddhist literature, love poems, and prose narratives.

103. Japanese Literature in Translation: The Modern Period (4) III. The Staff Lecture—3 hours; discussion—1 hour. Modern Japanese literature from the 1770s to the 1970s. Surveys representative literary works and ideas about the social and intellectual background of the Meiji, Taishō, and Showa periods.

104. Modern Japanese Literature: War and Revolution (3) I. The Staff Lecture/discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the systemic and often poignant experiences of war and socio-political upheaval from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. Offered in alternate years.

105. Modern Japanese Literature: Hero and Anti-hero (3) II. The Staff 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.

106. Japanese Culture Through Films (3) I. The Staff 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 Kimura, Sato, Furuta, Kubrick, Ozu, and Itami. Lectures, discussion, and readings in English. Film with Japanese subtitles.

107. Modern Japanese Autobiographies (In English) (3) I. The Staff 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 Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. Offered in alternate years.
The Major Programs

Classics can be defined broadly or narrowly. Broadly, it is the study of all aspects of ancient Greek and Roman life. narrowly, it is the study of the Greek and Latin languages and their literatures. The department offers three majors that reflect these different definitions of the subject: the Classical Civilization major offers a broad interdisciplinary approach to the world of the Greeks and Romans; the Latin and Greek majors focus on language and literature.

The Program. The core of the major in classical civilization consists of a two-year study of either Latin or Greek during which students learn the rudiments of the language and read three major ancient authors in the original language. Students complete the major requirements by selecting about ten courses from a broad range of offerings on different aspects of classical civilization. Latin majors and Greek majors spend a year learning the rudiments of the language, then read a selection (36 units) of major Greek or Latin authors.

Career Opportunities. Majors in classics can make direct use of their knowledge in careers in library science, museum work, or high school teaching, or by going on to graduate work in classics, philosophy, art history, archaeology, history or theology. Students planning to go on to graduate work in classics should bear in mind that good graduate schools look for students who have a minimum of two years work in both Latin and Greek and have reading knowledge of French or German. A degree in classics is also an excellent preparation for professional schools in the past 20 years, practically all majors in classics from David who have sought admission to law or medical school have been accepted.

Classical Civilization

A. B. Major Requirements:

Preparatory Subject Matter

Preparatory Subject Matter

3-27 Greek 1, 2, 3 or Latin 1, 2, 3 or the equivalent

Three courses from the following, including at least one from group (a)...

(b) Classics 4A, 10, 15.

Depth Subject Matter

Three upper division courses in Latin or Greek.

At least 28 units from upper division courses in Latin and Greek;

(c) Art, Archaeology, and Drama: Classics 174, 175, Art History 154A, 154B, 155, Dramatic Art 156.
(d) Philosophy and Political Theory: Philosophy 143, 161, 162, Political Science 116A, Rhetoric and Communication 110

Total Units for the Major

65-67

Recommended

Art History 1A, History 2; Philosophy 21; Comparative Literature 1; Religious Studies 40.


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:

Preparatory Subject Matter

0-15 Greek 1, 2, 3 (or the equivalent)...

15
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:**

Preparatory Subject Matter: 15
- Latin 1, 2, 3 (or the equivalent)
- Depth Subject Matter: 36
- At least 31 additional upper division units in Latin
- Total Units for the Major: 36-51

**Latin**

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:**

Preparatory Subject Matter: 15
- Latin 1, 2, 3 (or the equivalent)
- Depth Subject Matter: 36
- At least 31 additional upper division units in Latin
- Total Units for the Major: 36-51

**Minor Program Requirements:**

- Greek: 21
- Greek among Latin: 5
- Four upper division courses in Greek: 16
- Latin: 21
- Latin among Greek: 5
- Four upper division courses in Latin: 16

**Graduate Program**

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**

*4A. Classical Civilization (4) II. Roller
- Lecture: 3 hours; term paper/discussion: 1 hour
  - Introduction to the literature, art, and social and political institutions of ancient Greece, from the time of Homer to Plato. General Education credit: Civilization and Culture.

10. Greek and Roman Mythology (3) I. The Staff
- Lecture: 3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

15. Women in Classical Antiquity (4) III. All... 144. Greek and Roman Comedy (4) II. C. Allan

145. Greek and Roman Tragedy (4) I. Allan
- Lecture: 3 hours; term paper. Examination of the ancient Greek plays and their development into the grotesque realism of Petronius’ Satyricon, and the religious mysticism of Apuleius’ The Golden Ass.

143. Medieval Bronze Age Archaeology (4) I. Roller
- Lecture: 3 hours; term paper. Archeological monuments of the Ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the Minoan and Mycenaean civilizations. General Education credit: Civilization and Culture.

17B. Greek Archaeology (4) II. Roller
- Lecture: 3 hours; term paper. Archeological monuments of Geometric, Archaic, and Classical Greece, with special emphasis on the development of cities and sanctuaries. General Education credit: Civilization and Culture.

**17C. Later Greek and Roman Archaeology (4) III. The Staff**
- Lecture: 3 hours; term paper. Archeological monuments of the Greek world from the conquests of Alexander the Great, the fall of the Hellenistic empires, and the monuments of Rome and the Roman Empire. Offered in alternate years. General Education credit: Civilization and Culture.

20. Pompeii AD 79 (4) III. Trail
- Lecture: 3 hours; term paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slides presentation of the archeological evidence will be supplemented by selected readings from Petronius’ Satyricon and other ancient authors. Offered in alternate years. General Education credit: Civilization and Culture.

30. Greek and Latin Elements in English Vocabulary (3) II. P. Schaefer
- Lecture: 3 hours. Knowledge of Greek and Latin 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 may be noted.

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 for increased 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) 1.0. Rosenstock
- Lecture: 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 Hippocrates. General Education credit: Civilization and Culture.

Upper Division Courses

140. Homer and Ancient Epic (4) I. Trail
- Lecture: 3 hours; term paper. Examination of Homer’s Iliad, Odyssey, and Aegean literature. 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. General Education credit: Civilization and Culture.

141. Greek and Roman Poetry (4) III. C. Allan
- Lecture: 3 hours; conference: 1 hour. Studies in the works of Catullus, Horace, Ovid, and the other poets of the classical period. General Education credit: Civilization and Culture.

142. Greek and Roman Novel (4) III. Schenck
- Lecture: 3 hours; term paper. Examination of the ancient Greek novels and their development into the grotesque realism of Petronius’ Satyricon, and the religious mysticism of Apuleius’ The Golden Ass.

143. Greek Tragedy (4) I. Allan
- 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. General Education credit: Civilization and Culture.

150. Socrates and Classical Athens (4) III. Rosenstock
- Lecture: 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. General Education credit: Civilization and Culture.

174. Ancient Greek Sculpture (4) III. Roller
- Lecture/discussion: 4 hours. Prerequisite: course 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 their importance, chronology, and on the related documentary evidence. Offered in alternate years.

197CC. 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. Trail**
- Seminar: 3 hours; term paper. Survey of major contemporary areas of classical scholarship and 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. Trail
- Seminar: 3 hours; term paper. Reading of selected books of the Aenid, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilian poetic language.

204. Greek and Roman Comedy (4) II. The Staff
- Seminar: 3 hours; term paper. Classical texts of the Greek and Roman comedies. Offered in alternate years. General Education credit: Civilization and Culture.

205. Latin Lyric and Elegy (4) III. Trail
- Seminar: 3 hours; term paper. Critical examination of the works of Catullus, Horace, and 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 Aeschylus, Sophocles, and Euripides. May be repeated for credit.

299. Research (1-12) I, II, III. The Staff
- Seminar: 1-12 hours. Prerequisite: consent of instructor. May be repeated for credit.

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. 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. The Staff
- 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.
Upper Division Courses

*100. Attic Orators (4) I. Traill
  Lecture—3 hours; term paper. Prerequisite: course 3.

*101. Plato (4) I. Traill
  Lecture—3 hours; term paper. Prerequisite: course 3.

*102. Euripides (4) J. Rollin
  Lecture—3 hours; term paper. Prerequisite: course 101.

*103A. Homer: Iliad (4) I. Traill
  Recitation—3 hours; term paper. Prerequisite: course 3.

*103B. Homer: Odyssey (4) II. Schein
  Recitation—3 hours; term paper. Prerequisite: course 3.

*104. Menander (4) III. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3.

*105. Demosthenes (4) III. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3.

*111. Sophocles (4) II. Schein
  Lecture—3 hours; term paper. Prerequisite: course 103.

*112. Aristophanes (4) III. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 103.

103. Thucydides (4) III. Rollin
  Lecture—3 hours; term paper. Prerequisite: course 102. Offered in alternate years.

*114. Lyric Poetry (4) II. Schein
  Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years.

*115. Aeschylus (4) II. Schein
  Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years.

*116. Herodotus (4) III. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years.

198. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
  (P/N/P grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
  (P/N/P grading only.)

Courses in Latin (LAT)

Lower Division Courses

1. Elementary Latin (5) I. The Staff
  Lecture—6 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/N/P grading basis only. Although a passing grade will be charged to the student's P/N/P option, all other students will receive a letter grade unless a P/N/P 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 n 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/N/P grading only.)

Upper Division Courses

*100. Ovid (4) I. Allan
  Lecture—3 hours; term paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid.

101. Libya (4) II. Traill
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*102. Roman Poetry (4) I. Traill
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*103. Vergil: Aeneid (4) III. Scheffler
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*104. Sallust (4) II. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*105. Horace: Odes and Epodes (4) III. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*106. Horace: Satires and Epistles (4) I. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*107. Roman Elegy (4) III. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*110. Caesar (4) II. The Staff
  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.

*111. Silver Age Latin (4) II. The Staff
  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.

*112. Cicero: Political Writings (4) II. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*114. Cicero: Philosophical Works (4) II. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*115. Lucretius (4) II. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*116. Vergil: Eclogues and Georgica (4) II. The Staff
  Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

*121. Prose Composition (5) I. Traill
  Lecture—4 hours; term paper.

125. Medieval Latin (4) II. Traill
  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.

196. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
  (P/N/P grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
  (P/N/P grading only.)

*Course not offered this academic year.
Community Nutrition
(College of Agricultural and Environmental Sciences)

The Major Program
Community nutrition teaches students the identification and promotion of health-related problems and the 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 designed 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 programs or for graduate study 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 and Environmental 21 or Computer Science Engineering 15) .................. 9-4
Cultural food habits (Nutrition 20) .................. 4
Cultural social science (Anthropology 2, 4, 6, 8 or Sociology 3) .......................... 4
Social research methods (Sociology 46A or Psychology 41) ....... 4
Statistics (Sociology 46B or Statistics 13) .......... 4
Breadth/GentleEducation Requirement ..................... 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 10A, 10B, 10A, 10B .......................... 10
Nutrition 192 ............................................. 2
Neurobiology, Physiology and Behavior 101, 101 .................................. 4

Option Subject Matter ........................................ 28-32
Course work chosen from one of the following three options in consultation with adviser ................................ 18-20
Additional units in a related social or health science chosen in consultation with adviser ................................ 10-12
(All inclusive, a minor program in fields such as physical education, environmental toxicology, community development, statistics, or the social sciences.)

Behavioral-Psychological Option
Psychology 110 or Psychology 120 .................................. 3
Psychology 112 or Human Development 100A or 100B ........ 8
Psychology 115 or Human Development 100C .......................... 12
Applied Behavioral Sciences 173, 178 .......................... 4
Consumer Science 100 .................................. 4
Food Science and Technology 107, 117 .......................... 4
Sociology 154 .................................. 4
Anthropology 129, 130 .................................. 4
Rhetoric and Communication 115 .......................... 4

Economics and International Development Option
International Agricultural Development 10 Economics 1A, 1B Mathematics 16A Agricultural Economics 100A, 100B, 120, 130, 141 International Agricultural Development 103, 110, 111, 165 Economics 100, 101, 115A, 115B, 118, 123, 130, 162 \Consumer Science 100 Anthropology 122, 126 Sociology 170 Economics 151A Environmental Studies 1, 165 Rhetoric and Communication 115 \Sociocultural Option

Unrestricted Electives ...................................... 12-43

Total Units for Degree ..................................... 180

Major Adviser: R.B. McDonald (Nutrition)

Advising Center: The major is located in 1202E Meyer Hall (916-752-2512)

Internship. To fulfill the academic requirements for an internship in dietetics, the following course must be included: Economics 1B, Agricultural Economics 112, Food Service Management 120, 120L, 121, 122, 123, Applied Behavioral Sciences 173 or Education 110, Psychology 3, Nutrition 116A, 116B, 116C, 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)

Seeth L. Schein, Program Director
Program Office, 922 Sprout Hall (916-752-9934)

Committee in Charge
Salvatore Allosso, Ph.D. (Comparative Literature)
Marc El Blanchard, Agrégé de Lettres, Professor (Comparative Literature, French)
Gail Finney, Ph.D. (Comparative Literature, German)
Manfred Kusch, Ph.D. (Comparative Literature, French)
Kori Lokke, Ph.D. (Comparative Literature, English)
Harriet Murav (Comparative Literature, Russian)
Seeth L. Schein, Ph.D. (Comparative Literature)
Robert M. Torrance, Ph.D. (Comparative Literature)
Marian B. Ury, Ph.D. (Comparative Literature)

Faculty
Georges van den Abbeele, Ph.D., Associate Professor (French, Critical Theory)
Salvatore Allosso, Ph.D., Lecturer
Marc El Blanchard, Agrégé de Lettres, Professor (Comparative Literature, French)
Gail Finney, Ph.D., Professor (Comparative Literature, German)
M. Kay Fawell, Ph.D., Associate Professor (Critical Theory)
Manfred Kusch, Ph.D., Senior Lecturer (Comparative Literature, French)
Kori 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
Petter M. Schaffler, Ph.D., Professor (German)
Seeth L. Schein, Ph.D., Professor
Juliana Schlesier, Ph.D., Associate Professor (Italian)
Brenda Schildgen, Ph.D., Lecturer
Robert M. Torrance, Ph.D., Professor
Marian B. Ury, Ph.D., Professor

Emeriti Faculty
Ruby Cohn, Ph.D., Professor Emeritus
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 language departments with courses in comparative literature. The introductory course sequence, "Great Books of Western Civilization" and "Major Books of the Contemporary World," provides both an overview of European literature 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 language 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.
Courses in Comparative Literature (COM)

Lower Division Courses

1. Great Books of Western Culture: Antiquity

2. Great Books of Western Culture: Middle Ages and Renaissance

3. Great Books of Western Culture: 1800–1945

4. Major Books of the Contemporary World: 1945–Present

5. Fairy Tales, Fablés, and Parabôles

6. Myths and Legends

7. Literature of Fantasy and the Supernatural

8. Utopias and Their Transformations

9. The Short Story and Novella

10. Master Authors in World Literature

Cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: (A) Gilgamesh, Ramâyana, Beowulf, Nibelungenlied; (B) Metamorphoses, Descentron, Arabian Nights, Canterbury Tales; (C) Chanson de Roland, Don Quixote, the Thirty Years' War, the Thirty Years' War Campaign, Morte D'Arthur; (D) Sûtras, Tristan and Isolde, Accadis and Nicolette, Gawain and the Green Knight; (E) Swift, Rabelais. Le Celina, Simplicissimus; (F) Cervantes, Shakespeare, Balzac, Voltaire, Machiavel, Sophocles, Greek, Latin, Medieval, Renaissance, Cervantes, Shakespeare, Balzac, Voltaire, Machiavel, Sophocles, Greek, Latin, Medieval, Renaissance.
ing from such works as the Metabophara and Ramayana. The Cloud Messenger, Shakuntala. The Little Clay Cart, and the stories and poems of both ancient and modern India and Southeast Asia. General Education credit: Civilization and Culture.

98. Directed Group Study (1-5) I, II, III. The Staff
Seminar—1-2 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

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**

**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 discourses of humankind's problematic 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. General Education credit: Civilization and Culture.

**135. Women Writers (4) III. Reed, Ury**
Lecture/discussion—3 hours; term paper. An exploration of women's changing 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, on the Chinese novel, and Charlotte Bronte, on the Bronte sisters. General Education credit: Civilization and Culture.

**138. Gender and Interpretation (4) I. Schissler**
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. General Education credit: Civilization and Culture.

**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 a particular theme, as well as formal and structural elements. May be repeated for credit when substance of course varies.

**141. Literary Theory and Criticism (4) II. Torzilli**
Lecture/discussion—3 hours; term paper. Exploration of literary theories with emphasis on specific objectives and possibilities of comparative literature. General Education credit: Civilization and Culture.

**142. Critical Reading and Analysis (4) III. The Staff (Director in charge)**
Lecture/discussion—3 hours; term paper. Exploration of literary theories with emphasis on specific objectives and possibilities of comparative literature. General Education credit: Civilization and Culture.

**144. The Grotesque (4) II. The Staff**
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. Study of the grotesque in selected texts from the Renaissance to the 20th century. Attention to the "grotesque" as a means of social and cultural expression. General Education credit: Civilization and Culture.

**145. Representations of the City (4) I. The Staff**
Lecture/discussion—3 hours; term paper. Examination of the portrayal of the modern city in various cultures. General Education credit: Civilization and Culture.

**146. Myth in Literature (4) I. Schaefer, Lokke**
Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Comparative study of different versions of a mythical or folk tale, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions.

**147. Modern Jewish Writers (4) II. Murav**
Lecture—3 hours; discussion—1 hour. Prerequisite: completion of 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 in relation to the non-Jew. Works of Russian, German, Yiddish, and English Jewish writers.

**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 artistic, historic, social and cultural factors that contribute to a cosmopolitan vision of American literature, encompassing works by Canadians, United States, Caribbean, Brazilian, and Spanish-American writers. Offered in alternate years. General Education credit: Civilization and Culture.

**153. The Forms of Asian Literature (4) II. Ury**
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. General Education credit: Civilization and Culture.

**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 anthropic peace and war through the ages. General Education credit: Civilization and Culture.

**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 literary fiction of the literary fiction of detection in a comparative context.

**159A-G. Special Topics in Comparative Literature (4) III. Ury**
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A 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. General Education credit: Civilization and Culture.

**160A. The Modern Novel (4) II. Finney**
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. 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. General Education credit: Civilization and Culture.

**161A. Tragedy (4) III. Schlein**
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. 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. General Education credit: Civilization and Culture.

**162A. Comedy (4) II. Finney**
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. 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. General Education credit: Civilization and Culture.

**165A. The Middle Ages (4) I. Schildgen**
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. General Education credit: Civilization and Culture.

**166A. The Renaissance (4) II. Torrance**
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. General Education credit: Civilization and Culture.

**168A. Realism and Naturalism (4) I. Finney**
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. General Education credit: Civilization and Culture.

**170. The Contemporary Novel (4) II. Torrance**
Lecture/discussion—3 hours; term paper. 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. General Education credit: Civilization and Culture.

**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 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. General Education credit: Civilization and Culture.
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.

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Director in charge) Independent study—1 to 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. (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 distinguishing it from other literary disciplines. May be repeated once for credit when topic is different. Offered in alternate years.

197T. Tutoring in Comparative Literature (1-5) I, II, III. The Staff (Director in charge) Discussion—2 to 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 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) Individual instruction—1 hour. Prerequisite: courses 200 and 201. 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.

250. 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.

258. Directed Group Study (1-5) I, II, III. Prerequisite: graduate standing. (SU grading only.)

259. Individual Study (1-12) I, II, III. The Staff (Director in charge) (SU grading only.)

290. Special Study for the Doctoral Dissertation (1-12) I, II, III. (SU grading only.)

Professional Courses

290. Teaching Comparative Literature (3) I. Allosso Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with specific application to the introductory course 1, 2, and 3, in relation to major cultural and social developments. Discussion also of ways to teach analytical writing. (SU grading only.)

392. Teaching Internship in Comparative Literature (1) I, II. Allosso Discussion—1 hour. Regular consultations between the student instructor teaching Comparative Literature courses and the supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (SU grading only.)

Comparative Literature (A Graduate Group)

Seth L. Schein, Ph.D., Chairperson of the Group, (916-752-2398)

Faculty, interdepartmental faculty 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 major works 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 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. H. Murav (Comparative Literature, Russian.)

Comparative Pathology

(DA Graduate Group)

Dennis W. Wilcox, D.V.M., Ph.D., Chairperson of the Group

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 designed for students who have a professional medical degree, i.e., D.V.M., M.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. Zuelz (Pathology, Microbiology and Immunology), D. T. Kint (Anatomy, Physiology and Cell Biology), R. B. Lafevre (Pathology, Microbiology and Immunology), K. M. Lam (Pathology, Microbiology and Immunology).

Computer Science

See Computer Science (below); Computer Science (A Graduate Group); Engineering: Computer Science; and Engineering: Electrical and Computer Engineering.

Computer Science

Course not offered this academic year.
Computer Science
(College of Letters and Science)
Charles U. Merri, Ph.D., Chairperson of the Department
Ronald A. Olsson, Ph.D., Vice Chairperson of the Department
Department Office, 2063 Engineering II
(916-552-7864; http://www.cs.ucdavis.edu)

The Major Program
The computer science major is designed to prepare 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:

Preparatory Subject Matter: 4-8 units
- Computer Science Engineering 30 or 3S, 40
- Computer Science Engineering 50
- Mathematics 21A-21B-21C, 22A-22B
- Statistics 32

Depth Subject Matter: 53-55 units
- Computer science, core courses: 29 units
- Computer Science 100, 110, 120, 122A, 140A, 150T or 151A
- Computer Science Engineering 154A-154B
- Computer science electives: 14 units
- Upper division mathematics: 10-12 units
- One upper division Mathematics course numbered below 186

Total Units for the Major: 101-123

Minor Program Requirements

Computer Science
- Computer Science Engineering 50
- Computer Science Engineering 110
- Computer Science 100

Graduate Study. See the Graduate Studies section in this catalog.

Minor Program Requirements: UNITS

Computer Science Engineering 50: 4
Computer Science Engineering 110: 4
Upper division Computer Science Engineering: 16

Graduate Study. See the Graduate Studies section in this catalog.

Computer Science
(A Graduate Group)

Charles U. Merri, Ph.D., Chairperson of the Group
Department Office, 2063 Engineering II (Department of Computer Science)
(916-552-7004; gradinfo@cs.ucdavis.edu; http://www.cs.ucdavis.edu/homepage.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, natural language processing, cognitive science, numerical analysis, program specifications and verification, programming languages, 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 coursework 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. The candidates must also pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

Graduate Adviser. N.S. Matloff, N. Max. B. Mihalik.

Consumer Economics
(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Agricultural Economics.

Major Program and Graduate Study. See the major in Agricultural Economics; and for graduate study, see the Graduate Studies section in this catalog.

Related Courses. See Agricultural Economics.

Courses in Consumer Economics (CNE)

Questions pertaining to the following courses should be directed to the instructor or to the Department of Agricultural Economics, Advising Office, University House Annex.

Upper Division Courses

142. Personal Finance (3) L. Shepard; II, B. Butler; Summer
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. (Same course as Agricultural Economics 142.)

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

299. Seminar (1-5) II, III.
The Staff
Seminar--1 hour. Current issues in consumer economics and the economics of consumption.

299. Research (1-12) II, III.
The Staff
(1A grading only)

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 Consumer Economics, 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

47. Food Product Development Field Study (1)
III. Schutz
Discussion--three 2-hour sessions; field trip--2 days. To observe commercial aspects of the large-scale development, distribution and evaluation of food products intended for human consumption. Course given between Winter and Spring Quarters. Advance enrollment with instructor required Winter quarter. (P/NP grading only)

92. Internship in Consumer Science (1-12) II, III.
Rucker
Internship--3-36 hours. Prerequisite: consent of

Conservation Biology

See Ecology (A Graduate Group); Environmental Biology and Management; and Wildlife, Fish, and Conservation Biology

*Course not offered this academic year.
Design

Design (1, 3, 11, 12, 13)................20
Other (two courses from Aesthetic Studies
10; Anthropology 2, Geology 2, Psychology
1, Sociology 1, 25, Rhetoric and
Communication 1, 3)..........................7-9

Breadth/General Education..................32
Satisfaction of General Education require-
ment to include 16 units in natural sci-
cence and/or Nature and Environment and
16 units in social science and/or Contem-
porary Societies.................................32

Depth Subject Matter........................48
Design history, select from Design 140, 142,
142B, 143, 144.................................12
Design, selected with adviser's approval................12
Design, upper division courses................24

Restricted Electives..........................21
(Courses to be selected with approval of
adviser.)

Unrestricted Electives........................28-28
Total Units for the Degree.....................180

Additional Requirement
Development of a course of study, in consultation
with an adviser, no later than the second quarter of
the junior year.

Major Adviser: R. Berneau.

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 culture.

2. Fantasy Design (4) III. Hethorn
Lecture—4 hours; discussion—1 hour. Prerequisites:
courses 1 or 2. Investigation of fantasy as found in the
environment. All aspects of design are explored and
fantasy is presented as a problem-solving device.

3. Drawing Studio (4) I. The Staff (Stabb in
course)
Studio—8 hours. Prerequisite: course 1 must be taken
concurrently; priority enrollment to Design majors.
Drawing for the designer as an aid to perception and
communication of ideas, objects, and plans. May be
repeated once with a different instructor (course 1
should not be repeated).

Media Studio (4) II. Palmer and staff (Stabb in
course)
Studio—8 hours. Prerequisite: course 2 must be
taken concurrently; priority enrollment to Design
majors. Tools, materials, and techniques used are
those of the designer's studio.

4. Photography Media Studio (4) III. Sylva
and staff (Stabb in charge)
Studio—8 hours. Prerequisites: courses 1 or 2; course
3 must be taken concurrently; priority enrollment to
Design majors. Film and video tape for description,
simulation, analytical research, and design develop-
ment.

5. Drafting and Perspective (4) I. Olsen and
staff
Studio—8 hours. Prerequisite: course in drawing rec-
ommended. Creation of three-dimensional designs on
two-dimensional surfaces.

Basic Imagery (4) I. The Staff (Stabb in
course)
Studio—8 hours. Prerequisites: courses 11, 12. Pre-
sentation of the fundamentals of designed images,
combining a theoretical perspective with practice
using the components of visual literacy. Specific focus
upon (1) abstract structure, (2) symbolism, and (3)
representation.
23. Personal Adornment (4) II. The Staff (Stubb 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. Laky
   Studio—8 hours; two field trips. Prerequisite: courses 11, 12, Contemporary approach to textile techniques of construction such as netting, pleating, knotting and basketry.

25. Reproduction Graphics (4) II. Sylva and staff (Stubb in charge)
   Studio—8 hours; field trip. Prerequisite: courses 11 or 12, and 13. Basic studio and photographic skills for the designer; continuous tone, line and halftone films, mechanical color separations.

77A. Soft Product Development (4) II. Hethorn
   Studio—8 hours. Prerequisite: course 11 or 12 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. The Staff (Stubb 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. Emphasis on advanced theories and principles of soft product development.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Stubb in charge)
   Prerequisite: consent of instructor. (FINP grading only)

Upper Division Courses

121. Design Delineation (4) II. Olsen and staff
   Studio—8 hours; field trip. Prerequisite: courses 11, 12, 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)
   Studio—8 hours; field trip. Prerequisite: courses 23 or 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
   Lecture—2 hours; studio—5 hours. Prerequisite: courses 21, 22, 24. 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: course 11, 12 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 11, 12 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.

129C. Visual Presentation: Installation and Design (4) I. Gotelli
   Studio—8 hours; required field trips. Prerequisite: courses 126A and 126B. 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)
   Studio—8 hours; field trip required. Prerequisite: courses 11, 12, 13, and 24. Recommended. Exploration of surface embellishments and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of hand made textiles including mola and applique, piecing and quilting, beadwork, embroidery, and dimensional surfaces. Offered in alternate years.

132A. Loom-Constructed Textile Design (4) I. Shawcroft
   Studio—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic drafting, basic weave structure and pattern expression in context of original color effects and yarn combinations.

132B. Loom-Constructed Textile Design (4) II. Shawcroft
   Studio—8 hours. Prerequisite: course 132A. Intermediate level and complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

132C. Computer Aided Textile Design (4) III. Shawcroft
   Studio—6 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.

133A-133B. Visual Metaphor (4-4) II-II. The Staff (Stubb in charge)
   Studio—8 hours. Prerequisite: courses 13, 22, 25. Study and practice of image generation and production with emphasis on clarity of visual expression, the perception and use of color, and visual composition in the three-dimensional context.

134A. Introduction to Interior Architecture (4) I. Olsen
   Studio—8 hours; required field trips. Prerequisite: courses 11, 12, 21 and upper division standing. The design process through simple space planning problems focuses on residential and small commercial spaces.

134B. Introduction to Interior Architecture (4) II. Olsen
   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, schools and other 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 trips. Prerequisite: course 21; course 134A recommended. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, culture and historical expression, and structural and aesthetic qualities. Process includes research, drawings, and construction of scale models.

135B. Furniture Design (4) III. The Staff
   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.

140. History of Design (4) II. The Staff (Stubb in charge)
   Lecture—4 hours. Prerequisite: Art History 1A or the equivalent. 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.

142A. World Textiles: Far East and Pacific (4) I. 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.

142B. World Textiles: Middle East, Europe and the Americas (4) III. Laky
   Lecture—4 hours; two field trips. Prerequisite: course 1; a studio class highly recommended; course 24, 121, 132A, 132B, 160A-160B-160C or 170A-170B-170C (concurrently). Study of concepts and methods significant in the historical, social, aesthetic and stylistic development of the textile arts.

143. History of Costume Design (4) III. The Staff (Stubb in charge)
   Lecture—4 hours; field trip. Prerequisite: course 140. History of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

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 cultural setting and the development of the theory of modern interior design.

150. Computer Assisted Drawing for Designers (4) I, II, III. The Staff
   Studio—8 hours. Prerequisite: courses 21, 121. Computer-aided drafting for interior architecture and design.

160A. Textile Design: Pattern and Resists (4) I. Rivers
   Studio—8 hours; required field trip. Prerequisite: courses 11, 12 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 qualities of the individual producer. Techniques include silk screen printing, photolithograph, and advanced dyeing processes.

170A. Costume Design (4) I. Stubb
   Studio—8 hours; required field trip. Prerequisite: courses 11, 12, 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. Stubb
   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; field trip. 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. Olsen and staff
   Studio—8 hours; field trip. Prerequisite: course 134C and senior standing. Advanced problems in interior architectural design emphasizing re-use of existing

*Course not offered this academic year.
buildings. Focus is on commercial and retail environments, color, and lighting.

180B. Advanced Interior Architecture (4). II. Harrington and staff
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. Berieux
Studio—8 hours; field trip. Prerequisite: course 180B. Directly involves a complex facility, including the integration of interior design, building structure and building systems.

190. Proseminar (1-10) I. 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. (PINP grading only.)

191A-D. Workshops in Design (4-12 I). I, II, III. The Staff (Stabb in charge)
Seminar—1 hour; studio or field experience—3 hours per unit (determined by instructor and student); field trip. Prerequisite: course 11, 12, 12; 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 grade only.

192. Internship (1-6) I, II, III. Summer. The Staff (Stubb 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. (PINP grading only.)

197T. Tutoring in Design (1-5) I, II, III. The Staff (Stubb 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. (PINP grading only.)

198. Directed Group Study (1-5). I, II, III. The Staff (Stubb in charge)
Prerequisite: upper division standing and consent of instructor. (PINP grading only.)

199. Special Study of Advanced Undergraduates (1-5). I, II, III. The Staff (Stubb in charge)
(PINP grading only.)

Graduate Courses

221. Experimental Approaches to Textile and Costume Design Media and Methods (4). I. Shawcroft
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, comparative, and technological history of costume and textiles. Students apply theories to their creative explorations for presentation and discussion.

222. Seminar in Costume and Textile Design Criticism (4). III. Hethorn
Seminar—2 hours; discussion—1 hour. Prerequisite: course 221, graduate standing in Textile Arts/Costume Design or consent of instructor. An open forum which addresses criticism and communication in relation to creative work in textile and costume design through seminar, readings, field trips and discussion.

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/}

Costume Design or consent of instructor. Required of first-year students and 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). I, II, III. Laky, Rivers and 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.

Prerequisite: graduate standing in Textile Arts/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. (SU grading only.)

298. Directed Group Study for Graduate Students (1-5). I, II, III. The Staff (Rivers in charge)
Studio—variable hours. Prerequisite: consent of instructor. (SU grading only.)

299. Individual Directed Study for Graduate Students (1-5). I, II, III. The Staff (Rivers in charge)
Studio—variable hours. Prerequisite: consent of instructor. (SU grading only.)

299A. Individual Focused Study (1-12). I, II, III. The Staff
Prerequisite: graduate standing in Textile Arts/Costume Design or consent of instructor. Developing background through reading, research, and studio practice for an independent project. (SU grading only.)

299D. Project Concentration (1-12). I, II, III. The Staff
Prerequisite: graduate standing in Textile Arts/Costume Design or consent of instructor. A minimum of 20 units must be taken in Project Concentration for Individual Focused Study. Students create 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. (SU grading only.)

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 sciences 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 for entry into the dietetics profession. 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

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
Biology (Biology Sciences 1A, 1B)............16
Chemistry (Chemistry 2A, 2B, 8A, 8B)............16
Computer science (Agricultural Systems and Environment 10 or Computer Science Engineering 10)............16
Economic principles (Economics 1A, 1B)............8
Microbiology (Microbiology 102, 102L)............6
Psychology (Psychology 1)............4
Social science theory (Sociology 1 or Anthropology 2)............6
Statistics (Statistics 13)............4

Breadth/General Education

6-24
Satisfaction of General Education requirement............6-24

Depth Subject Matter

71
Agricultural Economics 112............4
Applied Behavioral Sciences 173 or Education 110............4
Biological chemistry (Biology Sciences 102 and 103)............4
Food Science and Technology 100A, 100B, 101A, 101B............10
Food Service Management 120, 120L, 121, 122, 123............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 (916-752-2612).

Graduate Study. See the Graduate Studies section in this catalog.

Dramatic Art

Programs in Dance

(College of Letters and Science)

D. Kern Holoman, Ph.D., Chairperson of the Department
Department Office, 222 Dramatic Art Building (916-752-0888)

Faculty

Bobbi J. Bolden, M.A. Lecturer
D. Kern Holoman, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Jeffrey Hunt, M.F.A., Assistant Professor
Phyllis J. Kress, M.F.A., Lecturer

*Course not offered this academic year.
Minor Program Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Dramatic Art 124A or 124B: 160A; two of the following three courses: 156, 157, or 158; and 159</td>
<td>20</td>
</tr>
<tr>
<td>(Plus prerequisites)</td>
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<tr>
<td>During the undergraduate career, minors are to participate in University Theatre Season and Second Season productions. Participation must include work in at least four of the eight areas required by the major.</td>
<td></td>
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<tr>
<td>Major Adviser, J. Hunt.</td>
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</table>
| Transfer Students. As described above, all students completing a major in Dramatic Art must participate in dramatic production, basic tools and materials, principles of scenic construction, stage rigging, lighting and sound equipment and control systems. 27. Fundamentals of Playwriting and Directing (3). The Staff. Discussion—2 hours; workshop—2 hours; reading of selected texts in the theory of directing and playwriting. Prerequisite: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the creative collaborative effort of playwright and director. 30. Theatre Laboratory (1-5). I, II, III. The Staff. Prerequisite: course 25. Consent of instructor. Projects in acting, production, scenic 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). Bolden Laboratory/discussion—4 hours. 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). Bolden Laboratory/discussion—4 hours. Prerequisite: course 40A. Modern dance techniques. Basic anatomy, dance terminology, and a general overview of modern dance history. 41A. Beginning Jazz Dance (2). Bolden Laboratory/discussion—4 hours. Introduction to the fundamentals of jazz dance, including warm-ups, dance technique, and combinations. Exercises in small portions of class time are devoted to basic anatomy, dance terminology, and a general overview of jazz dance history. 41B. Intermediate Jazz Dance (2). Bolden Laboratory/discussion—4 hours. Prerequisite: course 41A. Warm-ups, dance technique and combinations at the intermediate level. A small portion of the class is devoted to basic anatomy, dance terminology and a general overview of jazz dance history. 42A. Beginning Ballet (2). II. The Staff Laboratory/discussion—4 hours. Introduction to the fundamentals of ballet, focusing on the development of techniques through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history. 42B. Intermediate Ballet (2). III. 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, quality, 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). 98. 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). II. The Staff Laboratory/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. 411. The Staff Laboratory—6 hours. Prerequisite: course 21B. Theory and practice of acting focused on the performance of the skill set narrative plays. Specific concentration on the study of scenic acting as vocal and physical metaphor. Offered in alternate years. 121B. Advanced Acting: Comedy from Farce to Manners (4). I. The Staff Lecture—4 hours. Prerequisite: courses 21B and 121. 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. The problems of Stanislavskii 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 and 122A. Exploration of the acting technique needed to perform a non-realistic script. Different acting and scenic methods will be examined through performance of the scripts. Offered in alternate years.

**124A. Principles of Theatrical Design: Scenery (4) I.** J. L. 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) III.** J. L. 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) I.** W. H. 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: Costumes (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.

**126. Production Management (3) I.** Winn Lecture—3 hours. Prerequisite: course 25. Theoretical and practical study of back-stage operation from audition through performance: techniques of stage management, technical direction, cueing procedures and lighting control. Offered in alternate years.

**127A. Principles of Directing (4) I.** The Staff Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. The director's creative approach to the play and to its staging.

**127B. Principles of Directing (4) II.** The Staff 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.

**140A. Dance Composition I (3) II.** Bolland Lecture/laboratory—5 hours. Prerequisite: course 40A, 41A, 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.** Bolland 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.

**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.

**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/clinic—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.

**155. Black Theatre and Drama (4) III.** The Staff Lecture—4 hours. Problem of black theatre in the 20th century: the history, impact, and current direction of the work of Blacks in the theatre. Offered in alternate years.

**156. Theatre and Drama: Aescheulys to Machiavelli (4) I.** The Staff Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece through the Italian and Spanish Renaissance. General Education credit: Civilization and Culture.

**157. Theatre and Drama: Shakespeare to Schiller (4) II.** The Staff Lecture—4 hours. Plays and the history of the theatre from English Renaissance through German and French Romanticism. General Education credit: Civilization and Culture.

**158. Theatre and Drama: Ibsen to Albee (4) III.** The Staff Lecture—4 hours. Selected plays and the history of the theatre from English Romanticism to the present.

**159. Contemporary Experimental Theatre and Drama (4) I.** The Staff Lecture—4 hours. Examination and evaluation of the "New Theatre." Course includes attending theatre events.

**160A-160B. Principles of Playwriting (4-4-4) I-II.** The Staff Lecture-seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; selection of material for plays. May be repeated for credit.

**161. Internship in Drama (1-12) I-II, III.** The Staff (Chairperson in charge) Internship—38 hours. Prerequisite: upper division standing. Open to upper division or graduate students in drama. Intensive one-on-one supervision 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: affiliation with the 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) 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: Methods (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. Offered to graduate students with consent of instructor. Voice production and speech related to specific 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 Artlist, 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: Technical (4) III.** Winn Seminar—3 hours; term project. Special problems in visual and auxiliary 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.** 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.

**224C. 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, detailed accessory sketches, and scale drawings of patterns. Projects from classic plays to 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/tucre 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) I.** Granada Artlist 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 Artlist Seminar—3 hours; term paper. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for productions 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 Artlist Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in
Earth Sciences and Resources

See Hydrologic Science; Hydrologic Science (A Graduate Group); and Environmental and Resource Sciences

### East Asian Studies

**East Asian Studies**

(College of Letters and Science)

Michelle Yeh, Ph.D., Program Director
Program Office, Interdepartmental Programs
(916-752-1219)

**Faculty**

Beverly Bossler, Ph.D., Assistant Professor (History)
Robert Borgen, Ph.D. Professor (Chinese and Japanese)
Ching-Chun Chang, Ph.D. Associate Professor (Chinese and Japanese)
Susan Griswold, Ph.D., Assistant Professor (Chinese and Japanese)
Whalen W. Lai, Ph.D. Professor (Religious Studies)
Susan Mann, Ph.D. Professor (History)
Don C. Price, Ph.D., Professor (History)
G. William Skinner, Ph.D. Professor (Anthropology)
Janet S. Smith, Ph.D., Professor (Anthropology)
Marian Ury, Ph.D. Professor (Comparative Literature)
Michelle Yeh, Ph.D., Professor (Chinese and Japanese)

**Emeriti Faculty**

Mary H. Fong, Ph.D., 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 is designed to give 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:

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>History 9A, 9B</td>
<td>8</td>
</tr>
</tbody>
</table>

One course from Art History 1D, Chinese 10, 11, Comparative Literature 53A, Japanese 10, 25, Religious Studies 70, 75, 85, 95 | 3-4 |

Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2, 3-4-5, Japanese 1-2-3-4-5-6) | 30 |

**Depth Subject Matter**

Must include at least 8 units of core courses from each of the following categories: history, social science, and humanities. Core courses in each category are listed below.

**History:**


**Social Science:**


**Humanities:**


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, 116A, 140B, 140B; Geography 143; History 1020, 1020H, 1020N; Japanese (any upper division course); Linguistics 100; Political Science 127, 133, 138, 145, 148C; Sociology 111, 141, 170, 183. (Or other appropriate courses, including individual and group study courses (188, 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 (188, 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 98 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
148A. Traditional Japanese Society
148B. 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)
1020. Undergraduate Preminor: China to 1800
1020H. Undergraduate Preminor: China since 1800
1020N. Undergraduate Preminor: 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
Ecology

(A Graduate Group)

Theodore C. Fohn, Ph.D., Chairperson of the Group

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 specific areas of emphasis. For details, contact the group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social, or behavioral, and physical 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 and 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 of interdisciplinary graduate preparation appropriate to the selection. Details may be found in the Group Announcement.

Graduate Advisers. T.C. Fohn.

Courses in Ecology (ECL)

Graduate Courses

200A. Principles and Application of Ecological Theory (4) F, I

Lecture—3 hours; discussion—1 hour. Prerequisites: one course from History 190C, 193, or consent of instructor. Knowledge of Chinese not required. Viewing and analysis of 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 to credit to students who have completed Chinese 112.

192. East Asian Studies Internship (1-12) I, II, III. The Staff

Internship—36 hours; term paper. Prerequisites: 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

Independent study—1-5 hours. Prerequisites: 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 linguistics. (P/NP grading only.)

196A-196B. Honors Seminar (4-4) III. The Staff

Seminar—2 hours; conference—2 hours. Prerequisites: 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.)


Lecture—3 hours; laboratory—4 hours. Prerequisites: introductory courses in plant ecology; consent of instructor. Principles and techniques of vegetation analysis, including ordination and animal-determined vegetation patterns. Emphasis on methods tailored to specific biological systems. Topics include sampling, data analysis, and interpretation. Selected concerns, such as trends in vegetation and animal distribution, will be examined during field trips and laboratory sessions. Offered in alternate years.

207. Plant Population Biology (3) II. Rice (Agronomy)

Lecture—2 hours, laboratory—discussion—1 hour. Prerequisites: advanced undergraduate courses in population ecology (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Ecology 104) and advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level student and advanced undergraduates with an introduction to both theoretical and empirical research in population biology. Emphasis is placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Agronomy 207.)

208. Studies in Conservation Biology (3) II. Harrison

Lecture—3 hours; discussion—1 hour. Prerequisites: Environmental Studies 100, Zoology 125, Botany 117, Entomology 106. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and writing a primary literature. Specific topics will reflect the research interests of UC Davis conservation biology faculty.

209. Demography for Biologists (3) II. Carey

Lecture—3 hours; discussion—2 hours. Prerequisites: course 104 or Zoology 125 or the equivalent. Major demographic concepts and techniques including current, abridged and multiple decremented life tables, analysis of reproduction, stable population theory, stochastic, two-sex and multiregional models, and demographic applications such as life history scaling, harvesting theory, and curve fitting. Offered in alternate years.

210. Advanced Topics in Human Ecology (4) III. Orlove

Lecture—2 hours; discussion—2 hours. Prerequisites: 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 ecological ecology are examined. Offered in alternate years.

211. Advanced Topics in Cultural Ecology (3) III. Choff

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 Analysis (3) III. Sabatier

Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisites: course in public policy (e.g., Political Science 107 or 108); course in bureaucratic policy making (e.g., Environmental Studies 166 or Political Science 181); course in intermediate statistics (e.g., Sociology 106 or Agricultural Economics 106). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on case studies and methodological issues. Offered in alternate years. (Same course as Environmental Studies 212A.)

212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz

Lecture—1 hour; discussion—1 hour; seminar—2 hours; independent evaluation project. Prerequisite: Economics 100 or the equivalent. Environmental Studies 188 (or the equivalent course in policy analysis of resource economics); intermediate level statistics
180 Economics

(e.g., Sociology 106 or Agricultural Economics 106).
Examination of recent research and practice in the evaluation of agricultural science related policies, programs and plans. Ex-ante and ex-post evaluation will be studied. Offered in alternate years. (Same course as Environmental Studies 212B.)

214. Population, Environment, and Social Structure (4) I. Hastingseminar—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, environmental problems, and social structure; focus on demographic content of global ecological models and simulations, ecological content of modern demographic theories, and determinants of fertility, and social conflict and change. Offered in alternate years.

214. Use of Temporal/ Spatial Landscape Analysis in Conservation (4) II. Schonewald-Cox Lecture/discussion—3 hours; laboratory—2 hours. Multidisciplinary 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 fragmented habitats. Laboratory applies methodologies to analysis of specific sites. Offered in alternate years.

215. Thermal Ecology and Energetics (3) II. Weather 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) III. Jackson Lecture/discussion—3 hours. Prerequisite: Ecology 200A and 200B or Plant Pathology 210 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 crop systems ecology. (Same course as Plant Science 216 and Vegetables Crops 216.)

219. Ecosystem Biogeochemistry (4) III. Dahlgren, Bledsoe Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory ecology courses in ecological science 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.)

221. Chemical Aspects of Ecology (3) I. Lecture—3 hours. Prerequisite: Chemistry 1A-1B or BB and 128C (or the equivalent); a course in biological ecology; graduation standing and consent of instructor. A course will be offered on each of nine subjects including chemical ecology of reproduction, nutrition, defense, communication, adaptation, and ecosystem structure and function. Offered in alternate years.

225. Terrestrial Field Ecology (4) III. Karban Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. A field course conducted over spring break and four weeks during the summer emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Entomology 225.)

230. Analysis of a Selected Ecosystem (2) I. Bledsoe, Dahlgren 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. Methods in Population Biology (3) I. Hastings. Lecture—3 hours. Prerequisite: Mathematics 24C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology are stressed. (Same course as Environmental Studies 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 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 (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—1 to 3 hours. Prerequisite: consent of instructor. Topics in ecology, 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) III. Schonewald-Cox seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Examinations 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, UCDC faculty, and graduate students. May be repeated for credit. (Same course as Population Biology 296.) (S/U grading only.)

297. 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.)

Julie A. Nelson, Ph.D., Associate Professor
A. L. Oomma, Ph.D., Professor
Marylou Quinlivan, Ph.D., Professor
John E. Roemer, Ph.D., Professor
Kevin D. Salzer, Ph.D., Associate Professor
Steven M. Shekhin, Ph.D., Professor
Joaquim Silvestre, Ph.D., Professor
Deborah Swenson, Ph.D., Assistant Professor
Robert K. Trestel, Ph.D., Associate Professor
Gary R. Walton, Ph.D., Professor (Economics, Management)
Wing T. Woo, Ph.D., Professor
Emeritus 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
Hiroshi Kaneda, Ph.D., Professor Emeritus
Thomas Mowry, Ph.D., Professor Emeritus
Y. T. Shen, Professor Emeritus
Elia H. Tuma, Ph.D., Professor Emeritus
Leon L. Yerges, 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 the student is encouraged to concentrate the remainder of his 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, brokerage houses, 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:

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Economics

Preparatory Subject Matter: 22-26

Economics 1A-1B: Statistics 13, 32, or 102: Mathematics 16A-16B-16C: Depth Subject Matter: 40


Total Units for the Major: 62-66

Recommended Courses:

Students considering graduate study in economics or business administration are strongly urged to take Mathematics 21A-21B and Economics 21A.

The Economics Department suggests that Economics 100 and 101 be taken as soon as possible after the introductory courses.

Except under extraordinary circumstances, no 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.
Economics 181

Approval from a departmental adviser is required in all 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 grade of B or better, and all lower division 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.)


For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcements and contact the chairman 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. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies.

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 and the role of public policy. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies.

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.

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 applications 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: course 1A, 1B, and Mathematics 16A or Mathematics 21A with a grade of 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 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 and Mathematics 16A or Mathematics 21A with a grade of 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 or 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) II. Heims 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 Economics 100A or 100B. Intended for non-majors.

105. Intermediate Macroeconomics (4) I, II, III. The Staff 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.

110A. Economic History (4) II. Clark Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic history of Europe prior to 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

110B. Economic History (4) III. Clark Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

111A. Economic History (4) I. 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.

111B. Economic History (4) III. Clark 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.

115A. Economic Development (4) I, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major issues encountered in emerging from international poverty. Issues include problems of growth and structural change, human welfare, population pressure on markets and external migration. Important issues of policy concerning international trade and industrialization.

115B. Economic Development (4) II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major macroeconomic issues of developing countries. Issues include prob-

*Course not offered this academic year.
136B. Monetary Policy (4) I. Salyer
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Analysis of the role of financial intermediaries in the economy and the theory and practice of monetary policy.

140. Econometrics (4) R. Cameron
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 10A, 110A, 104, or 105B; Mathematics 16A or 16B or 121A. Statistics 13. Introduction of problems of observation, estimation and hypotheses testing in econometrics through the study of the theory and application of econometric models, critical evaluation of selected examples of empirical research and exercises in applied econometrics.

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. Nelson
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 discrimination; income distribution; poverty. Policy issues: negative income tax; manpower training programs; incomes policy.

160A. International Microeconomics (4) I. Swenson; III. III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 104 or 104C, 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) I. Swenson; II. Wooy
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 104, or 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) I. Swenson; III. Wooy
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, or 104, 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. Students who have completed course 160A or 160B may not receive credit for this course.

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 economics of the countries of the Middle East. Nonteaching department for course scheduling.

171. Economy of East Asia (4) I. 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 economics 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 economics 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 economics of the countries of South East Asia. Consult department for course scheduling.

174. Europe 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 economics of the countries of Europe. Consult department for course scheduling.

175. Economy of Sub-Saharan 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 economics of the countries of the Sub-Saharan. Consult department for course scheduling.

190. Topics in Economics (4) III. Lindert Lecture/discussion—4 hours. Selected topics in economics analysis and public policy. Variable content. May be repeated for credit.

190X. Upper Division Seminar (1-4) I. The Staff
Lecture—3 hours; discussion—1 hour. 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 and completion of 84 units of credit with a minimum grade-point average of 3.0; admission to the Davis-in-Washington Program. Internship in Washington, DC, with associated research project. Students must secure faculty sponsor and permission before embarking on the internship. Maximum of 3 units will count toward satisfying Economics major requirements. (P/N grading only.)

194HA-194HB. Special Study for Honors Students (4-4) I-II. The Staff (Undert in charge)
Independent study—3 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor and completion of 125 units with a minimum grade point average of 3.5 in courses counted toward the major. 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. Students may take the course as a teaching assistant or tutor by conveying students in one of the department's regularly scheduled courses. Units may not be counted toward satisfaction of major requirements. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses

200A. Microeconomic Theory (5) I. Caputo Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and nonlinear optimization theory applied to develop the theory of the profit-maximizing firm and social efficiency. (Same course as Agricultural Economics 200A.)

200B. Microeconomic Theory (5) II. Quintiliani Lecture—4 hours; discussion—1 hour. Prerequisite: courses 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 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 Economics 502C.)

200D. Macroeconomic Theory (5) III. 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 100B (mathematics 105B and 200D). Macroeconomic theory of income, employment, and prices.

210A. History of Economic Thought (4) III. Hoover Lecture—3 hours; discussion—1 hour. Economic thought from the classical Greek era to modern times. Offered in alternate years.

210B. History of Economic Thought (4) I. Hoover Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

210A. Advanced Economic Theory (4) I. Silvestri Lecture—4 hours. Prerequisite: course 200A, 200B. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness, and efficiency; intertemporal economics; uncertainty.

210B. Advanced Economic Theory: Game Theory (4) I. Bonacorsi 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.

210C. Topics in Economic Theory (4) III. Noh
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.

210D. Microeconomic Analysis (5) I. Hazlett (Agricultural Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 (or 100M) or Agricultural Economics 100A, 100C, Mathematics 21A, 21B and 21C or Mathematics 16A, 18B or 115). Open to advanced undergraduates with consent of instructor. Economic reasoning and social choice; behavior of firms and markets; concepts of partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Agricultural Economics 210D.)

210E. 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.)

210F. 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 characterization of resource allocation. Applications to modeling of the distributive theories of political philosophers J. Rawls, R. Dworkin, R. Nozick, and G.A. Cohen.

210G. Public Ownership Economics (4) II. Silvestri Lecture—4 hours. Prerequisite: course 200B. Public ownership from the viewpoint of microeconomics, in particular general equilibrium and welfare economics. Topics include return to scale and firm ownership, common-pool resources, externalities, and solution concepts for economies with public and private ownership. Offered in alternate years.
Course not offered this academic year.

**209C. Foundations of Decision Theory (4) III. Nehring Lecture—4 hours. Prerequisite: course 200B. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include: intertemporal decision; learning, information and ambiguity; individual and social choice; game theory as interactive decision theory, bounded rationality. Offered in alternate years.

**210A. Economic History (4) II. 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. Linder Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on research in current research. (Quarter offered to be flexible.)

**214. Development Economics (4) I. Jarvis Lecture—4 hours. Prerequisite: Agricultural Economics 100A, 106B, course 101; Agricultural Economics 204 and course 150A—150B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development models, current strategies and application to specific policy issues in developing countries. (Same course as Agricultural Economics 214.)

**215A. Agriculture and Economic Development (4) Taylor Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural 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 and intersectoral models. (Same course as Agricultural Economics 215A.)

**215B. Open Macroeconomics of Development (4) III. Woo Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural 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 context of an open developing country. The basic analytical focus is the relative price and its impact on sectoral allocation of resources. (Same course as Agricultural Economics 215B.)

**215C. Empirical Approaches to Development Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 215A, 215B. Extension of development models for policy analysis including Hausman-Fair models, models of resource allocation under uncertainty. Social Accounting Matrix and Computational General Equilibrium models. Analysis and case studies of methods of policy evaluation and without income-distribution weights. (Same course as Agricultural 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 government intervention.

**221B. Industrial Organization (4) III. The Staff 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 220A. Focus on housing, land-use patterns of cities and land-use patterns within cities. Explores efficiency and equity effects of local spending and taxes. Analysis of urban problems such as congestion (congestion toll, mass transit), crime, and inadequate housing.

**230A. Public Economics (4) I. Heim Lecture—3 hours; discussion—1 hour. Prerequisite: course 205A or 204. Measures of deadweight loss and income distribution; microeconomic and macroeconomic effects of income and tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; evaluation of effective tax rates.

**230B. Public Economics (4) II. Triest 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. Nelson Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Advanced topics in economics of the public sector. 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 effects 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 System, the definition of money, goals and tools of monetary policy. Alternative targets for monetary policy, importance of monetary policy, the problem of lags, alternative policies.

**240A. Econometric Methods (4) II. Green Lecture—4 hours. Prerequisite: Statistics 132 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, heteroscedasticity, autocorrelation, lagged dependent variables. (Same course as Agricultural Economics 240A.)

**240B. Econometric Methods (4) III. Havener (Agricultural 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 Economics 240B.)

**240C. Econometric Theory (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Topics in developing and dynamic econometric models; asymptotic distribution theory. (Same course as Agricultural Economics 240C.)

**240D. Topics in Econometric (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 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: courses 150A-150B or the equivalent. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis.

**256A. International Economics (4) I. Feenstra Lecture—3 hours; discussion—1 hour. Prerequisite: course 204A or 204. Trade theory of determinants; gains from trade; tariffs and effective protection; economic unions.

**256B. International Economics (4) II. Swenson Seminar—4 hours. Prerequisite: courses 260A and 260B. Survey of current literature in international trade theory.

**258A. Orientation to Economic Research (2) II. 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 origin of a research project, some mechanics of empirical research and hints on the submission of research papers. (SU 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. (SU grading only.)

**299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Permission of instructor and graduate standing. (SU grading only.)

**299D. Dissertation Research (1-12) I, II, III. The Staff (SU 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, evaluation and examination procedures. (SU grading only.)
Education

Graduate Study. The program on Economy, Justice, and Society offers a designated emphasis in Economy, Justice, and Society. This new emphasis is open to students pursuing a doctoral degree in philosophy, political science, or economics. The designated emphasis will provide interdisciplinary training in selected aspects of these fields, political theory, and political philosophy. Students will take one or two core courses offered by the program, a designated field in their home department, a choice of three designated courses in the other two departments, and will attend an advanced workshop/seminar run by the program. For students crossing the emphasis, these requirements will be in lieu of some requirements for the Ph.D. in the participating departments. Upon graduation, students will receive a Ph.D. in their major with a designated emphasis in Economy, Justice, and Society.

Graduate Advisers. 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, models, and functional results in modern microeconomics. Emphasis on first, Utility Theory; second, the logic of the equilibrium methods; third, welfare economics and public policy.

Graduate Courses

208A. Economics Models of Distributive Justice (4) II. Roemer Lecture—4 hours. Prerequisite: course 100 or the equivalent, and graduate standing. An introduction to the social choice, political economy, and distributive justice. The economic foundations of the liberal and conservative theories; the implications of the economic analyses for public policy decisions. Offered in alternate years.

208B. Economic Models of Public Ownership (4) 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.

208C. Foundations of Decision Theory (4) III. Nehring Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Basic concepts, models, and functional results in modern microeconomics. Emphasis on first, Utility Theory; second, the logic of the equilibrium methods; third, welfare economics and public policy. Offered in alternate years.

Barbara G. Goldman, Ph.D., Associate Director of Teacher Education
Sandra M. Murphy, Ph.D., Associate Director of Teacher Education
Jill Wilson, Ph.D., Associate Director, CRESS Center
Division Office, 2074 Academic Surge (916-752-8258; FAX: 916-752-5411)
Student Services, 2074 Academic Surge (916-752-0577)
CRESS Center, 206B Academic Surge (916-752-0381; FAX: 916-752-6135)

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
Michelle L. Foster, Ph.D., Associate Professor
Pauline V. Holmes, M.A., Supervisor of Teacher Education
Patricia E. Gandara, Ph.D., Assistant Professor
Barbara G. Goldman, Ph.D., Lecturer in and Supervisor of Teacher Education
Joanne Galli-Banducci, M.A., Supervisor of Teacher Education
Anna T. Kain, Ed.D., Supervisor of Teacher Education
Karen L. Niewies, M.A., Supervisor of Teacher Education
Barbara J. Merino, Ph.D., Professor
Sandra M. Murphy, Ph.D., Associate Professor
Keith H. Deaglin, Ph.D., Assistant Professor
J. Richard Pomeroy, M.A., Supervisor of Teacher Education
Jonathan H. Sardowal, 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 A. Armstrong, Ph.D., Emeritus Professor
Hugh C. Black, Ph.D., Emeritus Professor
G. Phillip Cartwright, Ph.D., Emeritus Professor
Douglas L. J. Emeritus
Julius M. Sassenrath, Ph.D., Emeritus Professor
Corten A. Spring, Jr., Ph.D., Emeritus Professor
George D. Yonge, Ph.D., Emeritus Professor

Cooperative Research and Extension Services for Schools (CRESS) Staff
Sandra Murphy, Ph.D., Co-Director, CRESS Center
Nancy Asbarg, M.A., Director, Northern California Mathematics Project
Pam Castor, M.A., Director, California Science Project—Sacramento
Kathy Dixon, Ph.D., Publications Editor
Fran Gibson, M.A., Co-Director, Northern California Mathematics Project
Beth Hart, M.A., Education Extension Specialist for Healthy Start
Barbara Hoffman, M.A., Co-Director, Sierra North Arts Project
Pauline Holmes, M.A., Associate Director for Inservice Programs, Area 3 Writing Project
Tom Hinojosa, M.S., Science Education and Assessment Specialist, Scope, Sequence and Coordination Project
Helen Kato, M.A., Co-Director, Scope, Sequence and Coordination Project
Judith Kersh, M.A., Education Extension Specialist for Mathematics Co-Director, College Preparatory Mathematics Project
Lona Latta, M.A., Co-Director, Northern California Mathematics Project
Rachel Lodge, M.A., Director, Healthy Start Field Office
Jayne Marfink, M.A., Director, Area 3 Writing Project

Kathy Medrano, M.A., Director, Area 3 History and Cultures Project
Teresa Ramirez, M.A., Co-Director, California Science Project
Janice Roche, M.A., Co-Director, Northern California Mathematics Project
Rick Rue, M.S., Staff Development Specialist, Scope, Sequence, and Coordination Project
Tom Seach, M.S., Director of the California Science Project, and of Scope, Sequence, and Coordination Project
Tom Sallee, Ph.D., Co-Director, College Preparatory Mathematics Project
Maryann Semore, Ph.D., Education Extension Specialist, Upper School Research Project
Jill Wilson, Ph.D., Associate Director, CRESS Center

Program of Study

The Division of Education does not offer an undergraduate major program. However, it does offer a minor.

Minor Program Requirements:

Education is considered to be the foundation or basic area for undergraduates to elect as a minor if they wish to (1) major in an allied program, (2) obtain a master's degree in education or allied field, (3) obtain a Ph.D. degree in education, (4) enter a profession that focuses on work with people, (5) seek employment in governmental or industrial training programs, or (6) achieve a better understanding of the issues and concerns of public and private education.

UNITs

Units (minimum units).............. 20-23
Education 110............................. 4
Education 120......................... 12-15
Depth courses......................... 12-15
At least 12-15 units from Education courses not used above chosen in consultation with an Education adviser.

Minor Advisers. All faculty members who teach undergraduate courses.

Teacher Education

For a statement of complete requirements and appointments with credential advisers, contact the Divisional Student Services Office, 2074 Academic Surge. Interested students are urged to do this as early as possible in their academic career.

Applicants to the elementary or secondary 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. Wemper
Bilingual Emphasis, B.J. Merino

Teacher Education Faculty Advisers—Secondary, P. Holmes, R. Van Dyne

Graduate Adviser, B. Merino, B. Goldman (Credential Program).

Graduate Study. The Division of Education, in conjunction with the Graduate Group in Education, offers programs of study and research leading to the master's 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 Adviser, Division of Education, 2074 Academic Surge. We are currently giving strong preference to doctoral applicants.

Graduate Coordinator. J. Bray

Graduate Adviser, J. Sandoval (M.A. and Ph.D. degree).

Joint UCD/CSU Fresno Doctoral Program (Ed.D.)

Rosemary Papalewis, Ph.D. (CSU Fresno) and Robert DeVillar, Program Director. UC Davis office, 2074 Academic Surge (916-752-0764; FAX: 916-752-5411; e-mail: kborley@ucdavis.edu)

The joint (UCD/CSU Fresno) doctoral program leads to the Doctorate in Education (Ed.D.) in Educational...
Courses in Education (EDU)

Lower Division Course

98. Directed Group Study (1-5-1) I, II, III. The Staff (Director in charge)
Prequisite: (DD) instructor. Primarily for lower division students. (P/NP grading only)

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. General Education credit: Contemporary Societies.

*111. Introduction to Psychopedagogics (4) I, II, III. Yonge
Lecture/discussion—4 hours. Prerequisite: Psychology 1; upper division standing. Introduction to the human science of pedagogics (education) with special emphasis on the psychopedagogic perspective. Such topics as the pedagogic situation, learning and becoming, teaching and the lesson structure, and the methods of pedagogics will be considered.

*114. Quantitative Methods in Educational Research (4) I. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: two years of high school algebra and methods and techniques in data analysis. Design of research projects. Some consideration of procedures suited to digital computers.

115. Educating Children with Disabilities (2) II, III. Figueroa, Sandovel
Lecture—2 hours. Prerequisite: upper division standing. Educational issues and processes involved in educating children with disabilities. The course will focus on the structure of special education, with an emphasis on the personal and educational needs of children who are mainstreamed in regular classes.

*117. Psychology of Reading (4) I. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: Psychological 1; upper division standing. Theory and research on psycholinguistic processes involved in learning to read. Topics include reading readiness, word recognition and spelling, knowledge of the orthographic system, phonological awareness, interactive processes, influence of dialect, difficulties of poorer readers.

120. Philosophical and Social Foundations of Education (4) II. Wagner
Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society. General Education credit: Civilization and Culture.

*122. Civil Rights of Teachers and Students (4) I, II, III. The Staff (Director in charge)
Discussion—4 hours. Prerequisite: upper division standing. Rights of teachers and students under the U.S. and California Constitutions and under Federal and State laws. Emphasis on the rights of speech, press, and assembly, religious autonomy, due process, equal protection and privacy. General Education credit: Contemporary Societies.

*123. John Dewey and the Foundations of Education (4) I. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: upper division standing. The philosophical and social foundations of education as interpreted by Dewey. While focusing on his critique of American education and his systematic proposals for reform, attention will also be given to criticism of Dewey.

*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 some practical implications of varying philosophical approaches to the role of the university.

*132. Church, State and School (4) III. The Staff (Director in charge)
Discussion—4 hours. Prerequisite: upper division standing; course 122 or the equivalent. Analysis of the decisions of the United States Supreme Court applying the free exercise clause of the First Amendment to the relationship between church, state, and schools. General Education credit: Contemporary Societies.

*145. Aesthetics in Education (4) II. The Staff (Director in charge)
Lecture/discussion—4 hours. Prerequisite: upper division standing. Considers the role of the arts in education. Examines various conceptions of the nature of art and aesthetic experience, and relates this to instructional procedures.

151. Language Development in the Chicano Child (3) Merino
Lecture—3 hours. Prerequisite: some knowledge of Spanish and its structure; first and second language acquisition, bilingual education, language assessment, Chicano Spanish, and the role of dialect variety in the classroom.

162. Communication Skills for Bilingual Teachers (3) 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) II. Merino and staff
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) II, III. Rodolfa
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. Rodolfa
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, Sandovel, and staff
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.

Lecture—1 hour; seminar—1 hour; laboratory—1 hour. Prerequisite: upper division or graduate student. Applications of computers in education as instructional, information, and research 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; 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.

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. The 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. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

200. Educational Research (4) III. Gandara
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.

201A. Ethnographic Research in Schools I: Current Theory and Practice (4) I. Delgado-Gaitan, Watson-Gage
Lecture—4 hours. Prerequisite: graduate standing. Review of current literature from anthropology and sociology related to schools, with 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.

201B. Ethnographic Research in Schools II: Field-Based Research Projects (4) II. Watson-Gage
Discussion—4 hours. Prerequisite: graduate standing and course 201A. Student research projects in specific schools with cooperative critical analysis of the design, data collection, and interpretation by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects.

*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,
illuminations of several types of philosophical discourse and argumentation, and an opportunity for students to locate and critique some contemporary studies in philosophy of education. Offered in alternate years.

203. Qualitative Research in Education (4) III. Wagner Seminar—4 hours; lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numeric data (e.g., text, discourse, imagery and artifacts; for example: meaning, validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments).

204. School Change and Educational Reform (4) II. Wagner Lecture—4 hours; discussion—2 hours; seminar—2 hours. Prerequisite: graduate standing or consent of instructor. Analysis of models, processes, and case studies of school change and educational reform in respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research.

205. The Concept of Mind in Teaching (4) III. The Staff (Director in charge) Seminar—4 hours. Philosophical analysis of the problems of educational practice which are created, aggravated, and sometimes solved by varying conceptualizations of mind and thinking. Offered in alternate years.

207. Concepts of the Curriculum (4) I. Murphy Lecture—2 hours; discussion—2 hours; prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis and argumentation 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 emphasis, hidden curriculum, and moral education.

209. Pedagogics (4) III. The Staff (Director in charge) Seminar—4 hours. Critical analysis of the literature available in English dealing with theoretical and practical issues in education. (Pedagogics is an existential phenomenological approach to the systematic study of education).


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. Sanders Lecture—4 hours; prerequisite: A topics 114 and 219, admission to the 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. Sanders 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 measurement; 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. Motivation and Behavior Modification (4) II. The Staff (Director in charge) Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Factors related to influencing behavioral change in educational settings, including theories of intrinsic and extrinsic motivation, psychological reactance, locus of control, achievement attribution, and behavior modification.

218. Testing Minority Children (4) I. Figueiredo Lecture—3 hours; fieldwork—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizes techniques and techniques that are appropriate for use with ethnic minority students. Includes guidelines of multicultural assessment. Review studies and guidelines on the use of tests with minority children. Offered in alternate years.

219. Educational Testing and Evaluation (3) I. Gandara Seminar—3 hours. Prerequisite: courses 114 and 200 or consent of instructor. Study of test theory as it applies to research and evaluation in education, with an emphasis on construct validity and reliability testing. Offered in alternate years.

221. 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.

222. 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.

223. 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 Education 231, 201A, or 201B, or consent of instructor. Uses concepts of anthropology to examine education in such settings as family, community, and formal institutions. 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. (F.P.N. grading only)

225. 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.

237. Education and Social Policy (4) III. Gandara Seminar—3 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 abroad. How education policy is formed in the broader public policy arena. Develops skills in educational policy development. Offered in alternate years.

239. Discourse Analysis in Educational Settings (4) II. Watson-Gego 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., narrative, conversation, routines), approaches to discourse analysis, and ethnography of language use. The use of course (lessons, teaching/learning interactional sequences).

Final term paper is an analysis of discourse data tape-recorded by student in a field setting.

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 studies including writing systems, theories of processes and acquisition, emergent reading, decoding, word reading, oral text reading, spelling stages, instructional methods, disability, dialect. Offered in alternate years.

242. Research on Text Comprehension (4) I. The Staff (Director in charge) Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis and evaluation of research related to the comprehension of written and oral text, with an emphasis on the teaching and learning of comprehension processes in school settings. The course will focus on current issues and research methodology. Offered in alternate years.

243. Research on the Teaching and Learning of Writing (4) III. Murphy Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis of research on composition, history of composition studies, data analysis techniques, product and process approaches, cognitive and social perspectives. Offered in alternate years.

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 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) III. Merino, Watson-Gego 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 coursework in mathematics or consent of instructor. Examination of curriculum 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 coursework 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 research foundations. Offered in alternate years.

*Course not offered this academic year.
256B. Research in Mathematics Education (4) I, II. Dugdale
Seminar—4 hours. Prerequisite: graduate standing in education with upper division coursework 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. Project 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 coursework, or consent of instructor. The roles of calculators, computers, and graphical software and 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.

*271. Recent Developments in Social Studies Education (3) III. The Staff (Director in charge)
Lecture—2 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rationales, goals, objectives, and criteria used in teaching social studies, and new trends and strategies of teaching social studies. Prerequisites: the sociology and methods courses of the student's major. 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 the teaching of education by graduate students with their major professors. May be repeated twice for credit. (SU grading only)

291. Proseminar in Education (3) I, II. Sandover
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 discussion of recent advances in education. Speakers from the graduate faculty are invited. May be taken twice for credit.

292. Special Topics in Education (2-4) I, II. The Staff (Director in charge)
Seminar—4 hours. Prerequisites: 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, II, III, Sandover
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.

296. Group Study (1-5) I, II, III. The Staff (Director in charge)
(SU 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. (SU grading only)

299D. Research (1-12) I, II, III. The Staff (Director in charge)
Independent study—3-36 hours. Research for individual graduate students. (SU 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 reading. Includes reading, 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 strategies for teaching reading in the secondary school. Techniques and strategies to improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to the linguistic development of English language learners.

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-disciplinary 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: course 304A; 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 concepts 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. Current concepts of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from the 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 middle 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 middle grades. Current conceptions of middle grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.

306. Education in the Elementary School (5-12) I. The Staff (Merino in charge)
Lecture—2 hours; laboratory—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school physical education. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning.

306B. Life Sciences in the Secondary School (5-12) I. The Staff (Merino in charge)
Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school physical education. Emphasis upon 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 (currently); 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 (Merino in charge)
Discussion—4 hours. Prerequisite: admission to graduate standing or credit 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.

*Course not offered this academic year.
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, science education, and language and literacy education including bilingual education. Students are expected to have a background in educational psychology, educational anthropology, and educational sociolinguistics 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 (752-0761).

Courses. See Education for courses.

Education Abroad Program

Dennis Duttschke, Ph.D., EAP Campus Director
Program Office, 320 Voorhis Hall
(916) 752-3014; FAX 916-754-8311

Programs of Study

The Education Abroad Program (EAP) of the University offers financial support to its students through the minimal program admission requirements. The opportunity to experience a different culture while promoting progress toward degree objectives. Students interested in the language, literature, art, culture, history, or governmental or social institutions of the countries or areas where study centers are located will gain substantially from first-hand academic and practical experience. All students, whatever their field of study, will broaden their outlook and gain new skills as the result of study in a foreign country. Estimated all-inclusive minimum costs for the three- to twelve-month program range from $3,000 to $20,000 (varies depending on the country). Financial Aid is available. Scholarships are available based on country selection.

Application

 Normally, students participate in the program during their junior year, but a number of students may be selected for participation as seniors. A few programs are open to sophomores and to graduate students as well. Students considering study abroad with the EAP should contact the EAP Office as soon as possible for application and filing deadlines. This is important, as deadlines for some centers, including the United Kingdom and Ireland, are in early November.

Eligibility requirements include:

- Residency of at least three regular session quarters completed in residence at UC by the time of participation
- 84 quarter units or more must be completed by the time of application
- At least 3.0 grade point average for specific short-term programs which may only require sophomore status
- At least 3.0 grade point average for core work completed at UC at the time of application and at least 3.0 grade point average for the University-level foreign language (with a 3.0 grade point average) or the equivalent. A number of EAP programs do not require previous knowledge of a second language for participation. Consult the EAP Office for specific requirements.

- An academic plan approved by your major adviser and the campus coordinator
- Enrollment of the appropriate Committee on the Education Abroad Program

Applications from the EAP Office. A provisional academic planning form, prepared in consultation with the EAP adviser and the major adviser, must be submitted along with the completed application to the EAP Office prior to the appropriate deadline. Applications received after the official deadline may not be considered.

For study abroad during the 1999-2000 academic year, the application deadlines are as follows: mid-October for the Japan Global Security Studies spring quarter program; early November for the United Kingdom and Ireland, Japan, the spring quarter programs in Mexico and the fall and spring quarters in Costa Rica, Tropical Biology, early May for Australia, Brazil, Chile, Mexico-Taxco: Language Program, New Zealand, and the year program in Costa Rica; and mid-to-late January for all other study centers. Participation in a study program during a senior year requires careful advance academic planning to make sure that all degree requirements will be met. Students should consult with the major adviser, the dean's office of their college, and an EAP academic adviser on the academic and non-academic—debts and credits of participation in the EAP should be weighed carefully prior to departure.

Students who do not meet the minimal requirements for acceptance (see under Education Abroad in the Introduction section) must consult with an EAP academic adviser. Students who will have accumulated more than 145 units prior to the beginning of their planned year of study abroad must receive permission from an EAP academic adviser before submitting an application.

Selection

The Academic Senate Committee on the Education Abroad Program is intimately involved in the selection of EAP participants on the Davis campus. This 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 EAP personnel. Among other things, academic goals, 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 receiving the endorsement of the Senate Committee on EAP are forwarded to the Systemwide Office of the EAP on the Santa Barbara campus, where further selection considerations will be 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. 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 in the host country. 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 Aus-
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 university 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 program is available during Fall quarter at the Centre International d'Etudes Francaises at Lyon.


Ecole Normale Supérieure at Fontenay-Saint Cloud, Paris Region. Coursework in social sciences and the humanities.


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.

Parc Center for Critical Studies. Film theory, literary criticism, philosophy, theology, literature, criticism, and history), history, and the arts.

Parc 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, politics, philosophy, 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 English.

Language and Society Program, Bayreuth: Short Term program available for Fall and Spring quarters.

Georg-August University, Göttingen. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics.

Hungary. Eotvos Lorand 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 language program 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.

Istituto Italiano per la Cultura e la Scienza, Milan. One year of Italian required. 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 thought 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.


Netherlands. Year or Fall/Fall-Europe 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 Alcalá 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 in 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 at least two regular-year-long courses in the University of Madrid.

Autonomous University of Barcelona. 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 at least two regular-year-long courses in the University of Madrid.

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.

*Course not offered this academic year.
Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and business disciplines are available.

Russia. One semester-long (fall only) program available at the State 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 from. Some courses will be available in English. Graduate and advanced opportunity 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 Israeli and Middle Eastern studies. UC students will take local program for foreign students, taught in English at the Hebrew University's Rothberg School for Overseas Students. The program offers courses in Judaica, 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, Beer Sheva. 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 take 15 units of Mandarin or Cantonese in their annual program.

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 music.

Jawaharlal Nehru University, New Delhi. EAP students majoring in economics, development studies, environmental studies, political science, and social sciences will find extensive coursework 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 an intensive program of continuous 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, and ethno-musical culture.

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 course program is also available. The programs are administered by a director located in Tokyo.

Doshisha University, Kyoto. Humanities and social sciences; emphasis on Japanese language and culture. Thirty-five- to 50-week Japanese language study is available.

Global Security Studies Program, Meiji Gakuin University, Yوكوهاما. This spring quarter program provides students the opportunity to study world peace and security issues. Previous Japanese language study is preferred, but not required.

Inter-University Center for Japanese Language Studies (IUC), Kyoto. This program offers an intensive program of training for graduates 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 cultural immersion. 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 and 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 culture, history, political science, economics and business are available. Many are taught in English. The prerequisite is one year of university-level Japanese.

Tokohku University, Sendai. This program is primarily for undergraduate students in the 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.

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 in 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 6-10 students will participate each year. The academic year consists of two terms, with the second term in a wide range of fields.

Beijing University of Science and Technology. Students receive a half-year of academic credit and financial support for studying 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 and culture 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 an 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, and Southeast Asian Studies.

Taiwan. Republic of China. Fall semester or 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 and lead 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 Chiang Mai 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 Chiang Mai University for the second semester and continue taking courses in Thai language and area studies classes taught in English. Students with sufficient 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. All language requirements precede the beginning of regular coursework.

Pontifical Catholic University of Rio de Janeiro (PUC-Rio). A semester or year academic program which consists of Portuguese study and regular university coursework 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.

*Courses not offered this academic year.
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 America and a year-long field research project are available, including upper division and graduate level courses. The academic year includes courses from the Schools of Medicine, Veterinary Medicine, and the College of Agriculture and Environmental Sciences. Graduate Study: The department offers graduate programs in Endocrinology and related research areas. Students must complete a minimum of one year of university-level Spanish, and have a background in basic science, including chemistry and biology. Graduate Admissions: Contact the Program Office.

Courses in Endocrinology (EDO)

Graduate Courses

201. Methods in Endocrine Research (4) I, II, III. The Staff. Laboratory—9 hours; discussion—1 hour. Prerequisite: consent of instructor. Ten-week assignment in endocrine research laboratory. Individual research project with emphasis on experimental design and methodology. Analysis of results. Exposure to experience with a range of endocrine research laboratory activities. May be repeated for credit. (SU grading only.)

218. Mammalian Endocrinology and Homeostasis (4) I. Walsh, Turgeon. Lecture—4 hours; Prerequisite: Biological Sciences 102 and 103, Neurobiology, Physiological and Behavior 110, and completion of the biochemical, physiological, and regulatory properties of the mammalian endocrine system, both at the cellular and systemic level. Signal transduction mechanisms and hormonal actions. Principles that regulate homeostasis, especially in the organ-organ interrelationships, metabolism, and minerals, fluids and electrolytes. Reproductive endocrinology.

220. Endocrinology Literature Critique (1) I. 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. (SU grading only.)


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 cellular biology of endocrine systems with emphasis on processes of hormone and receptor synthesis, secondary messenger phenomena, and hormonal control of gene expression.

280. 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.

296. Group Study (1-6) 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) Prerequisite: consent of instructor. (SU grading only.)

Endocrinology and Metabolism

See Internal Medicine in Medicine, School of.

Engineering

See College of Engineering.

S. M. Ghazi, Ph.D., Chair—Graduate Studies

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)

Undergraduate Study

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. The Biological Systems, Chemical, Civil, Electrical, Mechanical Engineering, Aeronautical Science and Engineering, and Computer Science and Engineering curricula are six programs which have been accredited by the Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). The nationally recognized accrediting body for engineering curricula.

The four-year undergraduate program is divided into two parts: the Lower Division Program and the Upper Division Program.

Graduate Study

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).

Lower Division Programs

If you enter the College of Engineering with fewer than 84 quarter units of credit, follow the lower division program specified for your major. If you enter the College with 84 or more quarter units of credit, you must fulfill the requirements outlined in the Bachelor's Degree Requirements section of this catalog, under "College of Engineering, Unit Requirements."
### Biological and Agricultural Engineering Lower Division Program: Biological Systems Engineering

**Requirements for majors in Biological Systems Engineering only**

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Usually Taken</th>
<th>Units Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculus—Mathematics 21A-21B-21C-21D</td>
<td>1-2-3-4</td>
<td></td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General physics—Physics 9A-9B-9C</td>
<td>3-4-5</td>
<td></td>
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<tr>
<td>General chemistry—Chemistry 2A-2B</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>1-2-3</td>
<td></td>
</tr>
<tr>
<td>Biological Systems Engineering 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Applications of computers—Engineering 5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Circuits—Engineering 17</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Statics—Engineering 17</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Dynamics—Engineering 35</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Properties of biological materials—Biological Systems Engineering 75</td>
<td>3</td>
<td>2-3-4</td>
</tr>
<tr>
<td>Expository writing—English 1 or 3, or Comparative Literature 1, 2, or 3</td>
<td>5</td>
<td>3-4-5</td>
</tr>
</tbody>
</table>

#### Total Lower Division Units: 31-36

† Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

#### Chemical Engineering Lower Division Program

**Requirements for majors in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering and Chemical Engineering/Biochemical Engineering, only.**

<table>
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<td>Differential equations—Mathematics 22B</td>
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<td></td>
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<tr>
<td>General physics—Physics 9A-9B-9C</td>
<td>3-4-5</td>
<td></td>
</tr>
<tr>
<td>General Chemistry—Chemistry 2A, 2B, 2C (Chemistry 2AH, 2BH, 2CH strongly recommended)</td>
<td>1-2-3</td>
<td>4-5</td>
</tr>
<tr>
<td>Organic Chemistry—Chemistry 12BH</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry laboratory—Chemistry 12BH</td>
<td>4</td>
<td></td>
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<tr>
<td>Biocatalysis 1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Other Science and Chemical Engineering (required only for Chemical/Biochemical majors)</td>
<td>6</td>
<td>2-3-4</td>
</tr>
<tr>
<td>Engineering—Applications of computers—Engineering 5</td>
<td>2 or 5</td>
<td>3-5</td>
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<tr>
<td>Circuits—Engineering 17</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Statics—Engineering 35</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Properties of materials—Engineering 45 (required only for Materials Science and Chemical Engineering/Materials Science and Engineering majors)</td>
<td>0 or 4</td>
<td>4</td>
</tr>
<tr>
<td>Expository writing—English 1 or 3, or Comparative Literature 1, 2, or 4</td>
<td>2 or 3</td>
<td>5-6</td>
</tr>
<tr>
<td>Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3</td>
<td>2 or 3</td>
<td>6-7</td>
</tr>
<tr>
<td>Humanities—Social Sciences electives and/or General Education electives</td>
<td>6</td>
<td>1-2-3</td>
</tr>
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#### Total Lower Division Units: 31-36

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### Civil Engineering Lower Division Program

**Requirements for Civil Engineering and the double major, Civil Engineering/Materials Science and Engineering, only.**

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<td>General Chemistry—Chemistry 2A, 2B, 2C (Chemistry 2AH, 2BH, 2CH strongly recommended)</td>
<td>1-2-3</td>
<td>4-5</td>
</tr>
<tr>
<td>Organic Chemistry—Chemistry 12BH</td>
<td>6</td>
<td></td>
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<tr>
<td>Organic Chemistry laboratory—Chemistry 12BH</td>
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<td></td>
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<td>Biocatalysis 1</td>
<td>6</td>
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<td>Other Science and Chemical Engineering (required only for Chemical/Biochemical majors)</td>
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<tr>
<td>Engineering—Applications of computers—Engineering 5</td>
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<tr>
<td>Statics—Engineering 35</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Properties of materials—Engineering 45 (required only for Materials Science and Chemical Engineering/Materials Science and Engineering majors)</td>
<td>0 or 4</td>
<td>4</td>
</tr>
<tr>
<td>Expository writing—English 1 or 3, or Comparative Literature 1, 2, or 4</td>
<td>2 or 3</td>
<td>5-6</td>
</tr>
<tr>
<td>Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3</td>
<td>2 or 3</td>
<td>6-7</td>
</tr>
<tr>
<td>Humanities—Social Sciences electives and/or General Education electives</td>
<td>6</td>
<td>1-2-3</td>
</tr>
</tbody>
</table>

#### Total Lower Division Units: 31-36

† Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

### Biological and Agricultural Engineering Lower Division Program: Food Engineering

**Requirements for major in Food Engineering.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Usually Taken</th>
<th>Units Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculus—Mathematics 21A-21B-21C-21D</td>
<td>1-2-3-4</td>
<td></td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General physics—Physics 9A-9B-9C</td>
<td>3-4-5</td>
<td></td>
</tr>
<tr>
<td>General chemistry—Chemistry 2A-2B</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Organic chemistry—Chemistry 8A-8B</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences 1A</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Biological Systems Engineering 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Applications of computers—Engineering 5</td>
<td>3-4-5</td>
<td></td>
</tr>
<tr>
<td>Circuits—Engineering 17</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Statics—Engineering 35</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Properties of biological materials—Biological Systems Engineering 75</td>
<td>4</td>
<td>3-4-5</td>
</tr>
<tr>
<td>Expository writing—English 1 or 3, or Comparative Literature 1, 2, or 4</td>
<td>4</td>
<td>3-5</td>
</tr>
<tr>
<td>Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3</td>
<td>4</td>
<td>3-4-5</td>
</tr>
</tbody>
</table>

#### Total Lower Division Units: 31-36

† Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

### Materials Science Lower Division Program

**Requirements for majors in Materials Science and Engineering only.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Usually Taken</th>
<th>Units Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus—Mathematics 21A-21B-21C-21D</td>
<td>1-2-3-4</td>
<td></td>
</tr>
<tr>
<td>Linear Algebra—Mathematics 22A</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differential Equations—Mathematics 22B</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physics—Physics 9A-9B-9C</td>
<td>3-4-5</td>
<td></td>
</tr>
<tr>
<td>General Chemistry—Chemistry 2A, 2B, 2C</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Introduction to Civil and Environmental Engineering Systems—Chemical/Biochemical Engineering</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Total Lower Division Units: 31-36

† Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.
Computer Science and Engineering Lower Division Program

Requirements for Computer Science and Engineering majors only.

QUARTER
USUALLY TAKEN

UNIT

Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

Electrical and Computer Engineering Lower Division Program

Requirements for Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science and Engineering majors only.

QUARTER
USUALLY TAKEN

UNIT

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...1 or 2

Introduction to 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

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...1 or 2
Public Speaking or Group Communication—Rhetoric and Communication 1 or 3...4 4, 5, or 6

Aeronautical Science and Engineering Lower Division Program

Requirements for Aeronautical Science and Engineering, Mechanical Engineering, and Mechanical Engineering/Materials Science majors only.

QUARTER
USUALLY TAKEN

UNIT

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...2 10-2 or 4-5

Engineering graphics in design—Engineering 4...3 1 or 2
Applications of computers—Engineering 5...3 2 or 3

Aeronautical science fundamentals—Aeronautical Science and Engineering 25 (Required for Aeronautical Science and Engineering majors)...3 2

Statistics—Engineering 36...3 4 or 5

Dynamics—Engineering 39...3 5 or 6

Properties of materials—Engineering 45...4 4 or 6

Manufacturing processes—Mechanical Engineering 50 (Required for Mechanical Engineering and Mechanical Engineering/Materials Science and Engineering majors)...3 1 or 2 or 3

Introductory writing—English 1 or 3, or Comparative Literature 1, 2, 3, or 4...1 or 2

Aeronautical Science and Engineering 126, 127...6

Fluid mechanics—Aeronautical Science and Engineering 103A, 103B...7

Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 128, 129, 130...12

Aircraft preliminary design—Aeronautical Science and Engineering 130...4

Aerospa structures—Aeronautical Science and Engineering 133, 135...7

Measurement systems—Engineering 176...3

Aerospace dynamics—Mechanical Engineering 171...4

Applied mathematics—Select one course from Engineering 180; Applied Science 115 or Mathematics 128C...3

Technical electives...12

Strongly recommended: Aeronautical Science and Engineering 131, 137, 139; Mechanical Engineering 172.
Biological and Agricultural Engineering: Biological Systems Engineering

Biological Systems Engineering is the branch of engineering that builds strongly on biology as a scientific basis 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, bioremediation, biotechnology, food processing, aquaculture, agriculture, and forestry 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. Specific courses for the first two years are given in the section on Lower-Division Programs.

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. These upper-division requirements are listed under the Biological Systems Curriculum. 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
- Pre-medical/Biomedical Engineering

You may also develop your own specialization in consultation with your advisor.

Areas of Specialization

Agro-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, nutrition, and waste. Suggested courses in the specialization provide students with the fundamental principles of agricultural production and a broad background in engineering. Agricultural engineers design, employ, and consult with professionals and managers with large and small agricultural producers, equipment manufacturers, food processors, consulting engineering firms, and government agencies.

- Biological science electives:
  - Biological Systems Engineering 114, 132, 145
  - Civil and Environmental Engineering 141, 141L

Aquacultural Engineering. Aquacultural engineers design, build, and manage equipment and systems for the production of aquatic animals and plants. 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.

- Biological science electives:
  - Applied Biological Systems Technology 161
  - Animal Science 116
  - Wildlife, Fish, and Conservation Biology 121

Biotechnical Engineering. This specialization is for students interested in 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 US and will increasingly require trained 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 pest and diseases; microbial production of biological products; tissue culture; and bioremediation.

- Biological science electives:
  - Biological Sciences 101, 102, 103
  - Microbiology 102
  - Molecular and Cellular Biology 120L
  - Engineering electives:
  - Biological Systems Engineering 132, 175
  - Chemical Engineering 161B, 161L
  - Engineering 190

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 wildlife resource management.

- Biological Sciences Electives:
  - Environmental Studies 100
  - Range and Wildlands Management 100
  - Soil Science 111

- Engineering electives:
  - Applied Biological Systems Technology 180
  - Biological Systems Engineering 115
  - Civil and Environmental Engineering 152, 148A, or 148
  - Hydrologic Sciences 100

*Course not offered the academic year.
Biological and Agricultural Engineering: Food 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 is a leading state in food production. Food engineers help develop new food products and processes, 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 agencies may also collaborate 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, processing, packaging, and distribution of food and related products. In addition to engineering principles, the food engineering degree is intended to provide 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 is designed to provide a strong foundation in mathematical, physical, biological, and food sciences. Courses are drawn from the biological and chemical sciences, and from biological systems, chemical, and mechanical engineering. These courses introduce students to methods which account for material and energy use, 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

Minimum units required for major: 181-182.

**Subject Areas and Courses**

- Applied Statistics in Agricultural Science—Agricultural Systems and Environment 120
- Environmental Management of Biological Systems—Biological Systems Engineering 125
- Biostatistics 101
- Bioinformatics and Control—Biological Systems Engineering 165
- Chemical Engineering Fluid Mechanics—Chemical Engineering 150
- Process Dynamics and Control—Chemical Engineering 157
- Chemical Engineering Analysis—Chemical Engineering 159
- Dynamics—Engineering 36
- Electrical Circuits and Systems—Engineering 100
- Mechanics of Rigid Bodies 101
- Thermodynamics—Engineering 105A, 105B
- Engineering Economics—Engineering 106
- Fundamentals of Heat Transfer—Mechanical Engineering 150
- Structure and Function of Biomolecules—Biological Systems Engineering 120
- Dynamic Modeling of Processes in Biological Systems—Biological Systems Engineering 130
- Unit Operations in Food Engineering—Biological Systems Engineering 132
- Engineering Design and Professional Responsibilities—Biological Systems Engineering 170A
- Engineering Projects—Design—Biological Systems Engineering 170C

**Total Units for Upper Division Program:** 89-92

*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 understanding of both chemical and physical principles, coupled with proficiency in concept development, design, and operating new processes.

The Chemical Engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences. It can lead to competence in treating not only current technical problems but also those that will arise in the technology of the future. 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, 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 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 designed specifically 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 1100, 111, 115, 121, 129, 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.
problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a strong functional 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

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:

- 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 130A, 130B, 130L
  - Microbiology and Cellular Biology 120L, 123, 130L, 161, 170L
  - Neurobiology, Physiology and Behavior 100B, 100L
  - Plant Science 140L
  - 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 main 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
- Mathematics 128B-C, 168
- Civil and Environmental Engineering 153
- Automatic Control
  - Electrical and Computer Engineering 150, 151, 157B
  - 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:

- Computer Science Engineering 140
- Chemical Engineering 163

Energy Conversion and Fuels Processing. This area of specialization is designed to introduce you to energy sources, energy conversion methods, and the manufacture of fuel.

Suggested technical electives:

- Biological Systems Engineering 120
- Chemical Engineering 111, 112
- 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 science, prepares you to seek employment with industry or government. For this specialization, six courses should be selected 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 242A, 242B, 242BL, 244
      - Environmental Studies 110, 112A, 112B, 131
  - Water Environment
    - Strongly recommended
      - Chemical Engineering 161A, 161B, 161L
      - Civil and Environmental Engineering 140L, 140L, 140A, 140B
    - Microbiology 102
    - Recommended
      - Biological Sciences 102, 103
      - Civil and Environmental Engineering 147, 240, 240A, 240B, 244, 245, 246, 249A
      - Environmental Studies 110, 150A, 151
      - Environmental Toxicology 112A, 112B
      - Soil Science 102, 107
      - Water Science 41, 104
  - 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.
    - Suggested technical electives:
      - Strongly recommended
        - Microbiology 102
      - Biological Sciences 102, 103
      - Chemical Engineering 161A, 161B, 161L
      - Chemical Systems Engineering 132
    - Food Science and Technology 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 Economics 113, 130, 136
- Psychology 183
- 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, 126C, 126B, 129C
- Fiber and Polymer Science 100, 150

This course not offered this academic year.

Prebiomedical Engineering. This area of specialization is designed to prepare you for graduate work in biomedical engineering. Early planning for a complete course schedule in consultation with a Chemical Engineering advisor is important to schedule necessary Biomedical Sciences courses into your program.

Suggested technical electives:

- For six to seven courses:
  - Anatomy 100, Biological Sciences 1A, 1B, 1C, 10, 102, 103, 104, Molecular and Cellular Biology 140L, 141, 142, Neurobiology, Physiology and Behavior 107, 116A, 116B, 112, 113, 114

Preclinical. Inclusion of both organic and physical chemistry in the curriculum allows you to complete the preclinical requirements while satisfying the requirements of the Chemical Engineering major. If you elect the preclinical (including prechemistry major) 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, it is important to prepare a course schedule with a Chemical Engineering advisor early in your freshman year.

Suggested technical electives:

- Anatomy 100
- Chemistry 129C, 129B, 129C
- Six biology or biochemistry courses, such as Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, Microbiology 102, Molecular Cellular and Developmental Biology 140L, 141, 142, 150, Neurobiology, Physiology and Behavior 110, 112, 113, 114

Chemical Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 187-188.

UNITs

Subject Areas and Courses

Chemistry—Chemistry 110A, 110B ........................................ 8
Quantum mechanics—Physics 8D or Chemistry 110B ........................................ 4 or 3
Advanced chemistry electives ........................................ 6

To be selected from upper division courses in Chemistry, Biochemistry, and Biophysics, 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, Biological Sciences 101A-101B, Fiber and Polymer Science 150.

Technical electives ........................................ 12

Humanities—Social Sciences/General Education electives ........................................ 8

Total Units for Upper Division Program—96-97

Chemical Engineering/Materials Science and Engineering

Minimum units required for major: 195-196.

UNITs

Subject Areas and Courses

Chemistry—Chemistry 110A, 110B ........................................ 8
Quantum mechanics—Physics 8D or Chemistry 110B ........................................ 4 or 3

Materials science—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
Chemical Engineering/Biochemical Engineering

Minimum units required for major: 187.

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical engineering—Chemical Engineering 150A, 150B, 151A, 152B, 153, 154A, 155A, 159A, 157, 157L, 156B, 156C, 156D</td>
<td>...</td>
</tr>
<tr>
<td>Biochemical engineering—Biological Sciences 100, 101, 102, Chemical Engineering 161A, 161B, 161L</td>
<td>...</td>
</tr>
<tr>
<td>Chemistry—Chemistry 110A, 110C</td>
<td>8</td>
</tr>
<tr>
<td>Biochemical Engineering electives</td>
<td>10</td>
</tr>
<tr>
<td>Choose at least six units of lecture from:</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences 1B, 101, 103, 104, 155A</td>
<td></td>
</tr>
<tr>
<td>Biological Systems Engineering 175</td>
<td></td>
</tr>
<tr>
<td>Molecular and Cellular Biology 123</td>
<td></td>
</tr>
<tr>
<td>Microbiology 130A, Neurobiology, Physiology and Behavior 100B, 117B, 146, 186, Chemical Engineering 170</td>
<td></td>
</tr>
<tr>
<td>Choose at least 4 units of laboratory from:</td>
<td></td>
</tr>
<tr>
<td>Molecular and Cellular Biology 129</td>
<td></td>
</tr>
<tr>
<td>160L, Microbiology 102L, Neurobiology, Physiology and Behavior 100L</td>
<td></td>
</tr>
<tr>
<td>Humanities—Social Sciences electives and/or General Education electives</td>
<td>8</td>
</tr>
</tbody>
</table>

Total Units for Upper Division Program...81

Materials Science and 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 commonplace metals, ceramics, and polymers. 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, elasticity 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 composites to fatigue behavior in aircraft structures, from corrosion behavior in process industries to radiation-induced damage in nuclear power plants, and from fabrication of steels in design of semiconductors. Materials engineers are also increasingly involved in developing new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes, and will play a central role in the development of the new technologies based on composites and superconducting materials.

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. 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 your 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. These 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 course 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 103, 133, 135, 137, 139

**Automatic Control and Systems Analysis:**
- Mechanical Engineering 177, 172, 185, 187, 188
- Electrical and Computer Engineering 157A, 157B, 174

**Biomedical Engineering:**
- Chemical Engineering 101B, 107B
- Biological Sciences 1A, 1B
- Physiology 111A, 111B, 112, 113
- Exercise Science 101, 102

**Chemical Correlation:**
- Chemistry 110A, 110B, 110C or 107A, 107B
- Chemical Engineering 151, 152A, 152B

**Computers:**
- Applied Science Engineering 115
- Computer Science 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
- Materials Science and Engineering 146
- Physics 121A, 140A, 140B

**Environmental Engineering:**
- Engineering 160 (only one unit of credit towards Technical Elective requirement)
- Atmospheric Science 120
- Biochemistry and Biophysics 101A, 101B
- Water Science 41
- Chemistry 4A, 8B
- Civil and Environmental Engineering 149

**Heat Transfer:**
- Engineering 105B
- Mechanical Engineering 165
- Chemical Engineering 150A, 153

**Materials and Design Processing:**
- Aeronautical Science and Engineering 137
- Engineering 104B, 106
- Materials Science and Engineering 146, 148, 149, 155
- Mechanical Engineering 150A, 150B, 150L, 151, 152, 155
- Civil and Environmental Engineering 139

**Physics of Solids:**
- Physics 115A, 115B, 140A, 140B
- Electrical and Computer Engineering 145A, 145B, 149

Materials Science and Engineering

Minimum units required for major: 183.

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits—Engineering 100</td>
<td>3</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 103A, 104</td>
<td>7</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.

Applied thermodynamics—Engineering 105A
Materials Science and Engineering 130
Engineering design electives—Select from:
Aeronautical Science and Engineering 137, 138A
Civil and Environmental Engineering 132, 135, 150A, 150B...

Materials science fundamentals—Materials Science and Engineering 132, 134, 138...

Materials science applications—Select from:
Materials Science and Engineering 142, 144, 146, 147 or (if not taken for the Materials in Design requirement) 140, 146, 155...

Applied mathematics—Select one course from:
Engineering 180, 182; Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114...

Basic science—Select from:
Chemistry 110A, 110C or Physics 140A, 140B, or Chemistry 128A, 128B, or Physics 121, 122A, or Geology 117A, 117B, or Physiology 110, 110L...

Technical electives—Select from:
Civil and Environmental Engineering electives and/or General Education electives...

Total Units for Upper Division Program...

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 to 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.

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 Resource 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, and 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 resource 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 and design 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 complete the suggested technical electives with coursework in the humanities and social sciences.

Suggested technical electives:
- Agricultural Economics 147, 148, 176
- Civil and Environmental Engineering 137, 146, 152, 153, 160, 161, 165
- Economics 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
Environmental Engineering

Environmental Engineering (Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.).

Minimum units required for major: 180

Subject Areas and Courses

Fluid Mechanics—Engineering 103A, 104A, 104L...........3
Structural mechanics—Engineering 104, 104L.............5
Applied thermodynamics—Engineering 105A or Chemistry 110A..........................3
Soil mechanics—Civil and Environmental Engineering 171, 171L.................6
Hydraulics and water resources—Civil and Environmental Engineering 114, 141L.............4
Environmental—Civil and Environmental Engineering 148A.......................3

Civil Engineering (Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.).

Minimum units required for major: 180

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..........................3
Soil mechanics—Civil and Environmental Engineering 130.........................................4
Hydraulics and water resources—Civil and Environmental Engineering 141, 141L.............4

Civil Engineering (Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.).

Minimum units required for major: 180

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..........................3
Soil mechanics—Civil and Environmental Engineering 130.........................................4
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 136, 145, 145B, 145B, 146, 146, 146B, 150, 152, 162, or 173; and two additional courses chosen from Civil and Environmental Engineering 132, 136, 139, 145, 147, 148B, 150, 152, 162, or 173..............................13

Economics—Engineering 106..................3


Material science—Materials Science and Engineering 132, 134, 136, 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 129L, 134L, 138L.............9

Civil Engineering 10 is a prerequisite to Civil Engineering 171.

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 is designed to provide students with a solid background in mathematics, physics, chemistry, and electronic circuits and systems, all supporting the computer hardware and computer software components of the field. The major requires knowledge of the basic concepts of computer science, and programming in the development of policies, programs, and projects.

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 computer science, economics, and planning in the development of transportation facilities in the form of an integrated system. Students should also acquire an awareness of the social sciences and environmental sciences through coursework in these areas.

Suggested technical electives:

Civil and Environmental Engineering 137, 149, 152, 161, 162, 163, 171, 173, 174, 176

Engineering 160 (only one unit of credit towards Technical Electives requirement)

Environmental Studies 167, 168A, 168B, 171, 173, 178, 179

Data structures and algorithms—Computer Science Engineering 110.................3
Computer science theory—Computer Science Engineering 120† or 122A†..................3
Computer hardware—Computer Science Engineering 152, 154A, 154B, and Electrical and Computer Engineering 172..............................15
Computer software—Computer Science Engineering 140A, 150A or 151A†, and 160..............12
Computer electives—At least 16 units chosen from Computer Science Engineering 120†, 122A†, 122B, 140B, 142, 150A, 151A, 151B, 152, 153, 158, 163, 165A, 165B, 168, 170, 172, 175, 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........................................21
Humanities—Social Sciences/General Education electives........................................21
Total Upper Division Units..................................................................................................................91
† 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 110 and 111A will satisfy a portion of the computer software operating system requirement and a computer elective requirement.

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 Computer Science/Materials Science curriculum. Double majors may be defined in Electrical Engineering and Computer Engineering, and in Electrical Engineering and Computer Science and Engineering.

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 Office.

Computing Majors

There are three computing majors offered within the College of Engineering: (1) Electrical Engineering with a Computer Operation specialty, (2) Computer Engineering, and (3) Computer Science and Engineering. All three curricula require the approximate 90 upper division units to be divided into three areas: electronics, computer hardware, and computer software. The Electrical Engineering with a Computer option and Computer Engineering curricula divide these 93 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.

Because Electrical Engineering is one of the few engineering majors recognized in all fifty states for professional registration, some computer majors wish to pursue a double major in Electrical Engineering and Computer Engineering or in Electrical Engineering and Computer Science and Engineering. Students interested in this option should check with a staff advisor since course selections must be planned very carefully. However, it is possible to obtain a double major in Electrical Engineering and Computer Engineering with only 135 units (15 more than either degree alone) or in Electrical Engineering and Computer Science and Engineering with 217 units.

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 communications, medicine, education, social and environmental protection, space exploration, defense, and home entertainment.

The Electrical Engineering curriculum is designed to prepare students for careers in electrical engineering or for graduate study in electrical engineering, providing a broad background in mathematics, physical sciences, and traditional electrical engineering subjects of (1) electronic circuits and systems, (2) electronic devices and fabrication, (3) computer hardware, (4) computer software, (5) electromagnetics and optics, and (6) communications and control systems. Through the proper choice of 25 units of very flexible design and free electives, students will be able to focus on any of these six specialty areas or to distribute the 25 units of electives among these areas. Students who complete the Electrical 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, 130B, 140B, 142A, 142B, 145, 148, 149B


Signs 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:


Electromagnetics studies microwave circuits and fiber-optical communications.

Recommended elective courses:


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 memories, and programmable logic arrays.

Recommended elective courses:


Computer Systems and Software includes courses in computer architecture, computer design, computer interfacing and computer software.

Recommended elective courses:


Logic Design considers the design of computer circuits at various levels, including the use of CAD systems, VHDL, and the design and fabrication of transistor-level digital circuits.

Recommended elective courses:


Electrical Engineering

Electrical Engineering (Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required by major: 180 UNITS

Required Courses

Note: Students enrolled in the Electrical Engineering, Computer Engineering, or Electrical Engineering/Materials Science and Engineering majors, or in any double major that includes one or more of these majors, may not exercise the Passed/Not Passed grading option.

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 130A, 140A, 150A, 160A, 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:


May also include approved Electrical and Computer Engineering or Computer Science Engineering 192 or 199 courses.

Mathematical/Scientific electives—to be selected from the College of Engineering Physical and Biological Sciences Elective list plus Statistics 32 or any upper-division Mathematics or statistics course except: Mathematics 128A-BC, 160, 164, 168, or Statistics 102, 103, 104, 105, 106, 110, 141..................................................5

Humanities—Social Sciences/General Education electives..................................................12

Total Upper Division Units..............................................................90

*Course not offered this academic year.
**Engineering**

Background in mathematics, physical sciences, and the traditional computer engineering subjects: electronics, computer hardware, and computer software. Here electronics refers to the two Electrical Engineering specialty areas (1) electronic circuits and systems and (2) electronic devices and fabrication. 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 four of the six Electrical Engineering areas: (1) electronic circuits and systems, (2) electronic devices and fabrication, (3) computer hardware, and (4) computer software. In comparison to the Computer Science and Engineering curriculum, the Computer Engineering curriculum requires students to take the electronics background necessary to pursue electives in integrated circuit design and offers more flexibility than the Computer Science and Engineering curriculum in the selection of course electives that complete the Computer Engineering curriculum will receive a Bachelor of Science in Computer Engineering.

### AREAS OF SPECIALIZATION

**Physical Electronics** includes the areas of solid-state circuits and fabrication and the theory courses supporting those subjects.

**Recommended electives courses:**


**Signals and Systems** includes digital communications, robotics, classical controls and communications, magnetic and cellular digital communications systems, as well as signal and image processing and computer vision.

**Recommended elective courses:**


**Electromagnetics** studies microwave circuits and fiber-optical communications.

**Recommended elective courses:**


**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 memories, and program-controlled logic array.

**Recommended elective courses:**


**Computer Systems and Software** includes courses in computer architecture, computer design, computer interfacing and computer software.

**Recommended elective courses:**

- Electrical and Computer Engineering 106, 170, 172, 194A, 195A, 195B


**Logic Design** considers the design of computer circuits at various levels, including the use of CAD systems, VHDL, and the design and fabrication of transfer-level digital circuits.

**Recommended electives courses:**


**Computer Engineering**

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)

Minimum units required for major: 180.

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**Electrical Engineering/Materials Science and Engineering**

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, and magnetics have expanded 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 is designed to provide 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**

Minimum units required for major: 186.

**Required Courses**

- Note: Students enrolled in the Electrical Engineering, Computer Engineering, or Electrical Engineering/Materials Science and Engineering majors, or in any double major that includes one or more of these majors, may not exercise the Passed/Not Passed grading option.

**Electrical engineering core—Electrical and Computer Engineering 100, 110A, 110B, 130A, 130B, 140A, 140B, 150A, 180A**

**Computer hardware—Electrical and Computer Engineering 170T, 172**

**Computer software—Electrical and Computer Engineering 173 and Computer Science Engineering 150 or 151A**

**Data structures and algorithms—Computer Science Engineering 110, 122A**

**Mathematics/Physics/Engineering 100, plus one course from: Statistics 120, 131A, or Mathematics 131**

**Thermodynamics/Engineering—150A**

**Professional responsibilities—Engineering 180, 190 or Applied Science Engineering 137**

**Design electives**

- Select three courses from:
  - Electrical and Computer Engineering 106, 110B, 111AB (111AB must both be taken to count as one design elective), 114, 118, 132A, 132B, 132C, 135, 140B, 157A, 157B, 166, 170, 172, 173, 174, 180B, 194ABC (194ABC together may count as one design elective), 195ABC (195ABC together may count as one design elective)
  - May also include approved Electrical and Computer Engineering or Computer Science Engineering 192 or 199 courses.
  - Humanities—Social Sciences/General Education electives
  - Unrestricted electives**

**Total Upper Division Units**

**Electrical and Computer Engineering 154A and 154B may be substituted for the Electrical and Computer Engineering 170 requirement.**

**No design credit allowed when taken with 154A as substitute for Electrical and Computer Engineering 170.**

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**Mechanical 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, properties of materials, and economics.

The Mechanical Engineering curriculum is based on a common core of engineering courses taken in the first two years. 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, thermodynamics, mechanical design, or materials science. You can either prepare for a professional career 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 and production assurance, and life cycle consideration areas are areas of study and specialization in the area of mechanical design.

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
- Biological Systems Engineering 165
- Applied Science Engineering 145
- Engineering 111, 122, 160 (only one unit of credit towards Technical Electives requirement)
- Materials Science and Engineering 140, 142, 165
- Mechanical Engineering 140, 152, 151, 152, 161, 162, 172, 184A with 184B (both courses must be taken), 185, 187, 188

### Energy Systems
This is a specifically designed course for students who plan to work in the fields of power generation, propulsion for transportation, and energy conversion. In these fields, the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to combustion engines, gas turbines, heat exchangers, nuclear reactors, fuel processing systems, solar energy systems, and others.

Suggested technical electives:
- Aeronautical Science and Engineering 138A
- Engineering 170 (only one unit of credit towards Technical Electives requirement)
- Mechanical Engineering 162, 166

### 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 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 50, 151, 153, 154, 172
- Suggested advisers: H.H. Cheng, B. Ravani, K. Yamanaki

### Systems Dynamics and Control
Engineers are increasingly concerned with the performance of integrated systems, and a systems approach is necessary to optimize component parts without considering the overall system.

Suggested technical electives:
- Systems Dynamics and Control 139
- Mechanical Engineering 165, 172
- Electrical and Computer Engineering 160, 174
- Materials Science and Engineering 140, 155
- Mechanical Engineering 50, 151, 153, 154, 172
- Suggested advisers: H.H. Cheng, B. Ravani, K. Yamanaki

### Fluid Mechanics

- Fluid mechanics—Engineering 103A, 103B...
- Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken), 185, 186, 187, 188

### Controls and Systems Analysis

- Controls and systems analysis—Mechanical Engineering 171...

### Measurements and Laboratory
- Measurements and laboratory—Engineering 102L, 103L, Mechanical Engineering 176...
- Professional responsibilities—Engineering 100...
- Applied mathematics—Select one course from: Engineering 180 or 182, Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114
- Technical electives...

In order to satisfy the design requirement, select three courses (on a letter grade basis) from the following: Materials Science and Engineering 140, 148, Aeronautical Science and Engineering 126, 129, 130, 137, 139, Mechanical Engineering 150A, 150B, 184A with 184B (both courses must be taken), 185, 186, 187, 188 (If these courses are not used for the core design requirements above), and 134, 151, 152, 154, 161, 162, 163

### Total Units for Upper Division Program

### Mechanical Engineering/Materials Science and Engineering

- Minimum units required for major: 166

### Subject Areas and Courses

- Electronic circuits—Engineering 100...
- Applied mechanics—Engineering 102, 104...
- Applied thermodynamics—Engineering 103A, 103B...
- Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken), 185, 186, 187, 188
- Fluid mechanics—Engineering 103A, 103B...
- Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken), 185, 186, 187, 188
- Fluid mechanics—Engineering 103A, 103B...
- 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, 136L
- Measurements and laboratory—Engineering 102L, 103L, Mechanical Engineering 176...
- Applied mathematics—Select one course from: Engineering 180 or 182, Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114
- Professional responsibilities—Engineering 190...

*Course not offered this academic year.*
Courses in Engineering (ENG)

4. Engineering Graphics in Design (3) I, II. Schaaf, Yamazaki
Lecture—2 hours; laboratory—3 hours. Introduction to design engineering, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in solution of engineering problems.

5. Applications of Computers (3), II, III.
The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A. Digital computation and computational simulations 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). 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—4 hours; laboratory—3 hours. 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. Henderson
Lecture—3 hours; laboratory—3 hours. Prerequisite: lower division standing in engineering and consent of instructor. Introduction to the interaction with common hardware and physical devices with the overall goal of enriching the students' understanding of physical devices and systems (P/N grading only).

30. 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. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 36, 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: sophomore student in Engineering. Introductory course covering the properties of engineering materials and their relation to the internal structure of materials.

Upper Division Courses

100. Electronic Circuits and Systems (3) I, II, III. Soderstrand, Suran
Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 17. Introduction to analog and digital circuit and system theory through hands-on laboratory design projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit.

122. Intermediate Dynamics (3) I, II, III. The Staff (Chairperson in charge)
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.

122L. Solid Mechanics Laboratory (2) I, II, III.
The Staff
Lecture—1.5 hours; laboratory—1.5 hours. Prerequisite: course 102 (may be taken concurrently) and 104. Experimental laboratory to demonstrate fundamental principles of solid mechanics and their application to engineering problems. Introduction to instrumentation for dynamic motion measurement.

123A. Elementary Fluid Mechanics (3) I, II, III.
The Staff
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.

123B. Elementary Fluid Mechanics (3) I, II, III.
The Staff
Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow; boundary layer flow; potential flows; compressible flows.

150L. Thermodynamics Laboratory (1) I, II, III.
The Staff
Lecture—1 hour; discussion—1 hour, and laboratory—1/2 hours (alternate weeks with course 103L). Prerequisite: course 105B (may be taken concurrently). Demonstrations and experiments to illustrate the principles of state, the first and second laws of thermodynamics, and thermodynamic cycles. (P/N grading only).

150L. Thermodynamics Laboratory (1) I, II, III.
The Staff
Lecture—1 hour; discussion—1 hour, and laboratory—1/2 hours (alternate weeks with course 103L). Prerequisite: course 105B (may be taken concurrently). Demonstrations and experiments to illustrate the principles of state, the first and second laws of thermodynamics, and thermodynamic cycles. (P/N grading only).

156. Environmental Engineering Economics (3) I, II, III.
Hartung, Rafter
Lecture—3 hours. Prerequisite: upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decision models. Concepts of present and future worth, and of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.

111. Electric Power Equipment (3) I. Chancellor, Delwiche, Hartung
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)
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.

160. Environmental Physics and Society (3)
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.) General Education credit: Contemporary Societies or Nature and Environment. (Same course as Physics 160.)

185. Industrial Engineering (3) I, II.
Arehart
Lecture—3 hours. Prerequisite: course 103 (may be taken concurrently) and Mathematics 22B. 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.

186. Industrial Engineering in Applied Mechanics (3) I, II.
Brewer
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) I, II, III.
Stander
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) I, II, III.
Dorf
Lecture—3 hours. Prerequisite: course 160, Statistics 120. Manufacturing and process engineering, production planning and control, manufacturing systems, inventory and facilities, quality, robustness and flexible manufacturing systems.

291. Seminar in Teaching (1) I, II.
The Staff
Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (SU grading only.)
Engineering: Applied Science

(College of Engineering)
Neville C. Luhmann, Jr., Ph.D., Chairperson of the Department
Ann E. Creel, Ph.D., Vice Chairperson of the Department

Department Office, 228 Walker Hall (916-752-0360); Hertz Hall, Livermore (510-422-9787)

Faculty
Meera M. Blattner, Ph.D., Professor
Richard Christensen, Ph.D., Professor
Stephen P. Cramer, Ph.D., Professor
Roger A. Haas, Ph.D., Professor
David Q. Hwang, Ph.D., Professor
Neville C. Luhmann, Jr., Ph.D., Professor
Nelson Max, Ph.D., Professor
William McCurdy, Ph.D., Professor
Ann Orel, Ph.D., Associate Professor
Gary Rodrigue, Ph.D., Professor
Rao Vemuri, Ph.D., Professor
Frederick Woo, Ph.D., Professor
Yin Yeh, Ph.D., Professor

Emeriti Faculty
Berni J. Alder, Ph.D., Professor Emeritus
Stewart D. Bloom, Ph.D., Professor Emeritus
Paul P. Craig, Ph.D., Professor Emeritus
John S. De Groot, Ph.D., Professor Emeritus
William G. Hoover, Ph.D., Professor Emeritus
Jorn Killeen, Ph.D., Professor Emeritus
William A. Newcomb, Ph.D., Professor Emeritus
Richard F. Post, Ph.D., Professor Emeritus
Wilson K. Taylor, Ph.D., Professor Emeritus
Edward Teller, Ph.D., University Professor Emeritus

Courses in Engineering: Applied Science

Davis (EAD)

Lower Division Courses
90C. Research Group Conference for Lower Division Students (1-5) 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—5 hours. Prerequisite: Engineering 5, Mathematics 22B. An introduction to error analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and deterministic and stochastic simulation. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

116. Computer Solution of Physical Problems (3) I. 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. Jungeman (Physics), Craig
Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 12B, 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. (Same course as Physics 137.) (In the College of Engineering, students may receive only credit toward the TEC 21 course requirement.) General Education credit: Contemporary Societies or Nature and Environment.

147. Arms Race Technologies and Strategies (3) I. Craig
Lecture—2 hours; discussion—1 hour. Prerequisite: course 137/Physics 137. Technological and strategic issues in the nuclear arms race. Characteristics of nuclear weapons and weapons defense systems; responses and counterresponses. Advantages and disadvantages of alternative realizations of weapons systems.

165A. Quantum Optics I (3) II. Yeh

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) I. 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) II. Yeh
Laboratory—3 hours. Prerequisite: course 165B concurrently. Continuation of course 166A.

171. Scanning Probe Microscopy (4) II. Yeh
Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 10A, 10B or the equivalent. Scanning probe microscopy techniques, scanning tunneling microscopy, and atomic force microscopy will be studied, as will their applications to surfaces and structural biology. Operational STM and AFM will further student's experience in nanoscale science and technology.

180. Introduction to Plasma Physics and Controlled Fusion (3) I. De Groot
Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma physics, 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. Construction and operation of Langmuir probe, plasma sources, Landau damping of ion acoustic waves, ion acoustic shocks, ion-ion two-stream instability.

190C. Research Group Conference for Advanced Undergraduates (1-3) 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-III. Hoover
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical and thermal properties.

230A-230B-230C. Structure of Matter (3-3-3)
I-III. Yeh
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.

234A-234B-234C. Electromagnetic Theory (3-3-3)
I-III. DeGroot
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.

271. Optical Methods in Biophysics (3) I. Yeh
Lecture—3 hours. Prerequisite: Physics 110A-110B, 110C, Chemistry 110A, 110B, or the equivalent. Optical properties of light-matter interactions used in biophysical research. Techniques of absorption, ellipsometer, spectroscopy, fluorescence, phosphoresence, elastic and inelastic scattering, diffraction, and nonlinear optics are applied to the studies of proteins, nucleic acids, lipids, and super-molecular structures in biological systems. Offered in alternate years.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-III. De Groot
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.

289J. 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) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electronics; (J) Solid State. May be repeated up to a total of 5 units per semester.

300. Seminar (1-5) I, II, III. The Staff
Seminar—1-2 hours. (SU 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. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff
(SU grading only.)

299. Research (1-12) I, II, III. The Staff
(SU grading only.)

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 method-
210A. Numerical Methods in Applied Science (3) I. 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.

2110C. Mathematical 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.

212. Analysis of Algorithms (3) III. The Staff
   Lecture—3 hours. Prerequisite: course 211. Investigation of time and space requirements of commonly used programming tasks, such as searching, sorting, set manipulation, and graph algorithms. NP completeness and intractability also discussed.

213A. Computer Graphics (3) III. Max
   Lecture—3 hours. Prerequisite: course 213. 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 215A. Emphasis on algorithms to produce color-halftoned raster renderings of three-dimensional models.

215A. Mathematical Methods in Computer Science (3) II. The Staff
   Lecture—3 hours. Prerequisite: course 210A. Mathematical techniques common to advanced computer science and scientific computing. Examination of methods used in statistical analysis and probability theory with applications to queues and other models.

215B. Mathematical Methods in Computer Science (3) II.
   Lecture—3 hours. Prerequisite: course 215A. Emphasis on the mathematical methods utilized in the study of data structures and computer architecture.

218-S. Special Topics in Computer Science (1-3) III, I, II.
   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.

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 165A, 121A-121B. Discrete-time and continuous-time signal processing. Fourier transforms, Laplace transforms, sampling and reconstruction, linear time-invariant systems, signal space concepts, and probability and random processes. Offered in alternate years.

218B. Signal Processing (3) III.
   The Staff

220. Artificial Neural Networks (3) III. Vemuri

222. User Interfaces (3) III. 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.
   Blatter
   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 and output. Virtual reality systems are also studied. Offered in alternate years.

227. Chaos, Fractals and Nonlinear Phenomena (3) III.
   The Staff
   Lecture—3 hours. Prerequisites: courses 205A and 205B. A computational study 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. Statistical Mechanics (3-3-3) I-IIIII.
   Hooper
   Lecture—3 hours. Prerequisites: Mathematics 22B and Physics 110B. Microscopic and macroscopic descriptions of matter, thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

230A-230B. Quantum Mechanics (3-3-3) I-IIIII.
   The Staff
   Lecture—3 hours. Prerequisite: course 205A-205B-205C (may be taken concurrently). Classical properties of matter: introduction to quantum mechanics by the correspondence principle; quantum mechanics: 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) III-I-IIIII.
   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-IIIII.
   Newcomb

255. Classical Mechanics (3).
   Newcomb
   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) III.
   Christensen
   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. Magneto hydrodynamics (3) III. Newcomb Lecture Hall. Prerequisite: course 234B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation; theory of stability, gyroscopic effects, finite-resistivity effects.

262A-262B - 262C. Atomic and Molecular Interactions (3-3-3) III-III. Orel Lecture Hall. Prerequisite: course 230A-230B-230C or the equivalent. Atomic structure and spectrums, molecular structure and spectrums, classical and quantum mechanics, collision theory of electron and heavy particle scattering.


271. Nonlinear Optics Laboratory (3) III. Haas Lecture Hall. Prerequisite: course 235A-235B. Experiments exploring the principles and properties 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, and spectroscopy.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. Hwang Lecture Hall. 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.

289-J. Special Topics in Applied Science (1-5) I, II, III. The Staff Lecture Hall. Prerequisite: consent of instructor. Special topics in the following areas:

(A) Atomic and Molecular Physics
(B) Chemical Physics
(C) Computational Physics
(D) Computer Science
(E) Nuclear Science
(F) Nonlinear Optics
(G) Plasma Physics
(H) Quantum Electromagnetics
(J) Solid State. May be repeated up to a total of 5 units per segment.

290. Seminar (1-2) I, II, III. The Staff (Chair in charge) Seminar Hall. Prerequisite: consent of instructor. May be repeated for credit. (SU grading only).

290C. Graduate Research Group Conference (1) I, II, III. The Staff Discussion Hall. Prerequisite: consent of instructor. May be repeated for credit. (SU grading only).

298. Group Study (1-5) I, II, III. The Staff (SU grading only).

299. Research (1-12) I, II, III. The Staff (Chair in charge). May be repeated for credit. (SU grading only).

903. Lower Division Seminar (1-4) I, II, III. The Staff Seminar Hall. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

92. Internship in Biological Systems Engineering (1-3) I-II (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/N grading only).

99. Directed Group Study (1-5) I, II. The Staff (Hills in charge). Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/N grading only).

99. Special Study for Lower Division Students (1-5) I, II. The Staff (Hills in charge). Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/N grading only).

Upper Division Courses

114. Principles of Field Machinry Design (3) III. Steinke Lecture Hall. Prerequisite: course 36, 104A. Tracings and steering vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design.

115. Forest Engineering (3) III. Hartough Lecture Hall. Prerequisite: course 104A. Environmental Science Policy and Management 182, 185 (Berkeley campus). Applications of engineering principles to problems in forestry, including those in forest regeneration, harvesting, and silviculture.

116. Forest Engineering Field Problems (2) I. Miles Lecture Hall. Prerequisite: course 114 or 115. 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 Sources and Transmission (4) II. Chen Lecture Hall. Prerequisite: course 36, 103A, 105A. Design and performance characteristics of power units: internal combustion engines, electric motors, and hydraulic power systems. Selection and design of power transmission systems for agricultural and industrial applications.

125. Psychrometrics, Heat and Mass Transfer (3) III. Jenkins Lecture Hall. Prerequisite: course 38, 103A. Psychrometrics and heat and mass transfer with principal applications in the design of controlled climates and environments for biological systems. Psychrometric variables and control processes. Steady and transient heat and mass transfer, including heat conduction, convection, radiation, and material diffusion.


132. Unit Operations in Food Engineering (4) III. Singh Lecture Hall. Prerequisite: course 103A. 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 Management (3) II. Parlane Lecture Hall. Prerequisite: course 102A or Hydrologic Science 103A. Physical and mathematical tools of FORTRAN. Introduction to watershed hydrology modeling. Techniques in precipitation, evaporation, infiltration, subsurface and overland flow, non-point source
199. Special Study for Advanced Undergraduates (1-5). III. Thesis (Hills in charge) (P/N/P grading only.)

200. Research Methods in Biological Systems Engineering (2) II. Giles
Lecture—2 hours. Prerequisite: standing in graduate school and permission of the Instructor. This course requires at least 24 hours of laboratory work per week. (P/N/P grading only.)

201. Soil-Machine Relations in Tillage and Traction (3) I. Upadhyaya
Lecture—2 hours. Prerequisite: course 114. Basic principles of soil mechanics, tillage and traction devices, determination of soil properties, interactions of soil and farm machinery, and experimental and analytical methods for synthesizing characterizations of soils. Offered in alternate years.

202. Energy Systems (3) II. Jenkins
Lecture—3 hours. Prerequisite: course 105A. Theory and applications of energy systems. Focus on input-output analysis, energy balances, thermodynamic analysis, economics, and environmental considerations. Course includes the analysis of solar energy systems, wind energy, biomass conversion, and thermal systems. Offered in alternate years.

203. Solar Thermal Engineering (3) T. R. Rumlsey
Lecture—3 hours. Prerequisite: course in heat transfer. Introduction to solar thermal systems. Course includes the analysis of solar energy systems, wind energy, biomass conversion, and thermal systems. Offered in alternate years.

204. Pilot Plant Operations in Aquaculture Engineering (3) II. Piedrahita
Lecture—1 hour. Prerequisite: course 243A. Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Offered in alternate years.

205. Mass Transfer in Food and Biological Systems (3) J. Krotka
Lecture/discussion—3 hours. Prerequisite: course 122. Principles of mass transfer in 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. Former course Agricultural Engineering 286C. Offered in alternate years.

206. Analysis of Processing Operations: Drying and Evaporation (3) T. Rumlsey
Lecture—3 hours. Prerequisite: course 122. Analysis of fixed-bed continuous flow dryers, steady-state and dynamic models to predict moisture content of porous materials. Effects of drying conditions and design. Offered in alternate years.

207. Advanced Analysis of Unit Operations in Food and Biological Engineering (3) I. Singh
Lecture—3 hours. Analysis of food processing operations. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

208. Thermal Process Design (3) I. Rumlsey
Lecture—2 hours; discussion—1 hour. Prerequisite: course 150 recommended. heat transfer and biological systems. Offered in alternate years.

238. Magnetic Resonance Imaging in Biological Systems (3) M. McCarthy
Lecture—3 hours. Prerequisite: graduate standing. Theory and applications of magnetic resonance imaging in biological systems. Classical Bloch model of magnetic resonance. Applications to studies of living systems. Offered in alternate years.

240. Infiltration and Drainage (3) II. Grismer
Lecture—3 hours. Prerequisite: course 145. Theory and applications of in situ flow of soil and surface drainage. Water transport and entrapment during infiltration, and transient drainage with nonlinear, capacity, and evapotranspiration considered. Offered in alternate years.

241. Sprinkle and Trickly Irrigation Systems (3) I. Hills
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145. Computerized design of sprinkler and trickly irrigation systems. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

242. Hydraulics of Surface Irrigation (3) I. Wallander
Lecture—3 hours. Prerequisite: course 145. Introduction to surface irrigation systems and their applications. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

245. Management of Wastes from Biological Production Systems (3) I. Piedrahita
Lecture—3 hours. Prerequisite: course 122. Management of wastes from biological systems. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

250. Analog Instrumentation (4) II. Delwiche
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122. Instrumentation in biological systems. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

255. Design and Analysis of Engineering Experiments (4) I. Upadhyaya
Lecture—3 hours; laboratory—3 hours. Prerequisite: at least one undergraduate course in statistics. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

270. Modeling and Analysis of Biological and Physical Systems (3) I. Upadhyaya, T. Rumlsey
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 122. Mathematical modeling of biological systems. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

275. Physical Properties of Biological Materials (3) I. Cheong
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties of biological materials, such as mechanical, optical, and electrical properties. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.

289A-K. Selected Topics in Biological Systems Engineering (1-5) T. Rumlsey
Prerequisite: consent of instructor. Course topics include theoretical and experimental analysis of biological systems. Course requires at least 24 hours of laboratory work per week. Offered in alternate years.
Division of Materials Science and Engineering

Faculty
Jeffrey G. Gibeling, Ph.D., Associate Professor
Joanna R. Groza, Ph.D., Associate Professor
David G. Howitt, Ph.D., Professor
Armin M. Kuipers, D.Phil., Professor, Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement
Zuha A. Munir, Ph.D., Professor
Subhash B. Riebold, Ph.D., Professor
James F. Shackleford, Ph.D., Professor
Emeriti Faculty
Richard L. Bell, Ph.D., Professor Emeritus
Howard L. Needleman, 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 (EEM) are listed immediately following.)

Lower Division Courses
1. The scope of Chemical Engineering (I) 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 (I) I, II, III. The Staff
Seminar—1 hour. Examination of a special topic in a small 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 Mechanic (I) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 222A, 222B, 210D, Engineering 35. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. The stress vectors—stress tensor. Review of the principles 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 (II) 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 choked flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

150C. Rheology and Polymer Processing (4) III. Powell
Lecture—4 hours. Prerequisite: Course 150A, Fundamentals of rheology. Introduction to polymer processing unit operations.

150L. Polymer Engineering Laboratory (4) II, III. Powell
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. Whitaker 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, semibatch, and continuous processes involving mass transfer, chemical reactions, and chemical reaction.

152A. Chemical Engineering Thermodynamics (III) II. The Staff Lecture—3 hours. Prerequisite: course 151, Chemistry 110A. Application of principles of thermodynamics to chemical processes and separation processes. Open for credit to students who have completed Engineering 105A.

152B. Chemical Engineering Thermodynamics (IV) 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) II, III. The Staff
Lecture—4 hours. Prerequisite: course 150A. Steady and transient 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 radiative 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) III. The Staff
Lecture—3 hours. Prerequisite course 154A. Application of the principles of mass transfer and thermodynamics to absorption, extraction, distillation, and other separation processes.

155A. Chemical Engineering Laboratory (4) I, II, III. The Staff Laboratory—12 hours. Prerequisite: course 155A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

155B. Chemical Engineering Laboratory (4) IV, II, III. The Staff Laboratory—12 hours. Prerequisites: courses 154B, 155A. Continuation of 155A.

156A. Chemical Engineering Kinetics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisites: 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. Prerequisites: course 157. 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.
208 Engineering: Chemical Engineering and Materials Science

158B. Process Equipment Design (3) II. Palozolgi Lecture—3 hours. Prerequisites: course 158A. Design of chemical process equipment. Equipment cost estimation techniques.

158C. Chemical Plant Design (3) III. Palozolgi Lecture—3 hours. Prerequisites: course 158B. Conceptual design of chemical processes. Design, costing, and profitablity analysis of complete chemical plants. Use of computer-aided design techniques.

159. Chemical Engineering Analysis (3) I. The Staff Lecture—3 hours. Prerequisites: Mathematics 222. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and optimization techniques.

161A. Biochemical Engineering Fundamentals (3) II. The Staff Lecture—3 hours. Prerequisites: Chemistry 128A, Mathematics 228, Microbiology 102 or consent of instructor. Bioinformatics; 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. Bioprocesses (3) II. The Staff Lecture—3 hours. Prerequisites: course 164A. Product recovery and purification of biochemicals. Cell digestion, centrifugation, filtration, membrane separations, extraction, and chromatographic separation processes.

161L. Bioprocess Engineering Laboratory (4) III. The Staff Laboratory—9 hours; discussion—1 hour. Prerequisites: courses 161A, 161B. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors; exchange chromatography; membrane filtration.

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 the principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in solid-state systems; catalysis in microreactors; catalysis on surfaces.

170. Introduction to Colloid and Surface Phenomena (3) III. Stroupe Lecture—3 hours. Prerequisite: Chemistry 110A. Introduction to the behavior of surfaces and dispersive systems. The fundamentals will be applied to the solution of problems in colloid science. The course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines.

190C. Research Group Conference (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)

199. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

206. Biocolloid Engineering (3) III. Ryu Lecture—3 hours. Prerequisites: Microbiology 102 and 102L, Biological Sciences 101, 102, 103, Molecular and Cellular Biology 120L, 202A; Food Science and Technology 221B. Interactions of colloids in complex systems. Principles of colloid science. Computer-aided design and simulation of biological systems. Evaluation of results of computer simulations. (Recommended for: students in chemical engineering, biotechnology, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agglutination, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Offered in alternate years)

228. Enzyme Engineering (3) II. Ryu Lecture—3 hours. Prerequisites: course 156A and 156B. Kinetics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow, and boundary layer theory.


250F. Fluid Dynamics and Transport Phenomena (3) II. The Staff Laboratory—6 hours; lecture—3 hours. Prerequisites: courses 154A, 154B, and 259 (may be taken concurrently) or the equivalents. Kinematics and basic conservation principles for multiphase systems. Continuity equations, momentum and heat transfer equations. Applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.

254. Colloid and Surface Phenomena (4) III. Stroupe Lecture—4 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 the collective properties of dispersible colloidal systems. Some emphasis on the behavior of macromolecules in solution.

256. Chemical Kinetics and Reaction Engineering (4) III. The Staff Lecture—4 hours. Prerequisites: 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.


260. Separation Processes: Particulate Systems (3) I. The Staff Lecture—3 hours. Prerequisites: course 154A. Analysis of particle systems in pollution abatement and chemical process equipment. Microscopic and macroscopic descriptions of particulate systems in pollution abatement and chemical process equipment. Distribution functions, population balances, rarefied gas phenomena, concentration polarization in reverse osmosis and filtration. Offered in alternate years.

261. Separation Processes: Column Operations (3) II. The Staff Lecture—3 hours. Prerequisites: course 154B. Analysis and design of chemical separation processes: distillation, extraction, adsorption, chromatography. Finite difference equations, unified design methods, axial dispersion models, probability and random walk theories, methods of characteristics, moment analysis, optimization. Offered in alternate years.

262. Transport Phenomena in Multiphase Systems (3) III. Whittaker Lecture—3 hours. Prerequisites: course 253C. Heat, mass, and momentum transfer in multiphase, multiphase system 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. Prerequisites: courses 253A and 259 or consent of instructor. Mechanics of polymer solutions and suspension, especially thermal development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Offered in alternate years.

264. Introduction to Hydrodynamic Stability Theory (4) III. The Staff Lecture—4 hours. Prerequisite: course 253A. Mathematical study for the stability of fluid motions. Introduction to bifurcation theory and the spectral problem for linear stability. Offered in alternate years.

265. Emulsions, Microemulsions and Bilayers (3) III. 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 micellar 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. Prerequisites: course 157 or the equivalent. Advanced control design in alternative 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 and 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 seminar: 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 in Biological Systems; (L) Multivariate Analysis.

290. Seminar (1) I, II, III. The Staff Seminar—1 hour (SU 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 for graduate students in chemical engineering. May be repeated for credit. (SU grading only)

*Course not offered this academic year.
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. (SU 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 other as well as dynamic modeling of such processes. (SU 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 in research in progress. May be repeated for credit. (SU grading only)

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU 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 chemical engineering. Participation as a teaching assistant or associate 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. (SU grading only)

Courses in Materials Science and Engineering (EMS)

Upper Division Courses

130. Thermodynamics of Materials Processes (3) I. Ribilbud
Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. The principles of the thermodynamics of solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, deformation, thermoelectric power and thermionic energy conversion.

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. The evaluation and manipulation of structure will be described using x-ray diffraction techniques.

132L. Structure and Testing of Materials Laboratory (2) I. Shackelford, Howitt
Laboratory—4 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) I, II, III. Groza
Lecture—4 hours. Prerequisite: Engineering 45 and 105A or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Applications in diffusion, nucleation, solidification, evaporations, and sintering processes.

134L. Rate Processes in Materials Laboratory (2) II, III. Groza
Laboratory—6 hours. Prerequisite: course 134 (concurrent enrollment recommended). Laboratory exercises 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) I. 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.

138L. Mechanical Properties Laboratory (2) I. Mukherjee
Laboratory—6 hours. Prerequisite: course 138 (concurrent enrollment recommended). Experimental investigations of the mechanical behavior of engineering materials exercises emphasize the fundamental relationships between microstructure and mechanical properties.

140. Materials in Engineering Design (3) III.
Gebbie
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.

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.

144. Corrosion and Oxidation of Engineering Materials (3) I.
The Staff
Lecture—3 hours. Prerequisite: upper division standing in Engineering. Examination of the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature, explosion reaction and selection criteria for the prevention and control of corrosion.

146. Electronic and Optical Materials Processing (3) III. Ribilbud
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 materials. Processing methods will be described using x-ray diffraction techniques.

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. Howitt
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.

240. Transport Phenomena in Materials Processes (4) I, II. 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. Development of a microscopic material's description. 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 presented. Offered in alternate years.

242. Advanced Mechanical Properties of Materials (4) I. Mukherjee
Lecture—3 hours; discussion—1 hour. Prerequisite: course 138. Strength and structure of engineering materials. Theories of 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.

Lecture—3 hours. Prerequisite: graduate standing in Engineering Materials. Kinetic theories 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: Programming 45 and 105A, or consent of instructor. Thermodynamics and kinetic conditions of failure; corrosion and oxidation processes. Prerequisites: applied mathematics, and mechanics of materials. Offered in alternate years.

245. Advanced Topics in Structure of Materials (4) I. Mukherjee
Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 and graduate standing in Engineering Materials or consent of instructor. Courses 138 and 142 recommended. Theory of microstructure in materials of engineering materials will be explored. Cylindrical and non-cylindrical structures will be studied with emphasis on crystallographic comparison of engineering materials and the radial distribution function of amorphous materials. Offered in alternate years.

246. Current Topics in Electronic Materials Processing (3) III. Rubad
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 polyethylene, 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 interfaces and surfaces; thermodynamics of defects in crystals, their effect on transport processes; thermodynamics of free energy and application to solid-state electrolytes. Offered in alternate years.

248. Fracture of Engineering Materials (3) I. Groza
Lecture—3 hours. Prerequisite: course 138. Description of fracture of metallic materials. Crack propagation, toughness testing, statistical aspects of fracture and failure at elevated temperatures. Offered in alternate years.

249. Mechanisms of Fatigue (3) I. Groza
Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, fatigue growth, threshold effects and high temperature cyclic deformation. Offered in alternate years.

250A-R Special Topics in Polymer and Fiber Science (3) I. 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 term the course is offered. (Same course as Textiles and Clothing 250A-R.)

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. (SU grading only.)

294. Materials Science Seminar (1) I, II, III. Slackell, Mukherjee, Munir, Howitt, Gibling, Groza, Rubad
Seminar—1 hour. Prerequisite: graduate student in good standing. Review and discussion of recent literature and developments in materials science with presentations by individual students. (SU 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. (SU grading only.)

Professional Course

390. Teaching in Materials Science (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate in materials science and engineering. Participation as a teaching assistant and/or associate in designated engineering course. Methods of leading discussion groups, laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (SU grading only.)

Engineering: Civil and Environmental Engineering (College of Engineering)

Melvin P. Ramsey, Ph.D., Chairperson of the Department 916-752-0386
Daniel P. Y. Chang, Vice-Chairperson of the Department 916-752-2537
Office Department, 116 Everson Hall (916-752-0586)
Faculties
Kandiah Arulananadan, Ph.D., Professor
Takashi Asano, Ph.D., Adjunct Professor
John Bohlander, Ph.D., Assistant Professor
Paul L. Johnson, Ph.D., Professor
Y. K. (Bob) Choi, Ph.D., Assistant Professor
Daniel P. Y. Chang, Ph.D., Professor
Jenni L. Darby, Ph.D., Associate Professor
Johannes J. DeVries, Ph.D., Lecturer
Leonard R. Herrmann, Ph.D., Professor, Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement

I. Mr. Hirsch, Ph.D., Professor
Roy A. Irlins, D.E., Adjunct Professor
Paul R. Johnson, Ph.D., Professor
M. L. Aviles, Ph.D., Professor
Ian P. King, Ph.D., Professor
Bruce L. Kutter, Ph.D., Professor
Bruce E. Larock, Ph.D., Professor
Roy A. Litt, Ph.D., Professor
Michael A. Maniño, Ph.D., Associate Professor
Debbie Nimeier, Ph.D., Assistant Professor
Melvin P. Ramsey, Ph.D., Professor
Mark M. Rashid, Ph.D., Associate 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 Syllabus, Ph.D., Assistant Professor
Robert Smith, Ph.D., Lecturer
Daniel Sperring, Ph.D., Professor (Civil and Environmental Engineering; Environmental Studies)
Fred Stephenson, M.S., Lecturer

Emeriti Faculty
Don O. Bush, Ph.D., Professor Emeritus
Robert H. Burgis, M.S., Professor Emeritus
James A. Cheney, Ph.D., Professor Emeritus
James R. Hutchinson, Ph.D., Professor Emeritus
Ray B. Kline, Ph.D., Professor Emeritus
Gerald T. Olt, 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 Engineering (ECI)

Lower Division Courses

1. The Civil Engineer in Society (1-1). 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/N grading only.)

3. Introduction to Civil and Environmental Engineering (3) I. Ramsey
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 generally simplified, engineering problems.

10. Introduction to Surveying (3) III. Smith
Lecture—2 hours; laboratory—3 hours. Theory and practice of measurement of distance, elevation, angles and 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 and radioactive waste, energy management. Students will evaluate environmental issues in written essays and oral discussion. Intended for non-physical science majors. General/Education credit: Nature and Environment.

92. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge).
Internship. Prerequisite: lower division standing; approval of project prior to start of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/N grading only.)

88. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor and lower division standing. (P/N 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/N grading only.)

Upper Division Courses

114. Probabilistic Systems Analysis for Civil Engineering (3) I, II. Mokhtarian
Lecture—3 hours. Prerequisite: Mathematics 21C or 21; Probabilistic concepts and models in civil engineering. Statistical analysis of civil engineering experimental and field data. Introduction to stochastic processes models of civil engineering systems.

*Course not offered this academic year.*

131. Matrix Structural Analysis and Introduction to Finite Element (3) I. Romstad Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104. Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Introduction to finite element method for elasticity and bending problems. ( Former course 131B.)

132. Structural Design: Metallic Elements (3) I, II. Ramsey Lecture—3 hours. Prerequisite: Engineering 104 (may be taken concurrently). Prerequisite: Mathematics 22A. 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 130A.)

135. Structural Design: Concrete Elements (4) I, II. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104. Strength design procedures for columns, rectangular beams, T-beams and slabs of general cross sections, including code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete.

136. Building Design: Wood, Steel, and Concrete Applications (2) I, II. Ramsey Lecture—2 hours; laboratory—3 hours. Prerequisite: course 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 fundamentals 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 seismic behavior. Consideration of wind and blast loading.

139. Prestressed Concrete (3) II. Chai Lecture—3 hours. Prerequisite: course 135; Principles and methods, analysis and design of sections for bending, interactive computer analysis, ultimate strength of sections. Loss of prestress, shear design, applications to bridges, buildings, and tanks. Special materials properties needed for effective prestressing.

140. Environmental Analysis of Aqueous Systems (3) I. Darby Lecture—3 hours. Prerequisite: Chemistry 28 or the equivalent. Introduction to chemical principles underlying current practices in sampling and analysis of water and wastewater.

140L Environmental Analysis of Aqueous Systems Lab (1) I. Darby Laboratory—3 hours. Prerequisite: Chemistry 28 or the equivalent. Introduction to the "wet chemical" and "wet chemical" methods commonly used in the examination of water and wastewater and associated data analysis.

141. Engineering Hydraulics (3) I, II. Larock Lecture—2 hours; laboratory—1 hour. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid in pipes; open channel flow; turbulence; fluid forces on objects: boundary layers, lift and drag.

141L. Engineering Hydraulics Laboratory (1) I, II. 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, II. Kaavas Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently) or the equivalent. Open to Engineering students only. Study of the hydrologic cycle. Frequency analysis of events. Precipitation analysis for hydrologic design. Evapo-transpiration, interception, depression storage and infiltration. Streamflow analysis. Flood routing through channels and reservoirs.

142L. Engineering Hydrology Laboratory (1) II. DeVries Laboratory—3 hours. Prerequisite: course 142 (may be taken concurrently). Laboratory calculations and demonstrations of hydrologic processes, such as rainfall-runoff, storm characteristics and precipitation, evaporation and transpiration, infiltration, streamflow, and flood routing.

144. Groundwater Systems Design (3) I. Darby Lecture—3 hours; laboratory—3 hours. Prerequisite: course 141 and 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. Prerequisites: courses 141, 141L, and 142. Principles of project design. Methods of design of open channel systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power, and flood control projects. Emphasis is on application of principles of water and channel hydraulics in these systems.

146. Water Resources Simulation (3) II. Lund Lecture—3 hours. Prerequisites: courses 142 and 114; Applied Science Engineering 115 recommended. Simulation techniques in the design and operation of water resources projects; introduction to simulation theory, testing, and application to surface and groundwater problems and system analysis.

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 removal of treated wastes to the environment.


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). Carroll (Land, Air and Water Resources), Chang, Raabe Lecture—3 hours. Prerequisite: Mathematics 22B, 21D, Chemistry 28B; Atmospheric Science 121A or Engineering 103A. Examination of physical and technical aspects of air pollution problems. Emphasis on geophysical and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Atmospheric Science 148.)

150. Air Pollution Control System Design (3) II. Chang Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 105A and 106; course 149 recommended. Introduction to the design and evaluation of air pollution control devices and systems.

152. Introduction to Civil Engineering Planning (3). The Staff Lecture—3 hours. Prerequisite: course 114 or the equivalent, and Engineering 106 or Economics 1A. Basic planning concepts; role of engineering, economic, environmental, and social information, institutional, political and legal aspects. Case studies will illustrate planning in water regulation and distribution systems, waste treatment and disposal systems, land and water transportation systems.

153. Deterministic Optimization and Design (3) III. Lund Lecture—3 hours. Prerequisite: Mathematics 21C, 22A, and Engineering 5 or the equivalent. Introduction to operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Application to resource planning, transportation planning, systems engineering, and other civil engineering disciplines through computer-based design projects.

154. Probabilistic Design and Optimization (3) III. Lund Lecture—3 hours. Prerequisites: courses 114 and 153, and Engineering 106, or the equivalents. 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.

160. Introduction to Transportation Planning (4) I. Sperling Lecture—3 hours; discussion—1 hour. Prerequisite: any two of Geography 5, Economics 1A or course 152. Transportation and related environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science, and environmental studies. General Education credit: Contemporary Societies.

161. Transportation System Operations (3) II. Jovannis 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. Jovannis 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. General overview and an introduction to application of large scale group problem solving.

163. Energy and Environmental Aspects of Transportation (3) II. Sperling Lecture—3 hours. Prerequisite: course 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 Environmental Studies 163.)

171. Soil Mechanics (4) I, II. Kutler Lecture—4 hours. Prerequisite: course 10, Engineering 104 (may be taken concurrently), and course 171L concurrently. Restricted to Civil Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, undrained and drained relationships, compaction, seepage, capillarity, compressibility, consolidation, stress, states of stress and failure, lateral earth pressures, and slope stability.

171L. Soil Mechanics Laboratory (1) I, II. Kutler Lecture—3 hours. Prerequisites: 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.
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173. Foundation Design (4) I. Idriss
Lecture—4 hours. Prerequisite: courses 123B, 171, 171L. Soil mechanics. Foundation design of soil properties for foundations: bearing capacity of soils and footing design; lateral earth pressures and retaining wall design; pile foundations; excavations and earth slopes.  

174. Environmental Geotechnical Engineering (3) III.
Arulananadan
Lecture—3 hours. Prerequisite: course 148A and 171. Soil and site characterization in relation to natural and man-made hazards, waste containment, and waste site remediation techniques.  

176. Geotechnical Engineering (3) I. Kutter
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171, 171L. Principles of similarity and the theory of soil mechanics and foundation engineering utilizing centrifugal instrumentation, calibration, computer-aide data reduction and recording. Experiments demonstrating basic principles, including bearing capacity, dynamic impact, slope stability, and liquefaction in earthquakes.  

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 a selected topic from a separate section of (A) Environmental Engineering, (B) Hydraulics and Hydrologic Engineering, (C) Engineering Geology, (D) Geotechnical Engineering, (E) Analysis and Design of Bridges, (F) Pavement Engineering,
and Concrete Applications, (G) Transportation Engineering, (H) Urban Planning, (I) Water Resources Engineering,
and (J) Water Resources Planning. May be repeated for credit. (P/N grading only.)  

190C. Research Group Conference in Civil and Environmental Engineering (1, 2) I, II, III.
The Staff
Discussion—1 hour. Prerequisite: upper division standing in Civil and Environmental Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/N grading only.)  

192. Internship in Engineering (1-5) I, II, III.
The Staff
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/N grading only.)  

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N 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/N grading only.)  

Graduate Courses

201. Introduction to Theory of Elasticity (4) I.
The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 110B. Fundamental theorems of elasticity in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes; introduction to variational and approximate methods.  

202. Buckling of Columns and Plates (3) II.
The Staff
Lecture—3 hours. Prerequisite: courses 201 and 221. Analysis of the buckling behavior of structural members: buckling of columns, lateral buckling of beams, nonlinear bending and lateral torsional buckling of beam-columns, stability of structural frames, buckling strength and ultimate strength of plates.  

203. Inelastic Behavior of Solids (3) III.
Dafallas
Lecture—3 hours. Prerequisite: course 201. Fundamental theorems of plasticity, viscoelasticity and viscoplasticity, and their applications. Microscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Offered in alternate years.  

205. Continuum Mechanics (3) III.
Dafallas
Lecture—3 hours. Prerequisite: course 203. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear thermoelasticity and thermo- elastodynamics. Solution of three-dimensional problems. Selected topics. Offered in alternate years.  

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; partial rigid connections; nonlinear and stability analysis; introduction to structural optimization.  

212A. Finite Element Procedures in Applied Mechanics (3) III.
Rashid

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 non- linear structural mechanics problems in continuum mechanics, soil mechanics, and to 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. Prerequisites: 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 structural problems; nonlinear response spectrum analysis; frequency and time domain analysis.  

217. Theory of Plates and Introduction to Shells (3) I.
Herrmann
Lecture—3 hours. Prerequisite: course 217 (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 plates.  

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 bases follow the AISC'S, LRFD, and ASD specifications.  

240. Water Quality (3) III.
The Staff

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. Physiological and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Offered in alternate years.  

243A. Water and Waste Treatment (3) I.
Scheider
Lecture—3 hours. Prerequisite: course 144A. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design.  

243B. Water and Waste Treatment (3) II.
Scheider
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.  

245. Applied Environmental Chemistry (4) III.
Darby
Lecture—4 hours. Prerequisite: Engineering 105A, courses 140 and 140L or the equivalent, Chemistry 2A, 2B, or the equivalent, Chemistry 5 or 2C or 107A recommended. Chemistry of natural and polluted waters. Chemical kinetic and equilibrium principles, thermodynamics, carbonate systems, precipitation and dissolution, coordination chemistry, oxidation reduction, and interfacial phenomena.  

246. Plant and Animal Laboratory (3) I.
Darby
Lecture—1 hour; laboratory—2 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: course Engineering 105A and 103A, and courses 141, 149. Generation, characterization and behavior of small particles and droplets suspended in air, including deposition and scavenging of airborne particles in the earth's atmosphere. Offered in alternate years. (Former course 242B.)  

247L. Airborne Particles Laboratory (1).
The Staff
Laboratory—3 hours. Prerequisite: course 247 (may be taken concurrently). Laboratory exercises designed to familiarize the student with the methods generation and characterization of airborne particles. Offered in alternate years. (Former course 242B.)  

248A. Design of Natural Systems for Wastewater Treatment (3) III.
Smith
Lecture—3 hours. Prerequisites: 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. Prerequisites: 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 risk mitigation. Offered in alternate years.  

250. Urban Transportation and Land Use Policy and Planning (3) I.
Mokhtarian
Lecture—3 hours. Prerequisites: 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 utilizing empirical data to calibrate models and forecast travel demand.

252. Sustainable Transportation Technology and Policy (3) III. Spirling
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 Environmental Studies 252.)

253. Transportation Safety Analysis (3) III. Jovannis
Lecture—3 hours. Prerequisite: course 114, 254. Human and vehicle factors in accident occurrence. Evaluation of safety investment returns; 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. Jovannis
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.

257. Urban Traffic Management and Control II (3) II. Jovannis
Lecture—3 hours. Prerequisite: course 256. Microscopic and macroscopic traffic stream models; traffic signal delay models; queueing theory applications. Traffic surveillance and detection; traffic forecasting; applications to traffic control systems. Offered in alternate years.

258. Transportation Planning in Developing Countries (3) III. Spirling
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 Analysis (3) II. Barlow
Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle navigation and guidance, telecommunications and information systems, vehicle-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. Characteristics of suspension, deposition and scour, channel and harbor design and maintenance. 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.

266A. Applied Stochastic Methods in Engineering (3) I. Kavass

266B. Applied Stochastic Methods in Engineering (3) II. Kavass
Lecture—3 hours. Stochastic differential equations and applications to the solution of engineering problems.

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. Operations, maintenance, and modification of existing water reservoirs; 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: course 106 or Agricultural 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.

269. Water Supply and Hydroelectric Power Planning (3) II. Barlow
Lecture—3 hours. Prerequisite: courses 142 and 152 or the equivalent. Analysis of drought phenomena and low streamflow; water demand; risk and reliability analysis; conjunctive supply and conservation; planning alternatives. Case studies of water and energy development.

270. Advanced Water Resources Management (3) III. Lund
Lecture—3 hours. Prerequisite: courses 153 and 267 or the equivalent. Application of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, and water resource 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 implementation in conducting a water resources planning study. Lectures provide instruction on computer usage and methodology used in the laboratory study. Offered in alternate years.

272. Advanced Groundwater Hydrology (3) II. Jovannis
Lecture—3 hours. Prerequisite: course 144 or the equivalent. Mathematical basis of groundwater flow systems. Fundamental physical concepts, groundwater flow systems (hydraulic head, potential function, stream function). Multi-phase flow of immiscible fluids. Contaminant transport in porous and fractured media. Geostatistic and stochastic approach in hydrogeology.

273. Advanced Groundwater Hydrology (3) III. King

274. Water Resource Systems Engineering (3) I. Marinho
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.

275. Hydraulic Processes of Pipe Networks (3) II. Barlow

276. Hydrologic Time-Series Analysis (3) III. Kavass
Lecture—3 hours. Prerequisite: Engineering 118 and course 142 or the equivalent. Application of statistical methods for analysis of hydrologic time-series. Statistical simulation and prediction of hydrologic sequences using time-series methodology. Offered in alternate years.

277. Watershed Hydrology (4) II. Kavass

278. Unsteady Flow in Surface Waters (3) II. King

279. Hydrodynamics (3) II. Barlow
Lecture—3 hours. Prerequisite: course 141. Equations for conservation of mass, momentum, continuity, circulation; stream functions, velocity potential; flows by superposition and conformal mapping; free streamline applications, gravity effects, Introduction to wave motion. Offered in alternate years.

279. Advanced Mechanics of Fluids (4) II. Barlow

281. Advanced Soil Mechanics (3) III. Ishiris

282. Advanced Soil Mechanics (3) I. 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 pressure and earthquake effects. Centrifuge modeling.

283. Physicochemical Influences and In Situ Evaluation of Soil Behavior (3) I. Arulendran
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal

*Course not offered this academic year.*
Engineering: Computer Science

(College of Engineering)

Charles U. Martel, Ph.D., Chairperson of the Department
Donald A. Olsson, Ph.D., Vice Chairperson of the Department
Department Office, 2063 Engineering II
(916) 752-7004; http://www.cs.ucdavis.edu

Faculty
Matthew Bishop, Ph.D., Assistant Professor
Matthew K. Farrells, Ph.D., Assistant Professor
Daniel Gushieh, Ph.D., Professor
Kenneth J. Joy, Ph.D., Associate Professor
Karl Levitt, Ph.D., Professor
Charles U. Martel, Ph.D., Professor
Norman S. Matloff, Ph.D., Professor
Susan L. McHenry, Ph.D., Associate Professor
Ronald A. Olsson, Ph.D., Associate Professor
Armond E. Prieditis, Ph.D., Assistant Professor
Philip Rogaway, Assistant Professor
Manfred R. Rindmann, Ph.D., Professor
Richard F. Walters, Ph.D., Professor
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) I, 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 the 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) II, I, II.
Walters
Lecture—3 hours; laboratory—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, objects, elementary programming concepts, overview of computer-aided instruction, and intended for students in the College of Letters and Science and other non-engineering science majors. Not open for credit to students who have completed course 30, 35, Engineering 5 or former course 30H. General Education credit. Nature and Environment.

30. Introduction to Programming and Problem Solving (4) I, II, III.
The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to computers and computer programming, algorithm design, running and 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, II.
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. Graph theory and complexity of algorithms. The Scheme programming language is used. Not open for credit to students who have completed course 10, 35 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.
The Staff
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.

Farrells, 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)

90X. Lower Division Seminar (2) I, II, III.
The Staff (Chairperson in charge)
Seminar—1 hour. 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. (PIN grading only)

93. Directed Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Directed Study—1 hour. Prerequisite: lower division standing. Supervised individual study. May be repeated for credit. (PIN grading only)

99. Special Study for Lower Division Students (1-5), I, II, III.
The Staff (Chairperson in charge)
Special Study for Lower Division Students—1 hour. Prerequisite: lower division standing. Supervised individual study. May be repeated for credit. (PIN grading only)

Upper Division Courses
100. Discrete Structures (3) I, II, III.
The Staff
Lecture—3 hours. Prerequisite: Mathematics 21C. Discrete structures and applications to various areas of computer science; mathematical models and mathematical reasoning, sets, relations, functions, methods of counting.

110. Data Structures and Programming (4) I, II, III.
Matle, Joy

120. Automata Theory and Formal Languages (3) I, II, Rogaway
Lecture—3 hours. Prerequisite: course 100. Theory of computation: abstract models of digital computers, finite automata, pushdown automata, Turing machines and other models of computation. Formal languages and their relation to programming languages; regular and context-free grammars, parsing and ambiguity.

122A. Algorithm Design and Analysis (3) II, III.
Ussia, Garfieled, Rogaway
Lecture—3 hours. 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 Computer Science Engineering 122.

*Course not offered this academic year.

214 Engineering: Computer Science

phenomena, ion-exchange. Soil-water- electrolyte characteristics and soil structure. Laboratory includes methods of characterization of soils, quantification of soil structure, and cutting cylinder tests to evaluate soil erosion.

284. Theoretical Soil Mechanics (3) II, Kutter

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, Irlanandana
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 buildheads; deep excavation; tie-back systems; cof ferdams; 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 188, 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) Environmenal Engineering, (B) Hydraulic and Hydrologic Engineering, (C) Geotechnical Engineering, (D) Geotechnical Engineering, (E) Structural Engineering, (F) Structural Mechanics Design, (G) Transportation Planning, (H) 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. (SU 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. (SU grading only)

290G. Group Study (1-5) I,II,III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only)

299. Research (1-12) I, II, III.
The Staff (Chairperson in charge)
(SU grading only)
122B. Algorithm Design and Analysis (3) I. Gusfield, Martel, Rogawey Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A. Theory and practice of hard problems, and problems with complex algorithmic solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Students develop a theoretical analysis, implementation, and practical evaluations. Examples from parallel, string, graph, and geometric algorithms.

140A. Programming Languages (4) I, II. Olsson Lecture—4 hours; discussion—1 hour. Prerequisite: course 110. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, expressions, statements, functions for data handling. Comparative study of several high-level languages. Not open for credit to students who have taken Computer Science Engineering 140.

140B. Programming Languages (4) II. Olsson, Levitt Lecture—4 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 features such as concurrent (parallel), dataflow, and constraint; key implementation issues for those paradigms; and programming language semantics.

142. Computer System Architecture (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140A; course 160 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of computer systems.

150. Operating Systems and System Programming (4) III. I. Levitt, Matloff, Olsson Lecture—3 hours; discussion—1 hour. Prerequisite: course 40, and 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 and their interaction. 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 deadlocks, mutual exclusion, and synchronization. Management of physical and virtual resources. Protection mechanisms. User interface and ease-of-use considerations. (Note to students: if you have taken Electrical and Computer Engineering 182B.)


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 protocols. File, data-base, and database management systems; programming and vulnerabilities analysis. An existing operating system will be studied.

154A. Computer Architecture (4) I, II. Farrens, Matloff, Mukherjee Lecture—4 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. Computer assembly and microcode. Instruction sets, processor structures, hardware interrupts and calls to operating system services. Hardware support for operating system 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. Hardware 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. I. Matloff, Levitt Lecture—3 hours. Prerequisite: course 154B or Electrical and Computer Engineering 170, and course 150 or 151A. Techniques for software development on shared-memory multiprocessor systems. Overview of interconnect architectures, and hardware for memory-access atomicity, Spin locks and barriers. Load balancing. Efficient use of interconnects and memories.

160. Introduction to Software Engineering (4) II, III. Levitt, Priedidt Lecture—3 hours; discussion—1 hour. Prerequisite: course 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 Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 110. Study of the principles of user/computer interaction. User interface management system architecture; 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; 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 database systems. 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 non-majors 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. General Education credit: Nature and Environment.

168. Information Systems (3) I. Walters Lecture—3 hours. Prerequisite: course 40 or the equivalent; upper division standing. Design, creation, implementation, and evaluation of information systems. Project-oriented, self-paced implementation of actual information including survey collection of data, input design, and development of comprehensive reports to evaluate and retrieve data. Case study of typical information systems problems. Offered in alternate years.

170. Introduction to Artificial Intelligence (4) II. Levitt, Priedidt Lecture—3 hours; discussion—1 hour. Prerequisite: course 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 natural language modeling. Study of structured and procedural techniques for implementing natural language parsers and generators.


198A-L. Special Topics in Computer Science (1-10) I, II, III. The Staff Course (evens) 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.

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. (PINP 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 64 units, and approval by department chairman. Supervised work experience in computer science. May be repeated for credit. (PINP grading only.)

197T. Tutoring in Computer Science (2-3) I, II, III. Walters Discussion—1 hour; laboratory—3 hours. Prerequisite: course 165A. Continuation of basic principles of database systems. Distributed systems; transaction processing; knowledge representation; new database models, including object-oriented; performance evaluation; optimization.

202. Theory of Computation (3) III. The Staff 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, complexity. Study of complexity and tractable problems.

221. Formal Language Theory (3) III. The Staff Lecture—3 hours. Prerequisite: course 220. Definition and properties of formal languages, deterministic context-free languages, context-sensitive languages, abstract families of languages, special topics of current interest.

*Course not offered this academic year.
224. Parallel Languages (3) I. Maitoff Lecture—3 hours. Prerequisite: course 250A. Logical languages for parallel and distributed systems. Different models of parallelism and distributed systems. Dependence analysis and coordination, memory models, high-level parallelism, and its compilation to parallel hardware. Prerequisites: course 122A; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting and estimating. Search algorithms. Graph algorithms. (Offered in alternate years.)

225. Evolution of a Computer Language (3) I. Walters Lecture—2 hours. Prerequisite: course 125A. The evolution of programming languages, their history, and their current status. The impact of programming languages on the development of computer science. The role of programming languages in the design of computer systems. (Offered in odd-numbered years.)

226. Machine Learning and Discovery (3) I. Pridelis Lecture—3 hours. Prerequisite: course 170 or 172. Artificial intelligence techniques for knowledge acquisition by machines. Fundamentals of knowledge representation and reasoning. The role of machine learning in the design of intelligent systems. (Offered in even-numbered years.)

227. Modern Cryptography (3) I. Rogaway Lecture—3 hours. Prerequisite: course 122A. Recent developments in cryptography, including public key cryptography, digital signatures, and secure protocols. (Offered in even-numbered years.)

228. Principles of Concurrent Programming (3) I. I. Lecture—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. Parallel Languages (3) I. Maitoff Lecture—3 hours. Prerequisite: course 240. Languages with constructs for parallel, distributed, and concurrent programming. Logical language based on flow graphs, graph reduction, backtracking, difference lists, etc. Mapping to architectures.

250B. Higher-Performance Uniprocessor Programming (3) I. Farrens Lecture—3 hours. Prerequisite: course 250A. Higher-performance uniprocessor programming. Barriers to high performance; solutions to the problems; historical and current processor designs.

250C. Parallel Processing (3) I. Maitoff Lecture—3 hours. Prerequisite: course 250A. Advanced topics in parallel programming, including parallel algorithms, parallel architectures, and parallel programming languages. The role of parallel programming in scientific computing and high-performance computing.


256B. Modeling and Analysis of Computer Networks (3) I. Maitoff Lecture—3 hours. Prerequisite: course 256A. Use of simulation and queueing theory in the design of wide-area and local computer networks, with special emphasis on optimization. Multiple access protocols, capacity planning, topology design, flow/congestion control, routing.

257. Computer Graphics (3) I. Joy Lecture—3 hours. Prerequisite: course 175. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, animation. Discussion of current research in the field. Offered in alternate years.

258. Computer-Aided Geometric Design (3) I. Joy Lecture—3 hours. Prerequisite: course 175. Applied Numerical Algorithms 128 or Mathematics 125 or Philosophy 112 or familiarity with first-order logic.

Knowledge of an iterative and a 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 operational semantics, termination, dynamic logic and proofs of concurrent programs.


265. Database Systems (3) I. 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.
curves and surfaces. B-spline curves and surfaces, beta-splines, box-splines. Integration into various computer graphics, rendering methods, and computer-aided design systems. Offered in alternate years.

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 the topic is different.

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 Lecture—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

298. Group Study 1-5 I, II, III. The Staff Lecture—1 hour. 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. W. Welter 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 Computer Science. Participation as a teaching assistant or associate-in a designed 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

(Statistics and Department of Electrical and Computer Engineering)

S. Louis Hakimi, Ph.D., Chairperson of the Department
John N. Churchill, Ph.D., Vice Chairperson of the Department

Department Office, 2064 Engineering II (916-752-0558)

Faculty

Khaled Abdel-Ghaffar, Ph.D., Associate Professor
Venkatesh Akella, Ph.D., Assistant Professor
Robert W. Bower, Ph.D., Professor
P. R. Bhat, Ph.D., Associate Professor
Tsai-Sun Chang, Ph.D., Assistant Professor
K. W. Chang, Ph.D., Professor
Andrew J. Diener, Ph.D., Professor
Kalinoi 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
Mohammed S. Ghausi, Ph.D., Professor
A. Nazli Gunes, 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 Hsu, Ph.D., Professor
Charles E. Hunt, Ph.D., Associate Professor
Paul J. Hurst, Ph.D., Associate Professor
Andre Knoesen, Ph.D., Associate Professor
Benard C. Liew, Ph.D., Associate Professor
Stephen H. Lewis, Ph.D., Assistant Professor
Neville G. Luhmann, Jr., Ph.D., Professor (Electrical and Computer Engineering and Applied Science Emeritus)
David D. Moore, Ph.D., Professor
Vojin G. Okrlobzija, Ph.D., Associate Professor
G.R. Redlin, Ph.D., Professor
Todd R. Reed, Ph.D., Associate Professor
Rosemary Smith, Ph.D., Associate Professor
Michael A. Soderstrand, Ph.D., Professor
Richard R. Spencer, Ph.D., Associate Professor
Shih-Ho Wang, Ph.D., Professor
Kant D. Wilken, Ph.D., Assistant Professor

Emeriti Faculty

V. Ralph Ague, Ph.D., Professor Emeritus
John N. Churchill, Ph.D., Professor Emeritus
Richard C. Dorf, Ph.D., Professor Emeritus
Herbert J. Fink, Ph.D., Professor Emeritus
I. Horowitz, Ph.D., Professor Emeritus
Wen C. Lin, Ph.D., Professor Emeritus
Ronald F. Soohoo, Ph.D., Professor Emeritus
Jerome J. Suran, Ph.D. (hon.), Senior Lecturer Emeritus

Courses in Engineering: Electrical and Computer Engineering (EEC)

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; discussion—1 hour. Prerequisite: Engineering 17. Introduction to the theory and application of analog circuits. Students who have completed Engineering 100 may receive only 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; image restoration; image compression; time-varying image analysis; elementary pattern recognition; segmentation; multi-resolution analysis.

110A. Electronic Circuits I (4) II, III. Spencer, Haley, Hurst, Lewis Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17, courses 100 and 140A, course 180A (may be taken concurrently). Applications of operational amplifiers, modeling of active devices, design of small-signal linear amplifiers, design of basic logic gates.

110B. Electronic Circuits II (4) 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 multistage 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, III. Spencer, Hurst, Lewis, Current Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: courses 100, 140A, 150A, course 110A (concurrently 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) II, III. Spencer, Hurst, Lewis, Current Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: courses 110B, 111B, 140B. Analysis and design of analog integrated circuits. Emphasis is on bipolar transistor circuits. Single-stage amplifiers, cascoded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers. (Former course 114A.)

118. Digital Integrated Circuits (3) III. Hurst, Spencer, Current, Oklobzija Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110A, 111A, 110B, 150A, course 110B (concurrently recommended); course 140B recommended. Design, analysis, and evaluation of logic circuits, multi-stage and feedback amplifiers, and oscillators.

114. Analog Integrated Circuits (3) I. Hurst, Current, Oklobzija Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110A, 111A, 140B. Analysis and design of digital integrated circuits. Emphasis is on bipolar circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs.


130B. Introductory Electromagnetics II (4) II, III. Diener, Fink, Heritage, Knoesen Lecture/discussion—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.

*Course not offered this academic year.*
131A. Electromagnetic Fields and Waves (3) I. Dienes, Fink, Knoesen
Lecture—3 hours. Prerequisite: course 130B or the equivalent. Diffraction 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. Traveling wave tubes.

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, and applications of microwave antennas and transmission lines. Design of microwave systems. (Formerly course 131B.)

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 devices and amplifiers. Theory and design of microwave devices. Microwave circuit and filter design. Introduction to analysis and design of microwave transistor and tunnel diode amplifiers.

132C. RF Amplifiers, Oscillators, Mixers and Antennas (3) III. Branner
Lecture—3 hours; laboratory—3 hours. Discussion—1 hour. 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 oscillator and mixer circuits. Analysis and design of linear, loop, waveguide, and horn radiators.

135. Optical Communications I: Fibers (3) I. 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 fibers, and fiber dispersion limitations. Design of zero dispersion fibers. Offered in alternate years.

Lecture—3 hours; discussion—1 hour. Prerequisite: Physical Chemistry I or an equivalent course. Theory and design of semiconductor devices, including the electronic and optical properties of semiconductors, and the fabrication and characterization of semiconductor devices.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Physical properties of semiconductors, and the design and fabrication of semiconductor devices.

145A. Solid-State Electronics (3) III. Bower, Churchill, Hailey, Hunt

145B. Solid-State Electronics (3) I. Hailey
Lecture—3 hours. Prerequisite: course 140A. Magneto- and superconductivity. Design of devices and the application of circuits utilizing the magnetic and superconducting properties of solids. Magnetic devices used in magnetrons and magnetic media: disk, tape and bubbles. Superconducting devices include Josephson junctions, squids, and SC microcircuits.

148A. Integrated Circuits Fabrication (3) I. Hunt, Bower
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. Basic fabrication processes for metal oxide semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and dry-etching. Study of processes in producing metal-gate PMOS test chips which will undergo parametric and functional testing. (Formerly course 115A.)

148B. Advanced Integrated Circuits Fabrication (3) II. Hunt, Bower
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A. Fabrication processes for CMOS VLSI. Lab projects examine deposition of thin films, ion implantation, photolithography, etching, sputter-metallization, and C-V analysis. Topics include isolation, projection alignment, epitaxial growth, thin gate oxidation, and rapid thermal annealing. (Former course 115B.)

148C. Superconductivity (3) III. The Staff
Lecture—3 hours. Prerequisite: course 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 of linear systems. Fourier analysis of linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. System stability. (Not open for credit to students who have taken course 115A.)

150B. Introduction to Signals and Systems II (4) I, II. 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. (Not open for credit to students who have taken course 151A.)

157A. Control Systems (4) I, II. Gündüz, Mayne, Wang, Chang
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150A. Analysis and design of feedback control 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 (3) III. Hailey
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Control system optimization and compensation techniques, digital control theory. Laboratory includes simulation systems and computer simulations.

160. Signal Analysis and Communications (4) I, II. Feher, Ford, Friedlander, Gardner, Levy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. 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

166. Digital Communication Design Techniques (4) II. Feher
Lecture—3 hours; discussion—1 hour. Prerequisite: course 160. Baseband digital signal processing for digital MODems and multi-access systems. Digital modulation techniques including BPSK, QPSK, MSK, and QAM. Spread spectrum, TDMA and FDMA access methods. Satellite, cellular, mobile, microwave and personal communications systems. DDS, MFSK, and spread spectrum applications. Computer-aided design and software 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 vocoders and video, cellular, and mobile systems. Expert (artificial intelligence) applications. In-class experiments and demonstrations.

170. Introduction to Computer Architecture (4) I, II. 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—3 hours; laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A; course 180B concurrently recommended. Review of 8086/8088 microprocessor architecture, microcomputer-based systems. Other microcomputer architecture, I/O interface design, software I/O device drivers; interrupt driven system design; MSDOS operating system based system design; real-time embedded system design.

173. Applications of Object-Oriented Programming (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A or Engineering 100. Introduction to the modern paradigms of object abstraction and object-oriented programming for engineering applications such as robotics, image processing, and real-time systems. Applications of object-oriented programming in C++ language. The technique of partitioning an application into pieces by defining new types that match the concept of the application. (Not open for credit to students who have taken course 185.)

174. Microprocessor-Based Instrumentation Systems (4) III. Soderrstrand
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A or Engineering 100. Introduction to the modern programming paradigms of data abstraction and object-oriented programming for engineering applications such as robotics, image processing, and real-time systems. Typical use of microprocessors and microprocessor development systems in instrumentation applications. Analytical and design methods common to modern instrumentation systems including digital signal processing, computer arithmetic, memory systems and arithmetic logic circuits. Design methods for computer-aided design (CAD) methodologies and tools. (Not open for credit to students who have taken course 150.)

180A. Digital Systems I (5) II. Oklobdzija, Redinbo, Wilken, Akella
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110A and 180A. Multi-input/output sequential digital systems; timing/pulse circuits: TTL, CMOS, ECL logic elements; analog switch; sample/hold; A-D and D-A converters; sample-and-hold; memory systems: PROMs, PLD/PAL; CAD with Xilinx FPGA. (Not open for credit to students who have taken course 177.)

180B. Digital Systems II (5) III. Oklobdzija, Redinbo, Wilken, Akella
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110A and 180A. Multi-input/output sequential digital systems; timing/pulse circuits: TTL, CMOS, ECL logic elements; analog switch; sample/hold; A-D and D-A converters; sample-and-hold; memory systems: PROMs, PLD/PAL; CAD with Xilinx FPGA. (Not open for credit to students who have taken course 177.)
perception, sampling and quantization, transform theory and applications, advancement, filtering and restoration, image analysis, and image processing systems.

207. Pattern Recognition and Classification (3) I. Ford, Reed Lecture—3 hours. Prerequisite: Statistics 120. Topics in 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.


209. Image Sequence Processing (3) II. Reed Lecture—3 hours. Prerequisite: course 106. Basic video concepts and image sequences as spatio-time data; three-dimensional signal processing; perception of visual motion; enhancement of image sequences; image sequence representation; resolution issues; the computation of motion; image sequence compression.


211. Advanced Analog Circuit Design (3) II. Spurken, Current, Hurst, Lewis Lecture—3 hours. Prerequisite: course 210; Statistics 131A or the equivalent recommended. Noise in electronic circuits and systems. Distortion analysis; the transistor principle and its application to circuit analysis and synthesis; phase-locked loops and their applications.


214B. Computer-Aided Circuit Analysis and Design (3) II. Hayley Lecture—3 hours. Prerequisite: course 214A. Transient (time-domain) analysis: harmonic analysis; steady-state analysis; time-domain network sensitivities, ac, dc, transient gradient calculations, design optimization. Extensive computer project.

218A. Introduction to VLSI Circuits (3) I. Current, Hayley Lecture—3 hours. Prerequisite: courses 110A-110B, 11A11B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design aids allows students to undertake a VLSI design project.

218B. Multiprocessing Chip Design (1) I. Current, Hurst, Oklobdzija, Spencer Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS multiprocessor chip layouts of processes begun in courses 218A, 212, and 219 are assembled and submitted to the DARP/NFS MOSIS program for fabrication. Laboratory—3 hours. Prerequisite: course 218A and 218B. Chips submitted in course 218A are tested and evaluated. Issues involving design of ICs for testability are discussed.


221. Passive Filter Design (3) I. Soderstrand Lecture—3 hours. Prerequisite: course 100 and 150A. Introduction to the design of passive filters with lumped and distributed elements. Filter specification and design process, approximation theory, modern doubly terminated reactance, two-port synthesis, passive filters with lumped elements, crystal and ceramic filters, mechanical filters.

222. Active Filter Design (3) I. Soderstrand, Current, Haley Lecture—3 hours. Prerequisite: course 221 recommended. Introduction to the design of active filters with lumped elements and switches. Active filters with lumped RC networks, active-R networks, and switched capacitor filters.

225A. Lasers (3) I. DiNes, 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 semiconductors, laser oscillator model and rate equations. Description and design of real laser systems. Offered in alternate years.


227A. Microwave Electronics (3) I. The Staff Lecture—3 hours. Prerequisite: courses 130B and 140B. Theory of microwave tubes, waves, waveguides and cavities. Interaction between electromagnetic fields and the electron charge. Lorentz force law, energy levels in matter and Zeeman splitting. Comparison between conventional and microwave tubes and other new types of microwave oscillators and amplifiers. Offered in alternate years.

227B. Microwave Electronics (3) II. The Staff Lecture—3 hours. Prerequisite: course 227A or the equivalent. Theory of interaction between electromagnetic fields and electronic charge, with applications to electron beam and solid-state devices. Beam formation, velocity and density modulation, plasma oscillation, space charge wave propagation in klystrons. Parametric amplifiers, tunnel and IMPATT diodes, Gunn oscillators. Offered in alternate years.


229. Electromagnetics (3) I. DiNes 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.

*Course not offered this academic year.
231. Photonics (3) I. Diens, Kössen
Lecture—3 hours. Prerequisite: course 130B or the equivalent. Course introduces the design and fabrication of III-V optical waveguides, including lasers, waveguides, coated waveguides, and solar concentrators. Offered in alternate years.

232A. Advanced Applied Electromagnetics I (3) I. Brandner
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) II. Brandner
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) III. Knoesen, Diens, Gemeis
Lecture—3 hours. Prerequisite: course 130B or the equivalent. Course 232 recommended. Nonlinear optical interactions have important applications in optical information processing, optical communications, 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 properties, characteristics and models of various semiconductor devices including: P-N junction, metal-insulator semiconductor diodes, junction and insulated-gate field-effect transistors. Not open for credit to students who have completed former course 220.

245A. Applied Solid-State Physics (3) I. Finn, Haley, Hunt
Lecture—3 hours. Prerequisite: course 140B, 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. Hunt, Haley, Haley
Lecture—3 hours. Prerequisite: course 245A. Theory and application of magnetism and superconductivity. Topics in magnetism include paramagnetism, ferrimagnetism, magnetic hysteresis, and switching properties of magnetic elements. Topics in superconductivity include basic superconducting phenomena, Ginzburg-Landau theory, Josephson junctions, SQUIDS, and SC microcircuit.

245C. Applied Solid-State Physics (3) III. Haley, Haley, Smith
Lecture—3 hours. Prerequisite: course 245A. The physics of semiconducting and quantum-confined systems relevant to applications of fundamental optical processes. Topics include elementary excitations, radiative and non-radiative recombinations, high-density excitations, stimulated emission, and electron effects in bulk material as well as quantum wells, wires, and boxes. Offered in alternate years.

246. Advanced Projects in IC Fabrication (3) I. Current, Hunt, Spencer, Smith
Discussion—2 hours; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. (Former course 215.)

247. Advanced Semiconductor Devices (3) I. Bower, Hunt
Lecture—3 hours. Prerequisite: course 240. Physics of several 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, Hunt
Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and fabrication of sensors using microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microfabricated 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. Applications in alternate years.

250. Linear Systems and Signals (4) I. Wang, Chang, Levy, Gundes

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.

252. Multivariable Control System Design (3) III. Mayne, Wang

253. Adaptive Systems (3) I. H. Ha
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. H. Ha, Wang
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and control. Learning algorithms and robotics 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-parameterization, all stabilizing controllers, all achievable input-output maps. Robustness, robustness and disturbance rejection. Offered alternate years.

257. Topics in Optimization (3) III. Chang, Mayne
Lecture—3 hours. Prerequisite: graduate standing. Advanced topics in the theoretical foundations of optimization and its applications, such as: linear and nonlinear systems theory, stochastic programming, stochastic optimal control, approximation theory for optimization, advanced topics in numerical implementation of algorithms, shape optimization, large scale optimization, semi-infinite and differentiable optimization with applications to engineering design, global optimization (see also Mathematics 267C).

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 constrained optimization (gradient, Newton, conjugate directions and minmax algorithms), convergence and rate of convergence, selected topics. (Same course as Mathematics 267A.)

258B. Optimization II (3) II. Chang, Mayne
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, linear and nonlinear programming and constrained optimization problems, projection, feasible directions and reduced gradient algorithms, interior point methods, Lagrangian theory, duality, augmented Lagrangian sequential quadratic programming, selected topics. (Same course as Mathematics 258B.)

259. Optimal Control, Theory and Algorithms (3) II. Chang, Mayne
Lecture—3 hours. Prerequisite: graduate standing. Control theory and calculus of variations; existence of solutions to optimal control problems; necessary conditions of optimality, Pontryagin maximum principle, Euler equation; sufficient conditions of optimality, Hamilton-Jacobi-Bellman equation, linear quadratic regulation problem; algorithms for unconstrained and constrained optimal control problems. (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) II. Gardner

263. Optimal and Adaptive Filtering (3) III. Friedlander, Gardner, Levy

264. Estimation and Detection of Signals in Noise (4) III. Friedlander, Gardner, Levy
Lecture—3 hours, discussion—1 hour. Prerequisite: course 250. 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.

266. Information Theory and Coding (3) II. Alagai, Abdellaher
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.

267. Cellular Digital Mobile Communications (3) I. Feher

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 QAM, QPSK, GMSK, spread QAM and of correlated coded modems. Computer-aided and hardware design of advanced communications and synchronization systems.

269. Error Correcting Codes (3) II. Abdellaher
Lecture—3 hours. Prerequisite: courses 220, 221, and 222. Introduction to coding theory, finite fields, linear codes, Hamming codes, cyclic codes, BCH and RS codes and their decoding algorithms, convolutional codes.

270. Computer Architecture (3) II. Redinbo, Oklobdzija, Wilken
Lecture—3 hours. Prerequisite: course 170, 190A.
Emphasize on quantitative analysis of design trade-offs, optimization of resource usage, formal description and interactions between architecture and software.

271. Advanced Digital System Design (4) II. Olszobiza
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 180B. Topics in advanced design of arithmetic processors. High-speed addition, multiplication, and division. Floating point processors. Pipeline processors. Laboratory involving design and construction of several example systems.

273. Bit-Slice Microprogramming CISC and RISC Systems (3) II.
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 172, 180B, 270. Microprogramming techniques in the design of control unit of CPU for CISC (Complex Instruction Set Computer); microprogram control architecture and state machine concept for digital logic design; hardware emulation of microprocessor, survey of RISC (Reduced Instruction Set Computer) based systems; hardware emulation of RISC-based systems. Offered in alternate years.

274. Parallel Computer Architectures (3) II. Olszobiza, Rednio
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 database research. Current research.

276A. Introduction to Fault-Tolerant Computing (3) II, Wilken
Lecture—3 hours. Prerequisite: course 170, 180A. Introduces fault-tolerant computing 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 examination of fault-tolerant architectures. Offered in alternate years.

276B. Introduction to Digital Fault Diagnosis (3) III. Rednio
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, 0-1 algorithm, Karnaugh map, and analysis of the effects of intermittent faults. Offered in alternate years.

277. Real-Time Multiprocessor/Multitasking System Design (5) III. Olszobiza
Lecture—2 hours; laboratory—9 hours. Prerequisite: courses 172, 180B, Computer Science Engineering 150. Real-time system design using multiple-CPU microprocessors. System development and simulation with BWAT driven STB-bus systems, and Intel's IRM286 development system. Bus arbitration, design of basic real-time executive, and system design with IRM286 real-time multitasking operating system. Offered in alternate years.

278. Computer Arithmetic for Digital Implementation (3) III. Olszobiza, Rednio
Lecture—3 hours. Prerequisite: course 170, 180A. Theory and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are studied, and fixed and floating-point representations are examined. Offered in alternate years.

279. Artificial Neurons and Applications (4) I.
The Staff
Lecture—1.5 hours; discussion—1.5 hours; laboratory—1.5 hours. Prerequisite: courses 172, 180B, 207. Biological, artificial neural modeling and implementation, adaptive/learning algorithms, applications to pattern recognition. Offered in alternate years.

280. Advanced Logic Design (3) I. Olszobiza
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 FPGA's. Design methodology and CAD tools.

282. Synthesis Approach to System Design (3) III.
Lecture—3 hours. Prerequisite: courses 180B, Computer Science Engineering 122 and 142, or the equivalents. Synthesis of VLSI, VHDL, logic synthesis, fixed-programmable gate arrays, controller synthesis, algorithms underlying computer-aided design tools, high-level synthesis, hardware/software co-design.

289A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

290. Seminar in Electrical and Computer Engineering (1-3) I, II, III. The Staff
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (SU grading only.)

290C. Graduate Research Group Conference in Electrical Engineering and Computer Engineering (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisites: consent of instructor and group members. Seminar on current research in electrical and computer engineering. May be repeated for credit. (SU grading only.)

291. Solid-State Circuit Research Laboratory Seminar (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing, lectures on solid-state circuit design by various visiting experts in the field. May be repeated for credit. (SU grading only.)

292. Seminar in Solid-State Technology (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state technology by visiting experts in the field. May be repeated for credit. (SU grading only.)

293. Computer Engineering Research Seminar (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Lectures on topics in computer engineering. May be repeated for credit.

294. Image, Video, and Computer Vision Research Seminar (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Lectures, tutorials, and seminars on image processing, video engineering, and computer vision. May be repeated for credit. (SU grading only.)

295A. Robotics Research Seminar (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Technical presentations and lectures on current topics of robotics research and robotics technology. May be repeated for credit. (SU grading only.)

295B. Systems and Control Seminar (1-3) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Seminars on current research in systems and control by faculty and visiting experts. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff
(Chairperson in charge)
Prerequisite: permission of instructor. (SU grading only.)

*Course offered this academic year.

Professional Course
386. The Teaching of Electrical Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-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. (SU grading only.)

Engineering: Mechanical and Aeronautical

(221)

Engineering: Mechanical and Aeronautical (College of Engineering)
Allan A. McKillop, Ph.D., Chairperson of the Department
Ian M. Kennedy, Ph.D., Vice Chairperson of the Department

Department Office, 2132 Bealette Hall (916-752-0690)

Faculty
Ralph C. Aldridge, III, Ph.D., Assistant Professor
James W. Baughn, Ph.D., Professor (Aeronautical Science and Engineering)
Vincent P. Caspe, Ph.D., Assistant Professor
Jean Jacques Chattot, Ph.D., Professor
Harry H. Cheng, Ph.D., Assistant Professor
Harry A. Dwyer, Ph.D., Professor (Aeronautical Science and Engineering)
Fidelis O. Ele, Ph.D., Associate Professor
Andrew A. Frank, Ph.D., Professor
Mohamed M. Hatzi, Ph.D., Professor (Aeronautical Science and Engineering)
Ronald A. Heis, Ph.D., Professor (Aeronautical Science and Engineering)
Mori Hubbard, Ph.D., Professor (Aeronautical Science and Engineering)
Mauri L. Hull, Ph.D., Professor
Dean C. Kernio, Ph.D., Professor
Ian M. Kennedy, Ph.D., Professor
Wolfgang Kolmann, Dr-ing, Professor (Aeronautical Science and Engineering)
Donald L. Margolis, Ph.D., Professor
Allan A. McKillop, Ph.D., Professor
Bahram Ravivi, Ph.D., Professor
Lawrence W. Reed, Ph.D., Professor (Aeronautical Science and Engineering)
Nesim Sariog-Kilijan, Ph.D., Associate Professor (Aeronautical Science and Engineering)
Benjamin D. Shaw, Ph.D., Assistant Professor
S. Arntley Shell, Ph.D., Assistant Professor (Aeronautical Science and Engineering)
Cornelius P. van Dorn, Ph.D., Associate Professor (Aeronautical Science and Engineering)
Steven A. Weirsky, Ph.D., Professor
Bruce R. White, Ph.D., Professor (Aeronautical Science and Engineering)
Kazu Yamazaki, Ph.D., Professor

Emeriti Faculty
Charles W. Beadle, Ph.D., Professor Emeritus
Harry Brandt, Ph.D., Professor Emeritus
John W. Brewer, Ph.D., Professor Emeritus
Clyde F. Garland, M.S., Professor Emeritus
Warren H. Geiss, Ph.D., Professor Emeritus
Jerald M. Henderson, D.Eng., Emeritus
Myron A. Hoffman, Sc.D., Professor Emeritus
John D. Kemper, Ph.D., Professor Emeritus
An Tzu Yang, D.E.Sc., Professor Emeritus

Division of Aeronautical Science and Engineering
Faculty
James W. Baughn, Ph.D., Professor
Jean-Jacques Chattot, Ph.D., Professor
Courses in Engineering: Mechanical (E&M)

(Courses in Mechanical Engineering (E&M) are listed below; courses in Aeronautical Science and Engineering (A&E) 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. (PnP grading only.)

50. Manufacturing Processes (3) III, III. The Staff
   Discussion—2 hours; laboratory—3 hours. Prerequisite: Engineering 2. 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 roles in the engineering design and development process.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor; lower division standing. (PnP grading only)

Upper Division Courses

134. Vehicle Stability (4) III. Karnopp
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102. 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, airplanes, bicycles, etc.

150A. Mechanical Design (4) I, III. Hull, Ravani
   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. Schaff, Henderson
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Aeronautical and Mechanical Engineering majors. Principles of engineering mechanics, failure theories and fatigue theory applied to 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 and control charts.

152. Computer-Aided Mechanism Design (3) I. Cheng
   Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5 or the equivalent or 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. Yamazaki
   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 demonstration of technology.

154. Introduction to Mechatronics (3) III. Yamazaki
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 36; Engineering 100 or Electrical and Computer Engineering 30; course 50 or consent of instructor. Mechatronics system concepts, 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 power plants for electric power generation and distribution. 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. Dewey
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A. Theoretical analysis, design, construction and testing of internal combustion engines. Emphasis on the influence of the engine configuration and design parameters on engine performance and emissions.

165. Fundamentals of Heat Transfer (4) II. Baughn, McMillan
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science Science majors. Analysis of fluids and solid systems, and solid systems, and solid systems, and solid systems. Analysis of methods of heat transfer; applications to engineering equipment with use of digital computers.

171. Analysis, Simulation and Design of Dynamic Systems (3) III. Margolis, Snell

172. Automatic Control of Engineering Systems (4) II. III. Snell, Hess
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Computer-aided control for engineering systems. Control system design using time and frequency domain methods. State space techniques.

   Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 36; restricted to Aeronautical and Mechanical Engineering and Materials Science Science students. Theory of measurement; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

184A. Mechanical Engineering Design Project (2) I, II, III. The Staff
   Laboratory—6 hours. Prerequisite: senior standing in Mechanical Engineering, consent of instructor; enrollment preference to students who have not taken any of course series, 184-188. Design of a major design project which includes design and possible development and evaluation of a mechanical engineering system.

184B. Mechanical Engineering 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 projects which include design and possible development and evaluation of a mechanical engineering system.

185. Mechanical Systems Design Projects (4) II, Velnik; III, I. Ravani
   Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: senior standing in Mechanical Engineering; enrollment preference to students who have not taken any of course series, 184-188. Design of mechanical systems. Mechanical systems design will introduce the student to the engineering design process and its use in design of engineering systems. Grading based on individual contributions to projects.

186. Thermal Systems Design Project (4) III. Aldredge
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 185; 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 projects. Limited enrollment.

187. Control Systems Design Project (4) III. Frank
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 172; senior standing in Mechanical Engineering; enrollment preference to students who have not taken any of course series, 184-185. 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. Limited enrollment.

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, optimize, and test a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

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. (PnP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (PnP grading only.)
199. Special Study for Advanced Undergraduates (1-5); II, III, The Staff
Prerequisite: consent of instructor (FIP grading only)

Graduate Courses

205. Thermal Radiation (3) II.
Lecture—2 hours. Prerequisite: consent of instructor. Introduction to thermal radiation. Heat transfer by radiation. Infrared and light. Offered in alternate years.

208A. Experimental Methods in the Thermal Sciences (3) I. Baughn
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Experiment design, statistical analysis, and measurement. Steady-state and transient temperature measurement. Steady-state flow and pressure measurements. Offered in alternate years.

208B. Experimental Methods in Fluid Mechanics and Combustion (3) II. Kennedy
Lecture—2 hours; laboratory—3 hours. Prerequisites: courses 165 and 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 spectroscopy. Offered in alternate years.

210A. Advanced Fluid Mechanics and Heat Transfer (4) I. White
Lecture—3 hours; discussion—1 hour. Prerequisite: course 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. The Staff
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. Study of complex phenomena occurring in two-phase flow, boiling and condensation. Development of fundamental relations. Use of these relations with experimental data to develop semi-empirical working relations; application to various energy systems and power-plant problems. Offered in alternate years.

212. Advanced Heat Transfer with Phase Change (4) III; I. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: course 165. Study of complex phenomena occurring in two-phase flow, boiling and condensation. Development of fundamental relations. Use of these relations with experimental data to develop semi-empirical working relations; application to various energy systems and power-plant problems. Offered in alternate years.

213. Advanced Turbulence Modeling (4) III. Kallmann
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 implications; numerical methods, application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Offered in alternate years.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A and Aeronautical Science Engineering 233. Numerical and analytical 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 combustible.

216. Advanced Thermodynamics (4) I. Kennedy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Fundamentals of thermodynamic cycles, heat engines, and refrigerators. Applications to modern engines. Offered in alternate years.

217. Combustion (4) II. Aldridge
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B and 105B. Review of chemical thermodynamics, hydrocarbon and hydrocarbon reactions, soot formation, and pollution. Offered in alternate years.

218. Advanced Energy Systems (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 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. Theory of advanced concepts such as a fusion, magnetohydrodynamic, or solar electric powerplant. Offered in alternate years.

220A-220B. Mechanical Vibrations (3-3) II-III.
Margolis
Lecture—3 hours. Prerequisite: course 122. Application of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations and response. Offered in alternate years.

222. Advanced Dynamics (3) I. Margolis
Lecture—3 hours. Prerequisite: course 192. Kinematics; Hamilton's Equations; Lagrange's Equations; Hamilton-Jacobi theory.

229A. Multibody Dynamics (4) II. Hubbard
Lecture—3 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructor. Dynamics of coupled rigid bodies. Newton-Euler and Tate-Bryan angles, constrained motion, nonholonomic; inverted pendulum, generalized active and inertial forces, Kane, Newton-Euler, and Lagrange formulation for multibody systems; computer-aided equation derivation.

229B. Multibody Dynamics II (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 223A. Advanced topics on the dynamics of coupled rigid bodies; kinematics; multibody; rigid kinematics; extraction of information from dynamical equations; linearization stability of motion; numerical methods in dynamics; computer simulations.

224. Kinematic Design of Mechanisms (3) III. Cheng
Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Bemerstein 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. Graphical and computer methods for kinematic design. Offered in alternate years.

225. Spatial Kinematics and Robotics (3) III. Cheng
Lecture—3 hours. Prerequisite: course 222. Spatial kinematics: point, line, and coordinate systems and their transformations; geometric properties and instantaneous invariants for rigid body motion. Robotics: solving for kinematic equations; differential relationships; motion trajectory. Application of dual-number mathematics and associated analytical methods. Offered in alternate years.

226. Acoustics and Noise Control (3) I. Margolis
Lecture—3 hours. Prerequisite: course 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—discussion—1 hour. Prerequisite: consent of instructor. Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluate data acquisition systems, data collection, analysis, computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electrophysiology, and biomechanical modeling. (Same course as Biomedical Engineering 227/Exercise Science 227.)

231. Musculo-Skeletal System Biomechanics (3) III. Hull
Lecture—3 hours. Prerequisite: course 178 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 inertial load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years. (Same course as Biomedical Engineering 231.)

232A. Skeletal Tissue Mechanics (3) II. Martin
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system; the relationship of these properties to anatomy and histology; and the changes of these properties caused by aging and disease. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Biomedical Engineering 232A.)

234. Design and Dynamics of Road Vehicles (3) II. Velinov
Lecture—3 hours. Prerequisite: course 134. Analysis and numerical simulation of road vehicles with emphasis on design applications. Offered in alternate years.

251. Mechatronics (4) III. Yamazaki
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 172. Studies of techniques required for designing the electromechanical system which consists of the mechanism and the electronics-based sophisticated control. Methodologies for designing the microprocessor operated control hardware and dedicated software, applying electric and dedicated software, and applying electric actuator and sensors with its theoretical background.

255. Computer-Aided Design and Manufacturing (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: course 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-numerical computations and geometric tools in design and manufacturing.

270. Modeling and Simulation of Engineering Systems (3) I. Karnopp
Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Multiphase models of mechanical, electrical, hydraulic, thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; formulation for analog and digital simulation; identification; instrumentation; approximate models of distributed systems.

271. Design of Multivariable Control Systems (3) II. Karnopp
Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Modern methods of state variable feedback applied to control system design. Introduction to observers and equivalent direct feedback. Stress on practical application of theory to engineering systems in various energy domains.

272A. Mathematical Foundations of System and Control Theory (4) I. Eke
Lecture—4 hours. Prerequisite: course 172. Singularity functions, Laplace transforms, and Z-transforms. Algebra of groups and rings and of polynomials and matrices. Reducibility, controllability, and observability. Observers and feedback control for single input,
272B. Multivariable Feedback Control and Estimation (4) II. S. Kailath Lecture—4 hours. Prerequisite: course 272A. Emphasis on multi-input, multi-output systems. Digital and continuous time control and estimation. Introduction to singular value methods and quantitative feedback theory, pole placement, and other frequency domain methods.


274. Analysis and Design of Digital Control Systems (4) III. I. H. Hess Lecture—3 hours; discussion—1 hour. 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. I. B. Gubenberg Lecture—2 hours; discussion—1 hour. Prerequisite: course 175. Computer applications of microprocessors and minicomputers to data acquisition and control. Topics include computer organization, hardware for laboratory applications of computers, fundamentals of interface design, modern experimental equipment, programming techniques for data acquisition, and basic data analysis.

276B. Digital Data Acquisition and Analysis (3) II. H. H. Zebrowski 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 methods in digital data analysis. Includes 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. K. Karpoff Lecture—2 hours; discussion—1 hour. Prerequisite: course 177. Applications of modern nonlinear dynamics methods to mechanical systems. Topics include stability, bifurcations, and chaos.

280. Advanced Engineering Analysis (3) I. C. Shaw Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications of mathematical methods to solve problems in engineering. Topics include partial differential equations, boundary value problems, and integral equations.

290C. Graduate Research Conference (1) I, II, III. The Staff (Chairperson in charge) Lecture—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. (SU grading only.)

295. Design Seminar (1) I, II, III. The Staff Lecture—1 hour. Prerequisite: consent of instructor. Review of current mechanical engineering design literature and projects with presentations by students and faculty. (SU grading only.)

296. Fluid and Thermal Sciences Seminar (1) I, II, III. The Staff Lecture—1 hour. Prerequisite: consent of instructor. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. (SU 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)

Professional Course

300. The Teaching of Mechanical Engineering (1) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

390. The Teaching of Mechanical Engineering (1) I, II, III. The Staff (Chairperson in charge)

Courses in Aeronautical Science and Engineering (EAE)

Lower Division Course


99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Upper Division Courses

126. Theoretical and Computational Aerodynamics (4) I. H. Hafez Lecture—3 hours; discussion—1 hour. Prerequisite: course 25, Engineering 103B, Engineering 160, or Applied Science 115 or Mathematics 128C. Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Application of numerical methods to wing design.


130. Aircraft Preliminary Design (4) III. I. I. L. van Dam Lecture—2 hours; discussion—1 hour. Prerequisite: course 128 or 129. Aircraft preliminary design including estimation of weight, lift, aerodynamics, stability, and control. Design iteration and trade-off studies.

131. Aircraft Flight Performance Laboratory (3) III. I. L. Baughn Lecture—1 hour; discussion—1 hour. Prerequisite: course 128 or 129. Measurements of aircraft performance characteristics and performance flight with flight simulator.


135. Aerospace Structures (3) I. R. Reiffield Lecture—3 hours. Prerequisite: course 133. Analysis of aerospace structural behavior and design. Structural analysis and design methods used in aircraft structures. Stress analysis using the finite element method. Applications to aerospace structures.

137. Structural Composites (4) II. R. Reiffield Lecture—3 hours; lab—3 hours. Prerequisite: Engineering 104. Overview of materials and technology for creating structures from fiber reinforced resin matrix composite materials. Elementary design analysis and case studies emphasizing aeronautical applications.

138. Aircraft Propulsion (4) II. I. M. Sobieski Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103B, and 105B. Analysis and design of aircraft propulsion systems. Development and application of cycle performance prediction techniques for importance engine configurations. Introduction to the operation and design of inlets, compressors, turbines, and combustors.

139. Introduction to Aeronautical Structures (4) II. I. M. Sobieski Lecture—3 hours; discussion—1 hour. Prerequisite: course 138. Analysis and design of aircraft propulsion systems. Development and application of cycle performance prediction techniques for important engine configurations. Introduction to the operation and design of inlets, compressors, turbines, and combustors.

140. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Graduate Courses


232. Advanced Aerodynamics-Viscous Flow (4) I. I. L. Chattoo Lecture—4 hours. Prerequisite: Engineering 103B. Discussion of boundary-layer theory, laminar and turbulent boundary layers, laminar boundary-layer instability, and flow separation. Viscous/inviscid interaction, three-dimensional flows, and computational methods and their applications. Offered in alternate years.


235. Computational Fluid Dynamics, Euler and Navier-Stokes Equations (4) III. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: course 233 or consent of instructor. Euler and Navier-Stokes equations, conservative form, numerical methods for systems of convection and convection–diffusion equations, computation of compressible Euler and Navier-Stokes equations, generalized coordinates, grid generation, applications.

236. Aerodynamics in Nature and Technology (4) WH. WH License—3 hours; discussion—1 hour. Prerequisite: 231B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, wind and effects on morphological objects, pedestrian–level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind–tunnel testing, extra–terrestrial aerodynamics. Offered in alternate years.

237. Analysis and Design of Composite Structures (4) III. The Staff 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.

238. Advanced Aerodynamic Design and Optimization (4) III. van Dam Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Application of aerodynamic theory to optimize 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. The Staff Lecture—4 hours. Prerequisite: Applied Science Engineering 115; Mathematics 128B. Deformation of solids and motion of fluids are treated within the framework of the state–of–the–art computational methods. The course is organized into nonlinear dynamics, classification of problems, vector computers with special applications to nonlinear mechanics. Offered in alternate years.

241. Advanced Topics in Aircraft Stability and Control (4) I. H. C. Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 172. Development of aircraft equations of motion, response to control actuation; response to random gust disturbances; state augmentation system design; pilot/vehicle analysis; handling qualities. Offered in alternate years.

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. (SU grading only)

288. Group Study (1–5) I, II, III. The Staff (Chairperson in charge)

259. Research (1–2) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only)

Professional Course

300. 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-charge 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. (SU grading only)

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**English**

(College of Letters and Science)

Karl F. Zender, Ph.D., Chairperson of the Department
Department Office, 114 Sproul Hall, (916) 752-2257

**Faculty**

Max Byrd, Ph.D., Professor
Caron A. Cott, Ph.D., Assistant Professor
Peter A. Dale, Ph.D., Professor
Joanne F. Deleh, Ph.D., Professor
Sandra M. Gill, Ph.D., Professor
Peter L. Hays, Ph.D., Professor
W. Jack Hicks, Ph.D., Associate Professor
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. Loko, Ph.D., Associate Professor
Clarence Major, Ph.D., Professor
Sandra J. McPherson, B.A., Professor
Patricia L. Moran, Ph.D., Assistant Professor
Linda A. Morris, Ph.D., Senior Lecturer
Marjorie Oster, Ph.D., Professor
David A. Robertson, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Winifred Schleier, Ph.D., Professor
Gary Snyder, B.A., Professor
Margaret K. Sage, Ph.D., Assistant Professor
David Van Leer, Ph.D., Professor
Raymond B. Wacanagat, Ph.D., Professor
Alan B. Williams, Ph.D., Professor
Karl F. Zender, Ph.D., Professor

**Emeriti Faculty**

William E. Baker, Ph.D., Emeritus
Everett Carter, Ph.D., Emeritus
Thomas A. Hanzo, Ph.D., Emeritus
Wayne Harsh, Ph.D., Emeritus
John O. Heyer, Ph.D., Emeritus
Robert H. Hopkins, Ph.D., Emeritus
Arthur E. McGuinness, Ph.D., Emeritus
James J. Murphy, Ph.D., Emeritus
Gwendolyn Schubel, M.A., Emeritus
Karl J. Shapiro, Emeritus
Daniel Silva, Ph.D., Emeritus
Brom Weiser, Ph.D., Emeritus

**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, undergradate 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 both master's and Ph.D. degrees.

**Career Alternatives**

Graduates have found the major excellent preparation for professional training and 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 work in local, state, and federal government agencies, as well as in industry and agriculture. Some have even established their own businesses.

**A.B. Degree Requirements:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>20</td>
</tr>
<tr>
<td>English 1 or 3</td>
<td>4</td>
</tr>
<tr>
<td>English 45</td>
<td>4</td>
</tr>
<tr>
<td>English 46A, 46B, 46C</td>
<td>12</td>
</tr>
</tbody>
</table>

**Depth Subject Matter (for each emphasis, see below)**

<table>
<thead>
<tr>
<th>Emphasis</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Shakespeare: English 117A, 117B, or 117C</td>
<td>4</td>
</tr>
<tr>
<td>B. British literature—two courses in periods prior to 1800: English 111, 113A, 113B, 115, 122, 150, 155A, or suitable sections of 150 or 157</td>
<td>8</td>
</tr>
<tr>
<td>C. American literature courses, one post–Civil War (English 142, 143, 158A, or appropriate 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)</td>
<td>8</td>
</tr>
<tr>
<td>D. Senior Seminar: One course selected from English 187, 188, 189, 194H</td>
<td>4</td>
</tr>
<tr>
<td>Area of Emphasis (choose one)</td>
<td>20</td>
</tr>
<tr>
<td>General Emphasis</td>
<td>5</td>
</tr>
<tr>
<td>Creative Writing Emphasis</td>
<td>5</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>64</td>
</tr>
<tr>
<td>English Majors</td>
<td>5</td>
</tr>
<tr>
<td>Total upper division English electives</td>
<td>120</td>
</tr>
</tbody>
</table>

**Total Units for the Major**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 1</td>
<td>20</td>
</tr>
<tr>
<td>English 103</td>
<td>4</td>
</tr>
<tr>
<td>English 104</td>
<td>4</td>
</tr>
<tr>
<td>One course selected from English 171, 179, 181A, 181B, or an ethnic literature course from outside the English department</td>
<td>4</td>
</tr>
<tr>
<td>Two upper division English electives</td>
<td>8</td>
</tr>
</tbody>
</table>

**Minor Program Requirements:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>15</td>
</tr>
<tr>
<td>Five upper division courses, at least four of which will be literature courses</td>
<td>120</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
Campus Writing Center. The Campus Writing Center, an affiliate of the English Department, is a program designed to provide writing instruction across the curriculum. Of special interest to students is 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 contact the Campus Writing Center, telephone 916-752-6024, 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 to courses 20, 30A, 30B, 45, 46A, 46B, 46C, and all upper division courses, unless otherwise stated in the course listings. Course 45 is recommended for High English Honor 16 series. Students taking GE-certified upper division courses in English may substitute Comparative 1, 2, 3, or 4 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 must see their advisers individually, in the spring quarters of their sophomore and junior years.


Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees and should consult their 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 Honors High English Honor 16 at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Office, 114 Sproul Hall. Refer to the Academic information section and the College section for information on Honors designation.

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. Contact department.

Courses in English (ENL)

Lower Division Courses

*Course not offered this academic year.

R. Communications Skills Workshop (0) I. The Staff (Chairperson in charge) Lecture—1 hour, 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 (Sacramento City College). Course worth 6 units toward minimum study list requirement. (P/NP grading only)

44. Expository Writing (4) I, II, III. The Staff (Chairperson in charge) Lecture—4 hours, discussion—2 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made.

45. 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. General Education credit: Civilization and Culture.

46. Critical Inquiry and Literature: Freshman Seminar (4) I. The Staff (Chairperson in charge) 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 of an essay, paper, or dialogue, and the writing of several papers or a longer seminar paper. General Education credit: Civilization and Culture.

56. 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 fiction writing. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

57. 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 poetry writing. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

20. Intermediate Composition (4) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—4 hours. Prerequisite: courses 1 or 3 and emphasis on the grammatical patterns of standard English, sentence revision techniques, development of cohesion and coherence, and the formal properties of the expository essay.

30A. Survey of American Literature (4) I. V. Van Leer; II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3 of American literature from the seventeenth century to 1865. General Education credit: Civilization and Culture.

30B. Survey of American Literature (4) I. Hays; II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3 of American literature from 1865 to the present. General Education credit: Civilization and Culture.

48A. 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.

48B. Masterpieces of English Literature (4) I. The Staff, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 or 3. Selected works of principal writers from 1600 to 1840. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

48C. Masterpieces of English Literature (4) I. Johns; II, 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.

48D. Masterpieces of English Literature (4) I. Johns; II, Byrd Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1840 to 1920. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

48E. Masterpieces of English Literature (4) I. Johns; II, Byrd Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1920 to 2000. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

48F. Masterpieces of English Literature (4) I. Johns; II, Byrd Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 2000 to the present. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

Upper Division Courses

100F. Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge) 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 fiction. May be repeated for credit with consent of instructor. No final examination.

100N. Creative Writing: Non-Fiction (4) I, II. 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, II, III. The Staff (Chairperson in charge) 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 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, analytic, explanation, argument, critique.

102. Writing in the Disciplines (3) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Instruction in a specially designed 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 in conjunction with a different subject-matter course.

104A. Writing in the Professions: Business Reports and Technical Communication (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 in the design, writing, and documenting formal and informal reports directed toward a variety of workplace audiences in a variety of settings. Emphasis on reflecting data graphically. Suitable for students planning careers in science, government, business, engineering, or industry.

104B. Writing in the Professions: Law (3) 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.

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 usage. Special emphasis on conducting research, interviewing, analyzing markets, and writing query letters.

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.

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.

106. History of the English Language (4) I, II, III. Schleier Lecture/discussion—3 hours; term paper. 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.

*110A. Introduction to Principles of Criticism (4) I. Ciolfi; II. Osborn 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.

*110B. Introduction to Principles of Criticism (4) 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 special problems presented by modern literary theory.

111. Medieval Literature (4) I. Ciolfi; II. Osborn 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.

113A. Chaucer: Troilus and the "Minor" Poems (4) I. Ciolfi; II. Osborn 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 Cressida. Courses 113A and 113B need not be taken in sequence.

113B. Chaucer: The Canterbury Tales (4) I. 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.

*115. Renaissance Literature (4) 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.

117A. Shakespeare: The Early Works (4) Waddington; III. Ciolfi 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.

117B. Shakespeare: The Middle Period (4) Waddington; III. Schleier Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's middle period, up to 1603. Courses 117A-117B-117C need not be taken in sequence.

117C. Shakespeare: The Later Works (4) I. Schleier; II. Zender 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.

*118. Shakespeare (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major works by Shakespeare. May be repeated for credit when topic differs.

123. 18th-Century British Literature (4) I. Romans; II. Shulman Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of 18th-century British literature. May be repeated for credit when content differs.

130. British Romantic Literature (4) I. Lokke Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of 19th-century Romantic English literature. May be repeated for credit when content differs.

133. 19th-Century British Literature (4) I. Romans; II. Shulman 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.

137. 20th-Century British Literature (4) I. Romans; II. Shulman 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, Eliot, Woolf, Larkin. May be repeated for credit when content differs.

142. Early American Literature (4) I. Van Leer Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of American literature from 1600 to 1800. May be repeated for credit when content differs.

143. 19th-Century American Literature to the Civil War (4) I. Romans; II. Van Leer; 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.

144. Post-Civil War American Literature (4) I. Romans; II. Hicks; III. Merkin 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.

149. Topics in Literature (4) 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 topic differs.

150. British Drama (4) I. Waddington Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical or thematically study of English drama. May be repeated for credit when topic differs.

*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 topic differs.

*153. Topics in Drama (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical or thematically study of drama. May be repeated for credit when topic differs.

155A. 18th-Century British Novel (4) I. Romans 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.

155B. 19th-Century British Novel (4) I. The Staff 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, the social novel, and novels by women: Scott, Dickens, the Brontes, Eliot, Hardy.

155C. 20th-Century British Novel (4) I. Romans Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of 20th-century British novel, with emphasis on impressionism; the revisionist naturalism; the experimental novel; the anti-modern reaction: Conrad, Joyce, Woolf, Lawrence, Drabble, Rhys.

156. The Short Story (4) I. Romans; II. Shulman 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. General Education credit: Civilization and Culture.

158A. The American Novel to 1900 (4) I. Romans 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.

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.

160. Film as Narrative (4) I. The Staff Lecture/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.

162. Film Theory and Criticism (4) 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. General Education credit: Civilization and Culture.

165. Topics in Poetry (4) I. The Staff; III. McPherson Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 and course 45. Intensive examination of various topics explored in poetry from all periods of English and American literature. May be repeated for credit when topic covers different poets and poems.

171A. The Bible as Literature: The Old Testament (4) I. 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

*Course not offered this academic year.
178. Literature of the Wilderness (4) I, II. Robertson Lecture/discussion—4 hours; term paper. Prerequisite: course 3 or 4. 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. General Education credit: Civilization and Culture.

185A. Literature by Women I (4) III. Stange Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or 4. Study of women's writing in English language literature by women from Bradstreet to Bath to the Brontës, Eliot, and Dickinson. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

187. Literature and the Other Arts (4) III. Robertison Seminar—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 the history of the Western art. Course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment.

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. One major writer's artistic development with attention to intellectual and literary milieu. Limited enrollment.

189. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: course 3 or 4. Internships in fields in which 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 The Staff (Chairperson in charge) 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; preparation for writing an honors thesis in course 195H.

195H. Honors Thesis—4 II, III. The Staff (Chairperson 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 must write a scholarly or creative work. Writing students submit a volume of poems or fiction.

1977. Tutoring in English (1-5) II, III. The Staff (Chairperson in charge) Tutoring—5 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small volunteer study 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.)

1977C. Comp. Writing in English (1-4) II, III. The Staff (Chairperson in charge) Tutoring—4 hours. Prerequisite: upper division standing and consent of Chairperson. Field experience with individuals or in Sarr in a field provided in order to develop their writing skills in literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study—4 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—4 I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

200. Techniques of Literary Scholarship—4 II. Waddington Discussion—3 hours; term paper. The elements of bibliography with special attention to literature and discussion of the principles of literary investigation—critical, historical, textual, and others.

201. Literary Criticism (4) II. Waddington 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.

206. Anglo-Saxon Language and Culture—4 II. Steyger 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.

209. Present-Day English Linguistics—4 III. Steyger Discussion—3 hours; oral and written reports; conferences with students. Prerequisite: course 205 or the equivalent. A study of the present-day structure of English and investigation of the English dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts.

210. Readings in English and American Literature—4 III. Steyger Seminar—3 hours; conferences—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. Prerequisites designed for students preparing for their comprehensive examinations. May be repeated with credit. (P/NP grading only.)

211. Middle English Romance (4) III. Steyger Seminar—3 hours; conferences. Prerequisite: course 204. The sources of Medieval Romance genre. Continental and English literary treatment; significant change of attitudes in post-Medieval literature.

215. Topics in Irish Literature (4) III. Steyger Seminar—3 hours; conferences—1 hour. Prerequisite: course 194. Course will vary from quarter to quarter and will include such topics as the sixteenth-century novel, contemporary Irish poetry, the drama, or a study of a major author.

220. Study of a Major Writer—4 III. Steyger Seminar—2 hours; conferences with individual students—1 hour; research papers. Artistic development of a major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

222. Problems in English Literature—4 II, III. Steyger 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 a different period or topic is studied.

223. Problems in American Literature—4 III. Steyger Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics for intensive investigation. May be repeated for credit when the different topic or period is studied.

*Course not offered this academic year.
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.

**Entomology**

- Entomology 100, 100L, 5...18-24
- At least two courses from Entomology 101, 102, 103, 107, 108...7-24
- At least two additional upper division Entomology courses (except courses 192, 198, 199)...6-11

**Agricultural Entomology**

- Agricultural Entomology 100, 100L, 110L, 113...18
- At least four additional upper division Entomology units...4

**Apiiculture**

- Apiiculture 100, 100L, 119...10
- Entomology 104 or 110, 110L...3-5
- Additional courses recommended: Agronomy 120, Plant Science 102, Plant Science 118...5-8

**Insect Ecology**

- Insect Ecology 100, 100L, 104...8
- Seven units from Entomology 107, 107L, 107...10
- Evolution and Ecology 149 or Environmental Studies 121...4

**Medical-Veterinary Entomology**

- Medical-Veterinary Entomology 100, 100L, 104, 153, 156...15
- At least three courses from Entomology 158L, 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. Kaya/Thorp
  - 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 gross anatomy, structures and functions, habitats, and their significance in relation to plants and animals including man.
- **17. Natural Selection and Sociobiology (4)** J. DeBakey
  - Lecture—3 hours; discussion—1 hour. Introduction to the theory of natural selection, using evaluations and applications of behavior/adaptations, ranging from insects to humans. General Education credit: Natural Environment.
- **99. Special Study for Undergraduates (1-5)** I, II, III.
  - The Staff (Chairperson in charge): (P MG grading only)
- **Upper Division Courses**
  - **100. General Entomology (3)** J. Granett in charge
    - Lecture—3 hours. Prerequisite: Biological Sciences 118, 119, 120.
  - **100L. General Entomology Laboratory (2)** J.
    - Granett in charge
    - Laboratory—2 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.
- **101. Functional Insect Morphology (3)** II. Peng
  - Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of the functional and morphological properties of insects and their relation to their environment.
- **102. Insect Physiology (4)** III. Duffey, Hammock
  - Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or course in physiology or entomology. Zoology. Processes by which insects maintain themselves, reproduce, and respond to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, facts, and interpretations.
- **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.
- **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.
- **107. California Insect Diversity (5)** III. Kinsey
  - Lecture—1 hour; laboratory—5 hours; fieldwork—6 hours. Prerequisite: introductory course in entomology or consent of instructor. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. Offered in alternate years.
- **109. Field Taxonomy and Ecology (7)** Extra-
  - Session summer. Ward
  - Lecture—2 hours; laboratory—36 hours; five-week course. Prerequisite: introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in alternate years.
- **110. Arthropod Pest Management (3)** II. Granett
  - Lecture—3 hours. Prerequisite: Biological Sciences 18. Identification, biology, and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage and ornamental pest problems.
- **110L. Arthropod Pest Management Laboratory (2)** II. Parmella
  - Laboratory—2 hours. Prerequisite: course 110 (may be taken concurrently) and Biological Sciences 18. Identification, biology and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage, and ornamental pest problems.
- **111. Insects and Human Affairs (4)** II. Dingle; II. Ulman
  - 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 implications. General Education credit: Nature and Environment.
- **116. Biology of Aquatic Insects (3)** III. Lawler
  - Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and aquatic insect collection. Prerequisite: course 100. Consent of instructor. A study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes.
119. Apiculture (III) L. Peng  
Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C. Credit and behavior of honeybees: communication, orientation, social organization, foraging activities, honey production, pollination and related topics. General Education: Credit: Nature and Environment.

135. Introduction to Biological Control (IV) L.  
Ekbel, Kaye  
Lecture—3 hours; practical—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 (IV) J. Kinsey  
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 16 or Biological Sciences 10. Relationships between physical changes in the continents and the evolution and diversification of plant and animal life, particularly insects, over the past 400 million years. General Education: Credit: Nature and Environment.

153. Medical Entomology (IV) L. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide role of insects and other arthropods to human health. The biology and basic classification of medically important arthropods, the use of insecticides affecting host-parasite relationships using selected examples from protozoan and metazoan fauna.

156L. Biology of Parasitism Laboratory (I) The Staff  
Laboratory—3 hours. Prerequisite: course 156 (concurrent) 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.

192. Internship (1-12) I, II, III, extra session.  
The Staff (Chairperson in charge)  
Internship—36 hours. Prerequisite: completion of 34 units at the time of application. Laboratory experience and fieldwork, 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. Pre-arranged assignments and preparation 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 Undergraduate Students (1-3) I, II, III, summer.  
The Staff (Chairperson in charge)  
(F/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 related to the control 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 current topics in behavior, population, and evolutionary ecology. Theory will be synthesized and interpreted. Empirical tests of ecological hypotheses emphasized in the laboratory seminar. Same course as Population Biology 206.2.

212. Molecular Biology of Insects and Insect Viruses (3) II.  
Maeda  

220. Chemical Ecology of Plant-Insect Interactions (4) II.  
Dufy  
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory biochemistry. Investigation of the interface between plants, herbivorous insects and their natural enemies from mechanistic point of view, stressing principles of biochemistry, biology, and ecology related to insect-vectored disease. Major emphasis is placed on plant natural products.

225. Terrestrial Field Ecology (4) III. Karban  
Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. A field course conducted over spring break and four weekends at Bogeda Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Ecology 225.)

230. Advanced Biological Control (4) III.  
Ehler  
Lecture—2 hours; discussion—1 hour. Prerequisite: course 135. Advanced treatment of current topics in biological control of arthropod pests and weeds. Offered in alternate years.

235. Advanced Medical Entomology (3) III.  
The Staff  
Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 132). One course in microbiology. Course 153 strongly recommended. An analysis of several arthropod-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.

236. 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) L. Eldridge  
Seminar—2 hours. Prerequisite: course 153. Discussed topics in parasitology, ecology and epidemiology related to vector-borne diseases in man and animals. May be repeated for credit.

292. Seminar in Insect Physiology (2) L. Dufy, 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. Kinsley  
Seminar—2 hours. Prerequisite: course 103. Selected topics in systematic 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. Casey, Ehler, Karban  
Seminar—2 hours. Prerequisite: 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.  
Grannet, Parrella, Rosenheim  
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.

296. Seminar in Bee Ecology (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  
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)  
(SU grading only)

The Staff (Chairperson in charge)  
(SU grading only)

Professional Course

404. Grantmanship (2) L. Grannet, Dufy  
Lecture—1 hour; 15-20 page research proposal required. Prerequisite: graduate standing; research experience. Approved for graduate degree credit. Develops in students an awareness of options and strategies in writing research proposals. Students write a full-length research proposal.

Environmental and Resource Sciences

(College of Agricultural and Environmental Sciences)

Faculty. See under departments of Agricultural 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 physical, chemical and biological features of the environment and the economical and social considerations associated with their use, conservation, protection, and management. 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 this 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, an upper division general or environmental resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses are required for all students in the major. 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. Area of specialization is achieved through selection of one of the options within the major.

Internships and Career Alternatives. Positions will be 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**

<table>
<thead>
<tr>
<th>Written/Oral Expression</th>
<th>11-12</th>
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<tbody>
<tr>
<td>See college requirement</td>
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<tr>
<td>English (1, 3, or 20)</td>
<td>7-8</td>
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<tr>
<td>Rhetoric (Rhetoric and Communication)</td>
<td>4</td>
</tr>
<tr>
<td>Preparatory Science (in addition to college requirements)</td>
<td>53-63</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
<td>15</td>
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<tr>
<td>Chemistry (Chemistry 2A-2B)</td>
<td>10</td>
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<tr>
<td>Environmental quality (Environmental Toxicology)</td>
<td>3</td>
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<tr>
<td>Geology (Geology 1 or 50)</td>
<td>3</td>
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<tr>
<td>Mathematics (Mathematics 16A-16B or 21A-21B)</td>
<td>6-8</td>
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<tr>
<td>Microcomputer programming (Agricultural Systems and Environment 21 and 121, Engineering 5, Computer Science Engineering 10, 15)</td>
<td>6-7</td>
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<tr>
<td>Physics (Physics 5A-5B or Physics 5B)</td>
<td>6-12</td>
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**Students are encouraged to take the advanced series—consult with your advisor.**

**Statistics (Statistics 13) | 4**

<table>
<thead>
<tr>
<th>Breadth/General Education</th>
<th>24</th>
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<tbody>
<tr>
<td>Satisfaction of General Education requirements, additional units in social sciences and humanities to total 24 units</td>
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<tr>
<th>Depth Subject Matter</th>
<th>24-27</th>
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<tbody>
<tr>
<td>Writing proficiency (in addition to college requirements)</td>
<td>(English 123D, 123E, 104)</td>
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<tr>
<td>Agricultural Economics 147 or 148</td>
<td>3-4</td>
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<tr>
<td>Soil Science 100</td>
<td>4</td>
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<tr>
<td>Hydrologic Science 100</td>
<td>5</td>
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<tr>
<td>Social-political awareness (Environmental Studies 161, 179; Environmental Toxicology 138, Geology 161, 163, Wildlife, Fish and Conservation Biology 154)</td>
<td>3-4</td>
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<tr>
<td>Plant or animal ecology (Botany 117, Entomology 104, Environmental Studies 100), Plant Science 101, Zoology 125</td>
<td>3-4</td>
</tr>
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**Areas of Specialization (choose one)**

<table>
<thead>
<tr>
<th>Air Resource Option</th>
<th>34</th>
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<tbody>
<tr>
<td>Directed towards a general understanding of the atmosphere as a finite resource and of environmental problems currently faced by mankind. 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 with federal, state, and county agencies concerned with environmental quality and with private companies. (Preparatory physics options Physics 5A-5B required.)</td>
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<tr>
<td>Atmospheric Science 30, 60, 110, 124, 133</td>
<td>17</td>
</tr>
<tr>
<td>Atmospheric Science 192 (specialization)</td>
<td>3</td>
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<tr>
<td>Environmental and Resource Science 131</td>
<td>4</td>
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<tr>
<td>Geography 116</td>
<td>4</td>
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<tr>
<td>Additional electives (Environmental Studies 116, Geography 116, Environmental and Resource Science 103)</td>
<td>3</td>
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**Units**

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<thead>
<tr>
<th>Unrestricted electives (to total 180)</th>
<th>19-34</th>
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<tbody>
<tr>
<td>Environmental Resources Option</td>
<td>39-43</td>
</tr>
</tbody>
</table>

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 post baccalaureate, academic, or professional training.

**Units**

| Environmental and Resource Science 192 | 3 |
| Environmental and Resource Science 192 | 3-4 |
| Upper division resource-oriented courses chosen in consultation and with approval of advisor | 18-24 |
| Environmental and Resource Science courses upper division breadth courses (choose from three of the following areas) | 9-12 |
| Agricultural economics, agronomy and range science, animal science, botany, agricultural engineering, civil and environmental engineering, economics, environmental horticulture, environmental studies, environmental toxicology, emergency management, geology, plant science, range management, environmental studies, soil science, water science, wildlife, fish and conservation biology, and zoology |  |

**Units**

| 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 and social) impacts of existing technologies. Appropriate preparation for careers with utilities, monitoring and environmental quality agencies. |  |
| Environmental Studies 116, 126, 167, 169 (select three courses) | 12 |
| Atmospheric Science 133 | 4 |
| Environmental and Resource Science 33 | 3 |
| Environmental and Resource Science 103 | 3 |
| Environmental and Resource Science 192 (Internship) | 3 |

**Units**

| Unrestricted Electives | 25-40 |
| 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. |  |
| Soil Science 10a, 118 | 7 |
| Hydrologic Science 103, 104 | 8 |
| Additional Hydrologic Science courses (in addition to advisor's approval) | 3 |

**Units**

| Unrestricted Electives | 25-44 |
| 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, 120 | 3-5 |
| Entomology 116 | 5 |
| Wildlife, Fish and Conservation Biology 120, 120L | 4 |
| Hydrobiology 1 | 3 |
| Hydrologic Science 192 (Internship) | 3 |
| Additional electives (Environmental Studies 123, 161 and 15L; Environmental Toxicology 116, Hydrologic Science 41, 41, 140, Wildlife, Fish and Conservation Biology 115) | 8-10 |

**Units**

| Unrestricted Electives | 18-36 |
| Total Units for the Major | 180 |

**Related Courses:** For courses that are related to this major see course listings for Agricultural Economics, Agricultural Systems and Environment, Animal Science, Entomology, Environmental Biology and Management, Environmental Studies, Environmental Toxicology, Evolution and Ecology, Geology, Hydrologistics, Soil Science, Wildlife, Fish and Conservation Biology.

**Major Adviser:** J. Stasulat (201 South Hall)

**Advising Center:** For the major is located in 257 Woytis Hall (916-752-1669).

**Courses in Environmental and Resource Sciences (ERS)**

Questions pertaining to the following courses should be directed to the instructor or to the Resources Sciences Teaching Center, 122 Hapagland Hall (916-752-1669)

**Lower Division Courses**

2. Concepts in Forestry (3) I. Zasoski Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Chemistry 10. Introduction to the physical, biological and ecological factors that give the forest its character and examination of social and economic factors governing forest management. General Education credits.

3. Energy and the Environment (3) I. McBean Lecture—3 hours. Prerequisite: Biological Sciences 10, Chemistry 10. Introduction to energy resources, their global distribution and the social, economic, political, and environmental factors influencing utilization. Roles of hydro, solar, biomass, geothermal, nuclear and fossil fuels in meeting California’s energy requirements. General Education credit with concurrent enrollment in course 3G: Nature and Environment.

3G. Energy and the Environment Discussion (1); 1 credit.


3L. Energy, Society and Environment Laboratory (2) I. McBean Lecture—2 hours; laboratory—2 hours. Field trips; 4 lectures; 2 quizzes; 1 project. Energy sources, their global distribution and the social, economic, political, and environmental factors influencing utilization. Roles of hydro, solar, biomass, geothermal, nuclear and fossil fuels in meeting California’s energy requirements. General Education credit with concurrent enrollment in course 3G: Nature and Environment.

10. California: The State (3) II. Stasulat Lecture—3 hours. Prerequisite: introductory geology or geography required. Introduction to geomorphology, hydrology 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. General Education credit with concurrent enrollment in course 10G: Contemporary Societies.

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. General Education credit with concurrent enrollment in course 10G: Contemporary Societies.

92. Resource 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 resource sciences. Internship supervised by a member of the faculty. (P/N 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/N 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, economic decision making, and the technical and 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 economics, 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 and management. 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 wildlife and rural areas. Practical courses in field area 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 choose the Environmental Biology option are prepared for 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 will be required to plan their course selection with their adviser.

UNITS

English Composition Requirement 6-15
See College requirement

Preparatory Subject Matter 40-54

Biological sciences (Biology Sciences 1A, 1B, 1C, 15)

Chemistry (Chemistry 2A-2B or 2AH-2BH) 10

Computer science (Agricultural Systems and Environment 21, or Computer Science Engineering 20, 16, 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 5A-5B 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 28-32

These units must be taken for a letter grade with an average grade-point average of 2.0 or higher.

Ecology (Select one of Botany 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, 153, 154, Hydrologic Science 100, 141, Soil Science 100) 6-8

Environmental Policy (Select one course from: Environmental Studies 161, 162, 163, 168, 171, 179; Agricultural Economics 147, 175, 176) 3-4

Choose Agricultural Economics if Environmental Management option is selected.

Management of Public Lands, Environmental Studies 172 4

Mathematics and/or Statistics (Select one course from: Mathematics 20A, 20B, 226; 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 131 4

Evolution and biogeography (Choose one from: Entomology 147, Evolution and Ecology 100, 102, 128, 144, 147, 149, Geography 173, Geology 107 3-4

Resource economics, Agricultural 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 Economics, Environmental Studies 161, 166, 171, 172, Geography 161 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, 155, 156, 158, 160, 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, Psychobiology 150, Wildlife and Fisheries 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) 3-6


Physiology, including laboratory experience. Choose from: Entomology 102, Environmental Studies 129, 129L, 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 Biology 121, 151, 150B, 150C, 155L, Evolution and Ecology 144, 149, Geography 173, 183

*Course not offered this academic year.
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
Richard Bertaux, B.Arch., M.S., Associate Professor
Mark Francis, M.L.A., Professor
Patricia Harrison, M.A., Associate Professor
Janet L. Hethorn, Ph.D., Assistant Professor
György Laká, M.A., Professor
E. Byron McCasley, B.S.L.A., Lecturer
Edward S. McNeil, M.L.A., Lecturer
Helge B. Olsen, Senior Lecturer
Pattie E. Owens, M.L.A., Assistant Professor
Susan Palmer, M.A., Lecturer
Kathleen R. Plummer, M.F.A., Lecturer
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor
Barbara Shawcroft, M.F.A., Professor
Heath Schenkel, M.A., Assistant Professor
Robert Sommer, Ph.D., Professor
Kathryn Sylva, M.F.A., Lecturer
JoAnn C. Stabb, M.A., Assistant Professor
Robert L. Thayer, Jr., M.A., Professor

Emeriti Faculty
Frances Butler, M.A., Professor Emerita
Katherine W. Rossbach, M.A., Professor Emerita

Programs of Study: See the majors in Design and Landscape Architecture.
Related Courses: See Design and Landscape Architecture course lists.

Environmental Geology

(College of Letters and Science)
The minor in Environmental Geology examines the multidisciplinary role of geology and related earth science fields, and planning and resources oriented programs.
Students in the minor are encouraged to participate in internship programs and to consider them in selecting the Environmental 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 | Geology | Geology 130, 134, or Geography 106 | Soils Science 118 | Hydrologic Science 141 or Civil and Environmental Engineering 142 | Two courses chosen from: Environmental Studies 160, 171, 179; Geology 135, or Geography 108; Environmental and Resource Sciences 100; Hydrologic Science 145 |

Minor Adviser: Robert T. Wise, Department of Geology, 391 Physics/Geology Building, 752-0179.

Environmental Horticulture

(College of Agricultural and Environmental Sciences)
James A. Harding, Ph.D., Chairperson of the Department

Department Office, 140 Environmental Horticulture Building (916-752-0130)

Faculty
Michael G. Barbour, Professor
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 Lieb, Ph.D., Associate Professor
Patricia A. Lindsey, Lecturer
James D. MacDonald, Ph.D., Professor (Plant Pathology)
Carolyn Napel, Ph.D., Assistant Professor
Michael P. Parnell, Ph.D., Professor (Entomology)
Michael S. Reid, Ph.D., Professor
Lisa L. W., Ph.D., Professor

Emeriti Faculty
Thomas G. Byrne, M.S., Lecturer Emeritus
Richard W. Harris, Ph.D., Professor Emeritus

Academic Senate Distinctions/Teaching Award
Charles E. Hess, Ph.D., Professor Emeritus
Arlon M. Kofman, Ph.D., Professor Emeritus
Harry C. Kohl, Jr., Ph.D., Professor Emeritus
Andrew T. Leiser, Ph.D., Professor Emeritus
John M. Madison, Jr., Ph.D., Professor Emeritus
Jack L. Paul, Ph.D., Professor Emeritus
Roy M. Sachs, Ph.D., Professor Emeritus

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 can specialize in Ornamental Nursery Management or Landscape Horticulture. Students can develop individual majors 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.

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 or 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 Agricultural Systems and Environment, Environmental Biology and Management, and Plant Science; for graduate studies, see the Graduate Studies section.

Related Courses: See Plant Science.

Minor Program Requirements:

| Units | Environmental Horticulture | Environmental Horticulture 6 | Plant Science 100 | Select one of the following courses: Environmental Horticulture 105, Environmental Horticulture 107 |

*Course not offered this academic year.*
Courses in Environmental Horticulture (ENH)

Lower Division Courses

1. Introduction to Environmental Horticulture/Urban Forestry (ENH 1) 3

Lecture—3 hours; discussion—1 hour. 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.

6. Introduction to Environmental Plants (ENH 3) 3

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growth of turf, flowers, and herbaceous and woody plants in the landscape.

92. Internship (1-12) 1, 2, 3

Internship—3-36 hours. Prerequisite: lower division standing, Biological Sciences 1C or Plant Science 10, 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 (1-6) 1, 2, 3

Special study in Environmenal Horticulture supervised by the Chairperson in charge. (P/NP grading only)

Upper Division Courses

100. Urban Forestry (ENH 3) 3

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 (ENH 4) 3

Sachs

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C. Physiological principles and processes essential to floriculture, nursery crop production, turfgrass, and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad spectrum of species of wide and extensive landscape environments.

105. Taxonomy and Ecology of Ornamental Plants (ENH 5) 3

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 phylictic relationships of plants that are important factors in the human environment.

107. Herbaceous Environmental Plants (ENH 6) 3

Harding

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: introductory course in environmental plants (course 6) or in plant taxonomy (Botany 108). Evolutionary relationships, hybridization, selection and cultural uses of herbs, ornamentals, environmental plant material with emphasis on family characteristics and genetic and environmental differences. Plants are catalogued with the use of taxonomic keys.

120. Management of Container Soils (ENH 7)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 100. Use of peat, sand, mineral soil, and amendments to formulate container soils. Management of container soils emphasizing irrigation, salinity control, and fertilizer practices.

125. Greenhouse and Nursery Crop Production (ENH 8)

Prerequisite: Agricultural Systems and Environment 2. Principles and techniques necessary for the greenhouse and nursery production of ornamental crops.

130. Turfgrass and Amenity Grasslands

Utilization and Management (ENH 9) 3

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 grasslands. 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 (ENH 10) 3

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. 

192. Internship (1-12) 1, 2, 3

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) 1, 2, 3

The Staff (Chairperson in charge)

Tutoring—4 to 8 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and consent of instructor. Leading discussion sessions, conducting laboratory exercises, and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conferences on subject matter and instructional techniques. May be repeated once for credit if different course is tutored. (P/NP grading only)

198. Directed Group Study (1-5) 1, 2, 3

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) 1, 2, 3

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 (ENH 220) 2

Durzan

Lecture—2 hours. Prerequisite: Bachelors or Masters degree in a plant science discipline (botany, plant physiology, genetics, horticulture, related fields) and a basic understanding of basic principles of biotechnology of woody perennial plants. Cell and tissue culture methods and current process control problems are emphasized. (P/NP grading only)

*Course not offered this academic year.
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 believe that plants improve the environment and the quality of our lives. The focus of the major is 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/peoples interactions in the urban environment. Plants are used to revitalize 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, intercroplands and commercial sites is an important aspect of this major. Students may select one of the following three Areas of Specialization: Urban Forestry, Horticulture/Nursery or Landscape Management/Turf.

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, governmental agencies or regional nurseries. Career opportunities in this field include growing and/or managing plants in a variety of settings, consulting as 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.................0-6

Preparatory Subject Matter.........................55-63
Environmental Horticulture 1 and 6.............6
Landscape Architecture 40.........................4
Soil Science 10..................................3
Biological sciences (Biological Sciences 1C or Agricultural Systems and Environment 2)........2.........................4-5
Physical sciences (Chemistry 2A and Chemistry 2B or Physics 10 or 11).........................14
Agricultural sciences (Agricultural Systems and Environment 22 or Plant Science 10)........10

Resource sciences (Choose two courses from Environmental and Resource Sciences 2, 3, 10; Geography 1, 2, 3, 5, 6; Water Science 41).........................6-8

Resource sciences (Environmental Sciences 1, 10, or 30).........................3-4
Social sciences (Psychology 1 or 15 or 16 and Sociology 1 or 2).........................7-9
Qualitative reasoning (Agricultural Systems and Environment 21 and either Mathematics 16A or Statistics 13).........................6-7

Breadth/General Education.........................6-24

Depth Subject Matter...........................41-45
Ecology (Select two courses from Environmental Studies 100, Evolution and Ecology 101, 117, or 121).........................8
Environmental Horticulture 102.................4

Resource sciences (Select two courses from Environmental Resource Science 103, 121, 131, Atmospheric Science 105).........................6

Psychology 144.................................4
Planning/Policy (Environmental Planning and Management 110 or Environmental Studies 171 or Political Science 107).........................4
Plant systematics (Environmental Horticulture 103 or Plant Biology 108 or 106).........................4-5
Plant management (Entomology 110, Plant Pathology 120).........................8
Internship, Environmental Horticulture 192.........................3-6

Areas of Specialization (Choose One)

Urban Forestry Option..........................22
Woodly Plants in the Landscape (Environmental Horticulture 133).........................4
Urban Forestry (Environmental Horticulture 100).........................4

Turfgrass Culture (Environmental Horticulture 130).........................3
Plants in the Cultural Environment (Landscape Architecture 155).........................3
Survey of Plant Communities of California (Evolution and Ecology 121).........................4

Urban Geography (Geography 155).........................4

Floriculture / Nursery Option..................18

Plant Propagation (Plant Science 104).........................4
Management of Container Soils (Environmental Horticulture 125).........................5

Greenhouse and Nursery Production (Environmental Horticulture 125).........................5
Introduction to Biological Control (Entomology 136).........................2
Irrigation Practices for an Urban Environment (Applied Biological Systems Technology 165).........................2

Landscaping Management / Turf Option........19

Turfgrass Culture (Environmental Horticulture 130).........................3

Woodly Plants in the Landscape (Environmental Horticulture 133).........................4
Diagnosis and Control of Plant Diseases (Plant Pathology 125).........................4
Irrigation Practices for an Urban Environment (Applied Biological Systems Technology 165).........................2
Plants in the Cultural Environment (Landscape Architecture 155).........................3
Management of Container Soils (Environmental Horticulture 125).........................3

Unrestricted Electives..........................26-60

Total Units for the Major.......................160


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. Students interested in this major should apply to the Environmental Program or Environmental Policy and Management. Applications to the major are accepted from Exploratory students on a continuing basis.

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, and 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 Course requirement.........................0-6

Preparatory Subject Matter.................51-58

Biological sciences (Biological Sciences 1A or 10).........................4-5
Chemistry (Chemistry 2A or 2B).........................10
Computer science (Agricultural Systems and Environment 21, Engineering 5, Computer Science Engineering 10, 30).........................3-4
Economic principles (Economics 1A or 1B).........................10

Environmental science/Plography (Animal Science 1, Biological Sciences 1B, Geology 1, Hydrologic Science 100, 104, Plant Science 10, Soil Science 100).........................3-5

Environmental studies (Environmental Studies 1).........................4

Mathematics (Mathematics 16A or 16B or 21A or 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.........................6-24

Depth Subject Matter..........................37-40

(Students must take these units on a letter grade basis, and must attain an overall grade-point average of 2.0 or higher in the Depth Subject Matter courses.)

Core Courses
Environmental Studies 160.........................4

*Course not offered this academic year.
Environmental Studies 161, 173, or Hydrologic Science 150 ................. 3-4
Environmental Studies 166 .................................................................. 4
Environmental Studies 168 .................................................................. 5
Environmental Studies 171 or 179 ....................................................... 3-4
Environmental Studies 180 .................................................................. 4
Environmental Studies 164 .................................................................. 4

Research Methods
Environmental Studies 178; or Sociology 103 ........................................ 4
Sociology 106; or Agricultural Economics 108 or Statistics 108 .............. 4
Economic Analysis
Economics 100, 104, or Agricultural Economics 100A ......................... 4-6
Agricultural Economics 176 ................................................................... 3

Areas of Specialization (choose one): 17-23

Advanced Policy Analysis Option
Political institutions (Political Science 102, 105, 108, 155, Environmental Studies 162) ........................................................................................................ 4
Political behavior (Political Science 164, 165, 170) ................................. 4
Science policy studies ............................................................................. 4
Policy evaluation research (Environmental Studies 166B) ......................... 4
Policy evaluation (Civil and Environmental Engineering 163, 169, Agricultural 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 (Geography 155, 156) .................................................. 4
Transportation planning (Civil and Environmental Engineering 160) ........ 3
Environmental impact assessment (Soil Science 118, Environmental Studies 179) ................................................................. 3
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 (Environmental Studies 115) .......................................... 4
Energy technology (Engineering 160, 162) ............................................. 4
Solar energy (Environmental and Resource Sciences 103) ...................... 3
Economics of energy (Economics 175) .................................................... 4
Energy policy (Environmental Studies 167) ........................................... 4

Environmental Science Option
Students choosing the Environmental Science area of specialization must con- sult with a faculty advisor to identify an emphasis within this specialization and to select suitable courses. Possible areas of emphasis are: biological conservation, pollution policy (Environmental Studies 165), energy, planning in the presence of environmental hazards. If you are considering this area of specialization, please contact the major advisor 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, Environmental Studies 162 .......................... 4
Recreation and Environment Economics 112, Applied Behavioral Science 163, 170, Political Science 183, 189) .................................................. 4

Transportation Planning Option
Urban structure (Geography 155, 156, Economics 125) .......................... 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
Environmental and energy 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
Field and laboratory methods (Hydrologic Science 122, Environmental Studies 151) ................................................................. 3-4
Water chemistry (Hydrologic Science 103, 142) ...................................... 3-4
Hydrology (Hydrologic Science 141) .................................................... 3
(Enroll in Hydrologic Science 182 for law requirement under Depth Subject Matter above.)

Unrestricted Electives ........................................................................... 24-58
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 intended for national and social science students desiring basic training in policy analysis theory and methods.

Energy Policy Minor
Preparation: Economics 1A; basic course in political science. .......................... 18-19
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 165 ................................................................... 4
Environmental Studies 167 or Political Science 171 ............................... 4

Enrollment Policy Analysis Minor
Preparation: Economics 1A; basic course in political science. .......................... 23-24
Environmental Studies 110, 160, 161, 166, 166A .................................... 20
Environmental Studies 171 or 179 ......................................................... 3-4

Minor Adviser, S.I. Schwartz (Environmental Studies)

*Course not offered this academic year.

Environmental Studies
(Intercollege Division)
Alan M. Hastings, Ph.D., Chairperson of the Division
Division Office, 2132 Wickeon Hall (916-752-3028)

Faculty
Theodore C. Foin, Jr., Ph.D., Professor
Charles R. Goldman, Ph.D., Professor
Susan P. Harrison, Ph.D., Assistant Professor
Alan M. Hastings, Ph.D., Professor
Jack D. Ives, Ph.D., Professor
Robert A. Johnston, M.S., Professor
Benjamin S. Orlow, Ph.D., Professor
James F. Quinn, Ph.D., Professor
Elisa Rejmanova, Ph.D., Assistant Professor
Peter J. Richison, Ph.D., Professor
Paul A. Sabatier, Ph.D., Professor
Thomas W. Schoenert, Ph.D., Professor (Evolution and Ecology)
Christina Schorewald, Ph.D., Assistant Adjunct Professor
Seymour I. Schwartz, Ph.D., Professor
Dennis Spelling, Ph.D., Professor (Environmental Studies, Civil and Environmental Engineering)
Geoffrey A. Wundersforst-Smith, Ph.D., Associate Professor (Environmental Studies, Political Science)
James E. Wilen, Ph.D., Professor (Environmental Studies, Agricultural Economics)

Emeriti Faculty
William J. Hamilton III, Ph.D., Professor Emeritus

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 economics, evolution and ecology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecol- ogy should be obtained from the Chairperson of the Graduate Group in Ecology.

Graduate Adviser, T.C. Foin (Ecology).

Courses in Environmental Studies (EST)

Lower Division Courses
1. Environmental Analysis (4) II. Quinn, Moyle Lecture—3 hours; discussion—1 hour. Prerequisite: English 1, English 102, Economics 1A, 1B, Biological

Environmental Studies 237
115. Biogeochemical Consequences of Nuclear Technology (3) III. Rasbe
Lecture—3 hours; field trip to nuclear power station.
Prerequisite: a course in biology. Biophysical implications of radio-nuclei and thermal effluents generated by nuclear technology. Hazard evaluation based on predictions of the most sensitive physiological response. Offered in alternate years.

116. The Oceans (3) I. Spero; II. Cowen
Lecture—3 hours. Introductory survey of the marine environment: oceanography, chemical, biological, and geological aspects. Emphasis on the interaction of the oceans and land. Field trips toselected areas are offered. (Same course as Geology 116.) General Education credit with concurrent enrollment in course 116G. Nature and Environment.

116G. The Oceans: Discussion—2 hours. I. Spero; II. Cowen
Prerequisite: course 116 or Geology 116 concurrently. Scientific method applied to discovery of the processes, biota, and history of the oceans. Group discussion and preparation of papers on related topics. General Education credit with concurrent enrollment in course 116F. Nature and Environment. (Same course as Geology 116G.)

(b) Ecological Analysis

121. Population Ecology (4) II. Hastings
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 11B, 1C, Mathematics 16A-16B, 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 150B.)

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, structure and composition 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 1B in general ecology, or consent of instructor. Survey of the major marine habita including intertidal, estuarine, pelagic, and deep-sea and planktonic communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use 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 1B, Junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3) III. C. Goldman
Lecture—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 ecologies.

155. Wetland Ecology (3) I. Rejmakova
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. Rejmakova
Lecture—3 hours; laboratory—6 hours; fieldwork—2 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, labora-

*Course not offered this academic year.
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 168 or Political Science 185. Not for credit 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. Wandersforde-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. General Education credit: Contemporary Societies.

162. Recreation Policy Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 147 or 176, or Environmental Biology and Management 127. Introduction to major issues and evaluative techniques in the analysis of outdoor recreation policy. Principles of political science and economic principles are applied to the analysis of recreation demand and provision, and the resolution of conflicts between recreation and other uses. Offered in alternate years.

163. Energy and Environmental Aspects of Transportation (3) II. Sperling Lecture—3 hours. Prerequisite: Civil Engineering 160 recommended. Application of engineering, economic, and system planning concepts. Analysis of energy, air quality, and environmental attributes of transportation technologies. Investigation of strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. (Same course as Civil Engineering 163.)

164. Ethical Issues in Environmental Policy (4) III. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: courses 160, 168A; seniors only in Environmental Policy Analysis. Lecture and paper writing or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policy-making.

165. Science, Experts and Public Policy (4) II. Craig Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 160 or Political Science 108 recommended. Analysis of factors that influence decision making by experts, politicians, planners, and other experts in policymaking. Several cases and controversies will be examined.

166. Policy-Making in Natural Resource Agencies (4) I. Wandersforde-Smith Lecture—4 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, Statistics 13. Analysis of factors affecting decision-making within administrative agencies responsible for managing natural resources such as the Forest Service and EPA. Emphasizes critical examination of written materials. General Education credit: Contemporary Societies.

167. Energy Policy (4) I. Johnston 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. Prerequisites: Statistics 13; Economics 100 or Agricultural Economics 100A; Mathematics 162 or 218; and 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 multiobjective evaluation.

168B. Methods of Environmental Policy Analysis (4) II. Sperling Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A. With emphasis on the examination of the literature for applicability 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.

169. Environmental Planning (4) III. Johnston Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 110, or 110A; 147 or 176, and Environmental Toxicology 10. Techniques for the design of residential environments. Analytical techniques are applied to the problem of land use, and the role and function of zoning, subdivision and building codes in environment preservation, constitutional and legal bases for controls; community and political factors influencing legislation and administration of controls; and the relative effectiveness of specific controls in channeling urban growth.

170. Natural Resource Economics (3) II. Wilen Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with water resources, renewable resources (ground water, forests, fisheries and wildlife populations), and non-renewable resources (mineral and energy resources, oil). (Same course as Economics 104.)

170. Applied Research Methods (4) I. The Staff 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 other environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and communication of research results.

171. 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 Resource Sciences 100. Methods of analysis used in environmental impact reporting. Emphasis on effective writing; review and management of environmental 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. Orientation and graduate students on application. (FNP grading only.)

192. Internship (1-12) I, II, III. The Staff (Department 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. (FNP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (FNP grading only.)

199. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (FNP grading only.)

Graduate Courses

212A. Environmental Policy Analysis (4) II. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g. Political Science 107 or 108), course in bureaucratic policy making (e.g. course 166 or Political Science 185) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in alternate years. (Same course as Ecology 212A.)

212B. Environmental Policy Analysis: Evaluation (4) III. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100B or Economics 100. A course for graduate and advanced 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 will be stressed. Offered in alternate years. (Same course as Ecology 212B.)

220. Tropical Ecology (3) III. Rejmankova Lecture—2 hours; discussion—1 hour. Prerequisite: 212A (or Advanced Introduction to Ecological Modeling course (course 100 or Evolution and Ecology 101 or 117); Evolution and Ecology 138 recommended. Open to graduate and undergraduate students who meet requirement, subject to consent of instructor. Examination of the present status of knowledge on structure and processes of major tropical ecosystems. Differences and similarities among tropical and temperate systems will be stressed. Offered in alternate years. (Same course as Ecology 212B.)

*Course not offered this academic year.

228. Advanced Simulation Modeling (3) III. Foin Lecture—2 hours; discussion—1 hour. Prerequisite: courses 128-128L, Statistics 106 or Agricultural 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 offers a laboratory-oriented introduction to computer simulation modeling and emphasizes the use of computer hardware and software for problem solving. (Same course as Environmental Engineering 252.)

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (FNP grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. (SU grading only.)
Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Robert H. Rice, Ph.D., Acting Chairperson of the Department

Department Office, 4138 Meyer Hall (916-752-1142)

Faculty

Michael S. Denison, Ph.D., Associate Professor
Bruce D. Harnack, Ph.D., Professor (Environmental Toxicology, Entomology)
Theodore L. Huttar, Ph.D., Professor
Fumio Masumura, Ph.D., Professor
Marlon G. Miller, Ph.D., Associate Professor
Clayton A. Reese, M.S., Lecturer
Robert H. Rice, Ph.D., Professor
Takayuki Shibamoto, Ph.D., Professor
Barry W. Winterling, M.S., Lecturer (Environmental Toxicology, Avian Sciences)
Dorothy E. Woolley, Ph.D., Professor (Environmental Toxicology, Neurobiology, Physiology and Behavior)

Emeriti Faculty

Richard G. Burts, Ph.D., Professor Emeritus
Donald G. Croy, Ph.D., Professor Emeritus
Dennis P. H. Haehl, Sc.D., Professor Emeritus
Wendell W. Kilgore, Ph.D., Professor Emeritus
Ming-yu Li, Ph.D., Lecturer Emeritus (Emerita)
James N. Seil, Ph.D., Professor Emeritus
Way W. Winterling, M.S., Lecturer Emeritus

The Major Program

Students in environmental toxicology study toxic substances which are found in our personal, occupational, community, and global environments. What these substances are, where they are distributed and what happens to them, how they work, and how they affect and are affected by these substances are the central focus of study. A special concern is with human-made toxicants such as pesticides, industrial chemicals, food additives, and environmental pollutants; but toxic substances that occur naturally in the environment (including heavy metals and toxins produced by animals, plants, molds, and bacteria) are also of concern.

The Program. The study of environmental toxicology draws heavily from preparatory courses in biology, chemistry, mathematics, and physics. The major offers courses outlining the chemical, biological, and legal aspects of environmental toxicology legislation concerning pollution, pesticides, food additives, and consumer protection) as well as providing in-depth treatment of different groups of toxic substances. Students may specialize in any of several areas of environmental toxicology—e.g., chemical analysis, environmental monitoring, animal toxicology, or environmental health and safety—by choosing electives in these areas.

Internships and Career Alternatives. Research positions in both university and private laboratories, as well as with governmental regulatory agencies in near Sacramento, are examples of current internships. Opportunities for environmental toxicology majors. Approximately half of the undergraduate students completing the environmental toxicology program seek to go on for advanced degrees in toxicology, pharmacology, public health, medicine, law, chemistry, or biology. Others with the B.S. degree have found jobs with government agencies, universities, in industry, research and consulting firms, and with laboratories. Those students who emphasize the physical sciences in their study of toxicants would qualify for positions in residue analysis, environmental monitoring, and forensic toxicology. Those emphasizing the biological sciences would qualify for similar positions in animal toxicology, environmental health and safety, and pest control.

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 substituted with advisor's approval. Courses shown without parentheses are required.)

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<tr>
<th>Course</th>
<th>Units</th>
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<tr>
<td>English Composition Requirement</td>
<td>0-8</td>
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<td>See College requirement</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>61-70</td>
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<tr>
<td>Biological sciences</td>
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<tr>
<td>(Biological Sciences 1A, 1B, 1C)</td>
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<tr>
<td>Chemistry</td>
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<tr>
<td>(Chemistry 2A-2B-2C, or 2AH-2B-2CH and 118A-118B-118C)</td>
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<tr>
<td>Computer science</td>
<td>24</td>
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<tr>
<td>(Computer Systems and Environment)</td>
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<tr>
<td>Environmental sciences</td>
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<tr>
<td>(Environmental Toxicology 10 or Environmental Studies 10)</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>(Mathematics 16A-16B or 21A-21B)</td>
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<tr>
<td>Physics</td>
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<tr>
<td>(Physics 1A or 6A-5A-5E)</td>
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<tr>
<td>Statistics</td>
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<td>(Statistics 13 or 100)</td>
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<tr>
<td>Breadth/General Education</td>
<td>36</td>
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<tr>
<td>Satisfaction of the General Education requirement to insures a course selected with advisor's approval to complement the major courses in agricultural economics, environmental studies, political science, psychology, and sociology (suggested in the following recommend)</td>
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<tr>
<td>Additional breadth in humanities and social sciences</td>
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<tr>
<td>Depth Subject Matter</td>
<td>29-30</td>
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<tr>
<td>Genetics and Biochemistry (Biological Sciences 101, 102, 103)</td>
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<tr>
<td>Environmental Toxicology</td>
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<tr>
<td>(Environmental Toxicology 101, 112A-112B, 114A-114B, 138)</td>
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<tr>
<td>Unrestricted Electives</td>
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<tr>
<td>Electives selected for area of specialization with advisor's approval</td>
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<tr>
<td>Total Units for the Degree</td>
<td>180</td>
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<tr>
<td>Major Adviser: M.G. Miller</td>
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<td>Advising Center</td>
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Minor Program Requirements:

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<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Environmental Toxicology</td>
<td>18</td>
</tr>
<tr>
<td>Environmental Toxicology 101, 112A, 114A, 138</td>
<td></td>
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<tr>
<td>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)</td>
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<tr>
<td>Minor Adviser: M.G. Miller</td>
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</tbody>
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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. Information on graduate study contact the Graduate Office of the University of California, Davis.

Graduate Advisers: A.P. Buckett, J.J. Last, B.W. Wilson (Pharmacology and Toxicology), T. Shibamoto (Agricultural and Environmental Chemistry).

Courses in Environmental Toxicology (ETX)

Lower Division Courses

10. Introduction to Toxicology (ETX 3) III. The Staff

Lecture 3 hours. Prerequisite: open to science and non-science majors. Study of some natural and man-made toxic substances and social, 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.

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 (ETX 101) III. Denison

Lecture 3 hours. Prerequisite: Chemistry 1B, 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, polychlorinated biphenyls, and emerging toxicants, and heavy metals.

112A. Toxicants in the Environment (ETX 112A) III. Shibamoto

Lecture 3 hours; laboratory 3 hours. Prerequisite: Chemistry 2C, or 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.

114A. Biological Effects of Toxicants (ETX 114A) III. Rice

Lecture 3 hours. Prerequisite: course 101 and Biological Sciences 102; Neurobiology, Physiology and Behavior 101 recommended. Illustrates the biological and ecological effects of toxic substances in living organisms. Topics covered include metabolism, cellular and tissue targets, mechanisms of action, and pathological effects.

114B. Biological Effects of Toxicants: Experimental Approaches (ETX 114B) III. Miller

Lecture/Discussion 2 hours; discussion/laboratory 4 hours. Prerequisite: course 114A and consent of instructor. Non-majors are not eligible unless they have completed at least 15 units of chemistry, biology, and/or environmental science. Major effects of toxic substances in living organisms. Topics covered include metabolism, cellular and tissue targets, mechanisms of action, and pathological effects.

128. Food Toxicology (ETX 128) III. Shibamoto, Gruenwedel (Food Science and Technology)

Lecture 3 hours. Prerequisite: Biological Sciences 102 and 103. Chemistry and biochemistry of 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)

130A-E. Selected Topics in Environmental Toxicology (ETX 130A-E) III. The Staff (Chairperson in charge)

Lecture/discussion 3 hours. Prerequisite: consent of instructor, course 101 recommended. Selected

*Course not offered this academic year.
topics of current interest in environmental toxicology. Topics will vary each time the course is offered, and will emphasize the mechanisms of action 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) The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: Chemistry 88 or the equivalent. Students will be introduced to the interaction between atmospheric chemistry and the effects of pollutants, focusing on the implications of industrial activities on the environment. Topics covered include: air pollution, chemical composition of the atmosphere, effects of air pollution on human health, and policies and regulations to mitigate the effects of air pollution.

132. Chromatochemistry for Analytical Toxicology (4) (II) The Staff (Chairperson in charge) Lecture—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 88 or the equivalent. Students will learn the principles and applications of chromatographic techniques, including thin-layer, gas, high-pressure liquid, and column chromatography, and the use of these techniques in the field of toxicology.

135. Health Risk Assessment of Toxicants (3) I. Hashe Lecture—3 hours. Prerequisite: course 101; course 114A recommended. Current practices of health risk assessment, environmental toxicants and their effects on human and ecological health. Students will learn the principles and techniques of health risk assessment, including the use of models and tools for risk assessment.

136. Legal Aspects of Environmental Toxicology (3) II. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Courses 10 and 101 recommended. Selected cases and regulations in environmental toxicology, focusing on the intersection between law and toxicology.

146. Exposure and Dose Assessment (3) I. McKone, Layton Lecture—3 hours. Prerequisite: course 112A recommended; course 125 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 these media.

190. Seminar (1) I. 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/N grading only.)

190C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/N grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3 to 36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off-campus in all areas of toxicology supervised by a member of the faculty. (P/N grading only.)

194HA-194HB. Honors Research (3-3) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—4 hours. Prerequisite: senior standing, minimum GPA of 3.25, consent of instructor. Specific research project conducted under the supervision of a faculty sponsor. Experience includes experimental design, learning new techniques, data analysis and interpretation of findings. (P/N grading only; deferred grading pending completion of sequence.)

194HC. Honors Research (3) I, II, III. The Staff (Chairperson in charge) Laboratory discussion—1 hour. Prerequisite: senior standing, minimum GPA of 3.25, and consent of instructor. Continuation of course 194HA-194HB. (P/N grading only.)

1977. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—1 hour. Prerequisite: consent of instructor. Prerequisites: advanced standing in Environmental Toxicology, or 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/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N 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 88 and consent of instructor. Toxicological interactions 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, Denlinger 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.

222. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) I. Reese, Shimamoto 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 fragmentation 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 their effects. Examples of ways toxins may act on the nervous system and their role in the development of neurotoxicity. (Same course as Psychology 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 of toxic effects, modeling, and field research. Selected case histories are analyzed and presented in class.
Exercise Science

290. Seminars in Epidemiology
(I) III. The Staff
Seminar—1 hour. Students will actively participate in presentation and discussion of ongoing or published research projects in epidemiology. (SU 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. (SU 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., Supervisor
Susan E. Jennings, Ph.D., Supervisor
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
Stephen T. Bronzan, M.S., Lecturer
Simon Davies, Ph.D., Lecturer
Kathleen M. DeYoung, B.A., Supervisor
Pamela L. Gil-Fisher, M.A., Supervisor
Raymond S. Goldfarb, B.A., Supervisor
Jorja E. Hoehn, M.S., Lecturer
Barbara A. Jahn, M.S., Supervisor
Sharon King, M.S., Lecturer
Philip S. Swetlik, M.S., Supervisor
Deanna V. Vochatzer, M.A., Manager
Jon E. Vochatzer, M.S., Supervisor
Robert A. Williams, M.A., Lecturer
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
William S. Lotter, Ed.D., Senior Lecturer Emeritus
E. Dean Ryan, Ed.D., Professor Emeritus

The Major Program

The mission of the Department of Exercise Science is the integrative study of physical activity and its adaptive consequences on human form and function.

The Program. The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is designed primarily for those students who desire a liberal arts program with a broadly based lower division curriculum. This program permits specialization in the biological or psychological aspects of physical education, 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 designed for students desiring a more intense curriculum in the natural sciences. It involves more physical education, physical science preparation in lower division courses, and requires additional upper division coursework more specific to either biomechanics or exercise physiology. 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:

Preparatory Subject Matter

Biological Sciences 1A-1B.......................... 10
Chemistry 2A, 2B.......................... 10
Exercise Science 45.......................... 3
Physics 1A, 1B, or 7A.......................... 3-4
Psychology 1 or 15.......................... 3-4

Additional requirements:

Biological emphasis—Statistics 13, 14
Psychological emphasis—Psychology 41

Depth Subject Matter

Cell Biology and Human Anatomy 101, 102, 103, 104, 105, 106.......................... 16
Cell Biology and Human Anatomy 101, 101L, 102, 103, 104, 105, 106, 117, 118.......................... 16
Neurobiology, Physiology and Behavior 101, 105.......................... 16
Minimum of 12 upper division units in exercise science chosen with approval by a major advisor

Students electing this emphasis must select a minimum of 9 units from Exercise Science 110, 111, 112, 113, 115, 116, 117, 118

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 advisor.

Biological emphasis: Anthropology 101, 152 or 153, Biological Sciences 101, 102, 103, 104, 105, 106, 117, 118, 120
Psychological emphasis: Psychology 114, 115, 136, 143, 145, or 160

None of the variable-unit courses or Physical Education 100, 102A, 102B, 10A, 143A, 143B, 144, or 145, 146, 147, 148, 148L, or 148B may be used to fulfill these requirements. Consult your advisor regularly.

Total Units for the Major.......................... 76-78

B.S. Major Requirements:

Preparatory Subject Matter

Biological Sciences 1A-1B.......................... 10
Chemistry 2A-2B or 2AH-2B.......................... 10
Mathematics 16A-16B or 21A-21B.......................... 6-8
Exercise Science 45.......................... 3
Physics 5A-5B, 7A-7B, or 9A-9B.......................... 3-4
Psychology 1 or 15.......................... 3-4
Statistics 13 or 102.......................... 4

Additional Requirements

Biomechanics emphasis: Computer Science Engineering 10 or 30 or Engineering 5, and Physics 5C, 7C, or 9C.......................... 7-8
Exercise Physiology emphasis: Chemistry 8A-8B, or 118A-118B.......................... 6-8

Depth Subject Matter

Cell Biology and Human Anatomy 101, 101L, 102, 103, 104, 105, 106, 117, 118.......................... 16
Neurobiology, Physiology and Behavior 101, 101L, 102, 103, 104, 105, 117, 118.......................... 7-8
Restriction electives.......................... 22
1. Minimum of 10 upper division units from outside the major selected with advisor's approval and as restricted below
2. Biomechanics emphasis: at least 3 of the 10 units must be selected from the following: Engineering 102A, Neurobiology,
Teaching Credential Subject Representative: R.S. Goldfarb. 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 1995-96 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, 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, and Physical Education 6, for students interested in participating in intramural activities 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 self-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 program, 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 (3).
Adams
Lecture—3 hours. An introduction to historical, biomechanical, physiological, psychological and sociological foundations of physical education. 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 (2-6)
I, II, III.
The Staff (Chairperson in charge)
Internship—6-15 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/N grading only)

97T. Tutoring in Exercise Science (1-5)
I, II, III.
The Staff (Chairperson in charge)
Tutor—1-6 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 course. Written reports may be required. May be repeated once for credit. (P/N grading only.)

98. Directed Group Study (1-5)
I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/N grading only)

99. Special Study for Undergraduates (1-5)
I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N 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.

101L. Exercise Physiology Laboratory (1)
I. Molé
Laboratory—3 hours (for 5 weeks); discussion—2.5 hours. 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, psychological and ergonomic 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)
I. 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)
I. Hawkins
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1 or 15, and course 45. Analysis of variables affecting the ability to produce, maintain, and control movement. 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 103.

104. Introduction to Motor Control and Skill Acquisition (3).
I. Jennings
Lecture—3 hours; laboratory—3 hours to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1 or 15, and course 45. Analysis of variables affecting the ability to produce, maintain, and control movement. 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. Jennings
Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Survey of theories and experimental findings from social psychology and human motivation and their application to motor performance, including sex differences, success and failure, expectations, anxiety, competition, and aggression. Not open for credit to students who have taken Physical Education 105.

110. Exercise Metabolism (3).
I. 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.

111. Environmental Effects on Physical Performance (3) III. Adams in charge. Lecture—3 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 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 112.

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) III. 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.

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 muscle-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.


117. Exercise and Aging in Health and Disease (3) II. Holly Lecture—2 hours; discussion—1 hour. Prerequisite: course 101. Physiology and Behavior 101, and 110 (concurrently). Biology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary and renal diseases, diabetes, obesity, lipogenesis, etc.). Exercise will then be considered as a potential treatment modality. Not open for credit to students who have taken Physical Education 117.

118. Physical Fitness in the Workplace (3) III. Bernier Lecture—2 hours; discussion—1 hour. Explores principles and practices of health promotion in the workplace. Established assessment procedures including validation of job standards are presented. Cost and health surveys are experience with respect to site and office programs of fitness maintenance and remediation. Not open for credit to students who have taken Physical Education 118.

120. Sports in American Society (4). Gill-Fisher Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religious, art, sexism, racism, and education; current trends and problems. Not open for credit to students who have taken Physical Education 119.

121. Sports Psychology (4) III. Jennings Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection through a cross-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. Jennings 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 (sex, concept, type A; species 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 alternate weekly with laboratory—2 hours. Prerequisite: course 103. Factors which control movement of the nervous system, physiological, behavioral, and morphological mechanisms. Topics include central versus peripheral control mechanisms, open and closed loop systems, cognitive, and environmental 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) III. Hawkins Lecture—2 hours; discussion—2 hours. Prerequisite: course 103 or consent of instructor. The mechanical properties of biological tissues are investigated. Tissues considered include bone, cartilage, ligament, tendon, muscles, and skeletal muscle. Not open for credit to students who have taken Physical Education 126.

131. The Teaching of Physical Activity to Special Populations (4) I. 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/entertainment programs play a role in the 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 of and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and 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 current topics in athletic training. Not open for credit to students who have taken Physical Education 135.

146. Theory and Practice of Exercise Training (4) I, II, III. Jennings Lecture/discussion—2 hours. Prerequisite: course 2 or 45 or 102. Physiological adaptations, exercise programming and behavioral techniques focusing on young and middle-aged adults. Topics include exercise prescription, nutrition, psychological effects of exercise, management techniques, and exercise adherence techniques. Not open for credit to students who have taken Physical Education 146. (PDP grading only).

146L. Shape-Up Testing and Training Laboratory (1) I, II, III. Jennings Lecture—4 hours. Prerequisite: course 146 (may be taken concurrently). Primary activities involve, shaping up class, attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (Former course 146L. (PDP grading only).

147L. Adult Fitness Training Laboratory (1) I, II, III. Jennings Laboratory—3 hours. Prerequisite: courses 146, 146L, 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. (PDP 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. (PDP 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. (PDP grading only).

149L. Cardiopulmonary Rehabilitation Laboratory (1) I, II, III. Holly Laboratory—3 hours. Prerequisite: courses 148 and 149L, 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. (PDP grading only).

192. Exercise Science Internship (2-12) I, II, III. The Staff (Chairperson in charge). Internship—30-36 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 principles to teaching, recreational, clinical or research situations under departmental supervision. May be repeated for credit for up to 12 units (including course 92), but no internship units will be counted toward Exercise Science major. (PDP grading only).

197T. Tutoring in Exercise Science (1-5) I, II, III. The Staff (Chairperson in charge) Tutorial—1-5 hours. Prerequisite: consent of instructor. Tutoring of students in upper division physical activity courses. Written reports on methods and materials required. May be repeated once for credit. (PDP grading only).

198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and Department Chairperson. (PDP grading only).

199. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of Department Chairperson. (PDP grading only).

Graduate Courses

200A. Introduction to Research: History and Philosophy in Physical Education (2) I. Moline Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science
and their application to current research in human performance, become a benchmark study in the evolution of the field. Not open for credit to students who have taken Physical Education 2004a.

200B. Problem Solving and Research Design in Physical Education (2) III. Jennings, Molé Division—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 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—3 hours. Prerequisite: course 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance and exercise capacity. Topics will include maturation and constitutional 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 current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas analysis, and their relationship to physical conditioning. Not open for credit to students who have taken Physical Education 222.

223. Physiological Basis of Physical Fitness (2) I. 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 (4) II. Holly Lecture—2 hours; laboratory—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. Hoffmann 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 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. Williams, Hawkins Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hour. Prerequisite: consent of instructor, Mathematics 228; 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 228, 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) III. 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 athletic training and sports. Not open for credit to students who have taken Physical Education 230.

232. Health Psychology: Effects of Physical Activity (3) I. Jennings 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 effects 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. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing; consent of instructor. (SU grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing; consent of instructor and Department Chairperson. (SU grading only)

*Course not offered this academic year.

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). (Swim 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., theories of aerobic functioning, exercise prescription, and diet in weight control, muscular strength development and maintenance, and limitations of environment, age, and gender on fitness levels. (P/NP grading only)

3. Foundations of Emergency First Aid Services (2) I, II, III. The Staff Lecture—1 hour; laboratory—1 hour. An introduction to the basic principles and practices that fulfill the prerequisites for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course the Standard Red Cross Certificate is awarded.

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 Intramural ICA. 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 2 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; 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. John Lecture—1 hour; laboratory—2 hours. Prerequisite: course 5; 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 all necessary requirements)

27. Training Course for Water Safety Instructors (2) I. 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 all necessary requirements.)

28. Basic Scuba (2) I, II, Fastenau Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swim test. Introduction to science of scuba diving, function and maintenance of equipment, physics and physiology of diving, diver first aid
44. Principles of Healthful Living (2) II, III. Gill-Fisher
   Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health education. (P/NP grading only)

92. Physical Education Internship (2-5) I, II, III. The Staff (Chairperson in charge)
   Internship—6-15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physical Education 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 Physical Education 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 on an individual or small group basis with instructor in charge of courses. Written reports on methods and materials 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; field work—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 member. May be repeated once for credit. (P/NP grading only)

128A. Research Diving: 65 Feet (1) II. Fastenau
   Lecture—1 hour; laboratory—1/2 hour. Prerequisite: basic Scuba Certification from approved agency (course 29 or the equivalent); 10 logged open-water dives since certification; consent of instructor. Lectures in diver rescue and resuscitation, navigation, search and skill assessment, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving. Pool and open water sessions available for certification (Contact Department Office for details). (P/NP grading only)

128B. Research Diving: 65 Feet (2) II. Fastenau
   Lecture—1 hour; laboratory—2 hours. Prerequisite: course 128A; consent of instructor. Lectures in diver rescue and resuscitation, navigation, search and skill assessment, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving. Pool and open water sessions available for certification (Contact Department Office for details). (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, recreational 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.

*143A. Coaching Effectiveness (2) I. The Staff
   Lecture—2 hours. Prerequisite: consent of instructor. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology to coaching. (P/NP grading only)

*143B. Coaching Effectiveness (2) I. The Staff
   Lecture—2 hours. Prerequisite: course 143A. Application of general principles of management and administration to athletic coaching in high school. (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 (2-12) I, II, III.
   The Staff (Chairperson in charge)
   Internship—6-36 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 Physical Education 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 Physical Education 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)

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)

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, theory, material, and practices of elementary school physical education program.

380. Methods of Teaching Physical Education (3) II. 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 grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only)

Family Practice

See Medicine, School of

Feminist Theory and Research

Linda Morris, Ph.D., Program Director
Program Office, 271 Kerr 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, mathematics, statistics, or computer science.

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

Biology (Biological Sciences 102, 103)........6

Chemistry (Chemistry 2A-2B-2C; and 8A-8B or 129A-129B, 129A).........21-25

*Course not offered this academic year.
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.  

Table: Fiber and Polymer Science Requirements  
<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Textiles Science; Textiles and Clothing 163, 163L, 163L</td>
<td>8</td>
</tr>
<tr>
<td>Fiber and Polymer Science 100, 150, 161, 161L, 161L</td>
<td>18</td>
</tr>
<tr>
<td>Textiles and Clothing 163 and 163L or 180A and 180B</td>
<td>14</td>
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Courses in Fiber and Polymer Science (FPS)  

Upper Division Courses  
100. Principles of Polymer Materials Science  
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 Engineering: Materials Science 147.)  

110. Plastics in Society and the Environment  
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. General Education credit: Nature and Environment.  

150. Polymer Syntheses and Reactions  
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)  
The Staff  
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  
Lecture—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.  

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.
Food Science

(College of Agricultural and Environmental Sciences)

The Major Program

Food science applies chemical, physical, biological, engineering, and social sciences to processing, preservation, distribution, storage, evaluation, identification, and utilization of foods.

The Program

Students majoring in food science spend the first two years of study developing the scientific and general knowledge necessary for upper division study. The science courses include chemistry, biology, physics, and mathematics. The general background is provided by course offerings 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. Graduates are employed in the food science field, the major of the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, microbiology, and nutrition.

Five career-oriented options are available in the major. 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.

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 in management in small food companies, and research and development-oriented marketing or technical sales opportunities in corporate food industries.

The Consumer Food Science Option prepares students for jobs in food product formulation, research and development-oriented marketing and sensory analytical organizations, restaurant service, creative writing, and community service. Students who obtain the requirements for the teaching credential teach elementary or secondary school home economics.

The Food Biology/Microbiology option and Food Chemistry option are designed for students interested in research and development careers with food companies or government laboratories, in teaching and research at academic institutions, and in professional (medical, veterinary, 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. The Food Chemistry option prepares students for graduate study and research in such areas as food chemistry, food additive chemistry, biotechnology, biochemistry and toxicology.

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.)

Food Science (58 units)

Preparatory Subject Matter

Biological Sciences 102, 103

Breadth/General Education

Food Science and Technology 100A, 104

Restricted Electives

At least one upper division food science course, other than Molecular and Cellular Biology 120L. One upper division Microbiology course. One nutrition course other than Nutrition 110A. Remaining courses can be selected from biochemistry, physiology, environmental technology, toxicology, mathematics, public health, microbiology or other subjects related to Food Science.

Unrestricted Electives

Graduate Study. Refer to the Graduate Studies section in this catalog.

Preparatory Subject Matter

Food Technology Option

Specific course requirements

Biology (Biological Sciences 1B-1C)...

Food Science and Technology 100A...

Restricted Electives

At least one upper division food science course, other than Molecular and Cellular Biology 120L. One upper division Microbiology course. One nutrition course other than Nutrition 110A. Remaining courses can be selected from biochemistry, physiology, environmental technology, toxicology, mathematics, public health, microbiology or other subjects related to Food Science.

Unrestricted Electives

Graduate Study. Refer to the Graduate Studies section in this catalog.
Food Science and Technology (FST)

Lower Division Courses

1. Food Science and Society (3) I. Bandman
   Lecture—2 hours; discussion—1 hour. Nature and scope of world food production; 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) III. Russell
   Lecture—3 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.

*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.) (Same course as Nutrition 93.)
103. Physical and Chemical Methods for Food Analysis (5) I. Russel, Gruenwedel Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 2C, Biological Science 201C (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.

104. Food Microbiology (3) I. Barrett, C. Price Lecture—3 hours. Prerequisite: Biological Sciences 1A. 102. Microorganisms in food safety, spoilage, and production. Focus on 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) I. C. Price, Barrett 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 foodborne disease, and in food fermentation. Analysis of microbiological quality of foods.

107. Principles of Sensory Analysis of Foods (4) II. Guinard Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 120 or the equivalent course in statistics. Nature of sensory evaluation with emphasis on aroma, taste, and texture of foods; critical use of analytical laboratory methods; relation of sensory data to chemical and instrumental measurements; collection and statistical analysis and interpretation of sensory data.

109. Food Processing Plant Sanitation (3) II. Ogrydziak Lecture—3 hours. Prerequisite: Chemistry 2B, Biological Sciences 1A. Discussion of factors relating to sanitation in food processing including water treatment, chemical and physical sanitation agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the pertinent regulations of governmental agencies.

109. Principles of Quality Assurance in Food Processing (3) III. Reid Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Systems and Environment 120. Quality assurance measurement techniques applied to selected areas of the food industry. Emphasis is placed on the rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance procedures are discussed.

110A. Physical Principles in Food Processing (3) I. K. McCarthy Lecture—2 hours, laboratory—2 hours. Prerequisite: Physics 1A and 1B or 7A-7B or 7C or the equivalent; calculator 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—3 hours. Prerequisite: course 110A or the equivalent. Basic principles of transport in food systems. Heat and mass transfer in foods. Rate processes: conduction, convection, and radiation heat transfer; microwave heating, refrigeration, freezing, dehiscence, mass transfer during drying, and storage.

117. The Senses, Sensory Measurement, Psychophysics, and Food (4) I. O'Mahony Lecture—4 hours. Prerequisite: Biological Sciences 1A, Statistics 13E, Agricultural Systems and Environment 120 (may be taken concurrently). Structure and function of sensory receptor systems; psychological and physiological variables affecting sensory responses. Critical examination of modern psychophysical methods for measuring the perception of human sensory systems. Problems of sensory measurement and their relation to food flavor.

119. Chemistry and Technology of Milk and Dairy Products (4) III. Hutcher 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. Role of chemical, microbiological, and technological principles in 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 103, 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 products; packing and processing plant and processing plant. (Same course as Animal Science 120.)

121. Principles of Poultry Product Technology (3) I. A. Schirm Lecture—3 hours. Prerequisite: Biological Sciences 1A, 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 economic aspects of fish; 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 covered. 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.)

125. Corrosion Principles in Food Processing Interactions (3) I. Gruenwedel Lecture—3 hours. Prerequisites: Mathematics 16B, Physics 5C; Chemistry 38B. Course presents thermal and kinetic principles of container-product interactions (internal corrosion). Studies how these interactions affect the wholesomeness of processed, canned foods.

127. Introduction to the Sensory Characteristics of Food (3) II. 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 correlation with instrumental measurements. Intended not to specialize in food sensory science.

128. Food Toxicology (3) I. Gruenwedel, Shibamoto (Environmental Toxicology) Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, chemistry and biology. Toxicity of substances 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.)

131. Food Packaging (3) III. K. Okhrin
Lectures: Chemistry 8B, Biological Sciences 1A, Physics 5B or 7C. Principles of food packaging. Familiarized students with functions, materials, properties, fabrication, applications and regulations of food packaging.

*140. Food Laws and Regulations (3) I. The Staff
Lectures—3 hours. Prerequisite: upper division standing. Legal and scientific issues involved in the regulation of the nation’s food supply and nutritional status. The role of the food and drug administration and other regulatory agencies.

*150. Thermal Processing of Foods (3) III. Merson
Lecture—2 hours; discussion, demonstration, and problem workshops—2 hours. Prerequisite: courses 104 and 110B or the equivalent. Theory and practical considerations of thermal processing by canning, pasteurization, and aseptic processing. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutrition, and consumer acceptance. Practice of good engineering analysis of thermal processing equipment.

150L. Thermal Processing Laboratory (2) III. Merson
Laboratory—6 hours. Prerequisite: courses 104 and 110B or the equivalent. Course may be taken concurrently. Laboratory exercises and students participation in the use and application of thermal processing equipment and related procedures, and the interpretation of results, including evaluation of can closures, operation of thermal processing equipment, and the development and testing of sterilization processes.

151. Freezing Preservation of Food (3) II. Reid
Lecture—3 hours. Prerequisite: course 110B, Biological Sciences 1A, and Chemistry 6B, course 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.

156. Computer Interfacing for Laboratory and Process Control (4) III. Russell
Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Principles of micro- and minicomputer use in measurement and control of laboratory instrumentation and processing operations with both theoretical and practical aspects of computer interfacing.

160. Food Product Development (2) II. Haard
Lecture—2 hours. Prerequisite: course 1 or 2 or 100A. Basic principles of food product research and development from concept to final product. Idea generation and associated screening and evaluation procedures for food formulation. Research and development project management.

160L. Food Product Development Laboratory (2) II. Haard
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 160. Continuously. Laboratory exercises adapting the principles of food product research and development to specific products and processes.

180. Food Processing (4) III. M. McCarthy
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100B, 104, 100C. 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. Reid
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 (Barrett in charge).
Prerequisites: consent of instructor. Work experience on or off campus in the practical application of food science. (P/N grading only.)

*196. Methods of Fruit and Vegetable Analysis (2) III. The Staff
Lecture—10 hours total; laboratory—30 hours total. Prerequisites: Chemistry 2C, course 100B. Principles of analysis and laboratory methods for the color, texture, and flavor analysis of fruits and vegetable used in food processing. Held during the first two weeks immediately following the last day of spring quarter; considered a spring course for registration.

198. Directed Group Study (1-5) I, II, III.
The Staff (Barrett in charge). Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Barrett in charge).
Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses

201. Food Chemistry and Biochemistry (3) I. Shemin
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. Paasch
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103; Chemistry 107B. Fundamental principles of chemical 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) I. R. K. McCarthy
Lecture—3 hours. Prerequisites: Physics SC or 7C, Mathematics 16C, Chemistry 107B; undergraduate food processing course. Principles of food engineering 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. Barrett, Price, Ogrydziak
Lecture—3 hours. Prerequisite: Biological Sciences 1C, 103, or course 104 or course 154A. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of spoilage and beverage fermentation.

*205. Industrial Microbiology (3) I. Ogrydziak
Lecture—3 hours. Prerequisite: Biological Sciences 1A and 102, 103; Microbiology 130A-130B or Biological Sciences 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, anti-biotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, and yeast fermentations, and on genetic engineering and 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 sensory, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Offered in alternate years.

210. Proteins: Functional Activities and Interactions (3) III. Smith, Hutchins
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. Gorman
Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 128B. Chemistry of lipids as it pertains to research in food and nutrition. Relationships between lipid structure and properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.

*225. Mycology of Food and Food Products (3) II. Miller
Lecture—3 hours. Prerequisite: course 104 or consent of instructor. Morphology and physiology of fungi associated with food. Desirable activities of fungi: food fermentations, single-cell protein production, mushroom culture. Undesirable activities: preharvest and postharvest deterioration, food spoilage and preservation, toxin production.

250. Chromatographic and Electrophoretic Methods (4) I. German, Bandman
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1A-1B-1C, 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) II. German
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.

256. Computer Applications in Laboratory and Process Control (3) III. Russell
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 156 or the equivalent. Theory and practice of microcomputer interfacing to laboratory instrumentation for analytical and process control applications. Study of methods common to modern instrumentation and control systems including: A/D and D/A conversions, transducers, signal conditioning, and data transmission.

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 the instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit.

290. Seminar (1) I, II, III. Price
Seminar—1 hour. (S/U grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Barrett 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. Price
Seminar—1 hour. Prerequisite: completion of at least one quarter of course 290. Oral presentation of student original research, discussion, and critical evaluation. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Barrett in charge).

299. Research (1-12) I, II, III. The Staff (Barrett 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 (916-752-2912).

Upper Division Courses
120. Principles of Quantity Food Production (3) III, Prophit Lecture—3 hours. Prerequisite: Food Science and Technology 100A and 101B. Fundamental principles of food service management including quantity food production, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

120L. Quantity Food Production Laboratory (2) II, Prophit 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) III. Prophit Lecture—3 hours. Prerequisite: Agricultural Economics 112, courses 120, 120L, 121. Principles of quantity food production: 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 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/lab—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.)

Elective courses in French literature, language, or civilization to be chosen in consultation with an 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. G. Herman.

Minor Program Requirements:

French

French 101 ........................................... 4
French 102, 103 .................................. 12
Two lower-division courses in French language, literature, or civilization to be chosen in consultation with an undergraduate adviser. 8

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 at least six units of French 194H and distribute 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 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 adviser or the department chairperson.


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.

2. *G. French for Graduate Students (5) III. The Staff (Chairperson in charge) Lecture/discussion—6 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. Prerequi-
site: course 1. Continuation of course 1.

3. Elementary French (5) I, II, III. The Staff Discussion—5 hours; laboratory—1 hour. Prerequi-
site: course 2. Continuation of course 2.

8. French Conversation (2) I, II, III. The Staff Recitation—3 hours. Prerequisite: course 3 or the equivalent. Practically oriented presentation of French sounds and intonational pattern. 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.)

tury texts.


ture; reading and discussion of a novel.

25. Introduction to French Literature in Translation (3) I. 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 literature; techniques, structure, and meaning to foster better understanding of creative processes in French cultural context. Intended for the nonmajor. General Education credit: Civilization and Culture.

35. Explication and Dissertation (2) III. The Staff Lecture/discussion—2 hours. Prerequisite: course 22. Theory and practice of French explication de texte and dissertation. Especially recommended for those stu-
dents planning to study abroad in French universities.

38. Advanced Intermediate French Conversation (2) I, II, III. The Staff Recitation—3 hours. Prerequisite: course 8 or the equivalent. Continued practice in initiating and main-
taining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

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. Compositions 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 em-
phasis on organization, correct syntax, and vocabu-
larv 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 verisimilitude.

102. Introduction to French Drama (4) I, II, III. Abraham 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.

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 structure and techniques.

104. Translation (4) I, II, III. 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 translations using a variety of non-
literary materials, illustrating different problems and styles. Not open to students who have spent an acad-
emic year as an EAP student in a Francophone coun-
try or who have completed course 136.

106. French Business and the Professions (4) I. Herman 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 govern-
ment and world business.

107. Contemporary France (4) I. Prager Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to aspects of French culture and institutions of the contemporary period such as art, architecture, music, literature. Pro-
vides a background for French contemporary history, sociology, and institutions.

110. Stylistics and Creative Composition (4) II. Herman 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 Gueuzeau's Exercices de style. Practice in such stylistic modifications as inversion, abbreviation, changes in tense, mood, tone, etc. The writing of poetry.

112. Masterpieces of French Drama in Translation (3) II. The Staff Lecture/discussion—3 hours. Prerequisite: course 25 or con-
sequent of instructor. Plays in translation representing the main types of French drama with emphasis on dra-
matic structure and techniques. Consideration of this genre within French social and cultural context. Intended for the nonmajor. General Education credit: Civilization and Culture.

113. Masterpieces of French Novel in Translation (3) III. The Staff Lecture/discussion—3 hours. Prerequisite: course 25 or con-
sequent 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 tech-
niques of the genre. Intended for the nonmajor. Gen-
eral Education credit: Civilization and Culture.

114. French Philosophical Literature in Translation (3) III. The Staff Lecture/discussion—3 hours. Prerequisite: course 25 or con-
sequent of instructor. Literature, with works analyzed within broad philosophic, moral, and historical contexts. Focus on such topics as stoicism, classicism, libertinism, naturalism, existentialism, absurdism, and modernism. Literary techniques and styles analyzed. General Education credit: Civilization and Culture.

115. Medieval French Literature and Society (4) I. Van Den Abbeele Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. The social and cultural life of medieval France as studied through its repre-
sentation in such literary works as La Chanson de Roland, courtly love lyric, the Arthurian romances of Chrétien de Troyes, the troubadours, selected tablatures and farces. Offered in alternate years.

116. The French Renaissance (4) III. Van Den Abbeele Lecture/discussion—3 hours; term paper. Prerequi-
site: 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, Rondeau, Du Bel-
lay, Labe, Marguerite de Navarre, Montaigne, and D'Aubigné. May be repeated once for credit when topic differs. Offered in alternate years.

117A. Baroque and Preclassicism (4) II. Abraham Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. The literature and intel-
llectual culture of the period between the Renaissance and French classicism. Offered in alternate years.

117B. The Classical Moment (4) III. Abraham Lecture/discussion—3 hours; term paper. Prerequi-
site: 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.

118A. The Age of Reason and Revolution (4) II. Kusch Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. Literature and philos-
ophy of the French Enlightenment. Readings from such authors as Bayle, Fontenelle, Montesquieu, Voltaire, Rousseau and Diderot. Offered in alternate years.

118B. Private Lives and Public Secrets: The Early French Novel (4) II. Kusch Lecture/discussion—3 hours; term paper. Prerequi-
site: course 103. History of the French roman from the Middle Ages to the Revolution with particular empha-
sis on the novels of the 18th century. Offered in alter-
ate years.

119A. The Romantic Imaginary (4) II. The Staff Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolu-
tion, individualism, nature, etc. Introduction to poe-
tic irony, the creative imagination, the cult of ruin. Offered in alternate years.

119B. Realism, History and the Novel (4) III. The Staff Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. Investigation of the nar-
native 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 situ-
aton of post-revolutionary society. Offered in alternate years.

119C. From Saudebleire to Surrealism (4). I. The Staff Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101. Study of the main poets and poetic movements from the mid-19th to the early 20th cen-
tury including Baudelaire, Mallarmé, and the surrealists, and the Surrealists. Offered in alternate years.

120. Modern French Thought (4) I. Prager Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. Overview of post-Second World War French intellectual currents from existen-
tialism to structuralism and deconstructionism. Readings will include Sartre and de Beauvoir, Camus, Levi-Strauss, Lacan, Barthes, Foucault, Derrida, Kristeva, Sollers, Cicou and Leiris. Offered in alternate years.

121. Twentieth Century French Novel (4) II. Prager Lecture/discussion—3 hours; term paper. Prerequi-
site: 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, Sarrasite, Sartre, Barthes, Duras, Tournier, Perec, Modiano, Guibert, Tousaint. Offered in alternate years.

124. Post-Colonialist and Francophone Literature (4) III. Prager Lecture/discussion—3 hours; term paper. Prerequi-
site: course 101, 102, or 103. An overview of 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 liter-
atures, cultural syncretism, theories of postcolonial-

*Course not offered this academic year.
ism. May be repeated once for credit when topic differs. Offered in alternate years.

**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, etc., from different periods. May be repeated once for credit when topic differs. Offered in alternate years.

**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.

**130. From Page to Stage: Theatre and Theatricality (4) I.** Abraham Lecture/discussion—3 hours; term paper. Prerequisite: course 102. French theatre as literature and performance. May be repeated once for credit when topic differs. Offered in alternate years.

**133. Gender and Politics in French Literature and Culture (4) I.** The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 102 or 103. Exploration 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.

**138. Advanced Literary Translation (4) II.** Bloemberg 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 at 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 one course numbered 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. Subjected to change each term such as satiric and didactic poetry of the Middle Ages, poetry of the Pleiade, theatrical Hispanic, pre-romantic poetry, etc. May be repeated twice for credit in a different subject area.

**160. Topics in French Morphosyntax (4) III.** Manea-Manolju 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.** Manea-Manolju 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.** Manea-Manolju Lecture—3 hours; term paper. Prerequisite: course 160. Development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language.

**169. Internship (1-12) I, II, III.** The Staff Internship—3-12 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) II, III.** The Staff 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.** Manea-Manolju Seminar—3 hours; term paper. Prerequisite: courses 159, 160, 250A, or consent of instructor. Presentation of the main changes in the phonemic 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.** Abraham 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 expose. 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.** Abraham Seminar—3 hours; term paper and/or expose. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor.

*Course not offered this academic year.

**207A. Eighteenth-Century Literature: Philosophes (4) I.** Kusch Seminar—3 hours; term paper and/or expose. 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.

**208A. 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.

**208B. Nineteenth-Century Literature: Poetry (4) III.** Blumenfeld 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.

**209B. Nineteenth-Century Literature: Poetry (4) III.** The Staff Seminar—3 hours; term paper and/or expose. Study of the works of one or several novelists. May be repeated for credit with consent of instructor.

**209C. Twentieth-Century: Poetry (4) III.** The Staff Seminar—3 hours; term paper and/or expose. Study of the works of one or several dramatists 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) II.** 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.** Bloemberg 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.** Manea-Manolju Seminar—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar with emphasis on morpheme structure, i.e., a semantic analysis of grammatical categories, as well as their paradigmatic and syntactic relations.

**250B. French Linguistics: Transformational Syntax (4) I.** Manea-Manolju Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectification, 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) III.** Manea-Manolju Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Issues in contemporary French linguistic thought and their relation-
ship 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 for credit with consent of instructor when topic differs.

*261. Current Issues in Modern French Syntax (4) II. Manea-Mamoulou Seminar—3 hours, term paper. Presentation of contemporary approaches to French syntax. Explanations of various less regular phenomena, reference to ongoing changes in modern spoken French. Offered in alternate years. May be repeated for credit with consent of instructor when topic differs.

297. Individual Study (1-5) I, II, III. The Staff (SU 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 (SU grading only)

299D. Dissertation Research (1-12) I, II, III. The Staff (SU 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.

300A. The Teaching of French in College (2) I
Wagner
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. (SU grading only)

300B. The Teaching of French In College (2) II
Wagner
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. (SU grading only)

300C. The Teaching of French In College (2) III
Wagner
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. (SU grading only)

Freshman Seminar Program

Francisco J. Samaniego, Ph.D., Program Director
Program Office, 17 Weilman (Teaching Resources Center) (916-752-8850)

Committee in Charge
Stephanie Beedle, Ph.D. (Residence Life)
Aron Bloom (Student Representative, ASUCD—Academic Affairs)
Richard Castanias, Ph.D. (Graduate School of Management)
Sara Estrabrooks, M.A. (Teaching Resources Center)
Loise Grinville, Ph.D. (Previous President—FRRS Coordinator)
Annie King, Ph.D. (College of Environmental and Agricultural Sciences)
Martha Maciá, Ph.D. (College of Letters and Sciences)
John P. Pasco, D.V.M., Ph.D. (School of Veterinary Medicine)
Rex Perschbacher, J.D. (School of Law)

Ronald J. Phillips, Ph.D. (College of Engineering)
John Vols, M.A. (Academic Senate Committee on Courses)
Donald Walsh, Ph.D. (School of Medicine)

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

1. Freshman Seminar (2) I, II, III. The Staff Seminar—20 hours total (8 weeks). Prerequisite: open only to students who have completed fewer than 40 quarter units. Investigation of a special topic through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis upon student participation in learning.

Genetics

See Division of Biological Sciences; and Genetics (A Graduate Group), below

Genetics

(A Graduate Group)

Kenneth Hurst, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9062)

Faculty. Includes members drawn from the Colleges of Agricultural and Environmental Sciences, and Letters and Science, 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 divided 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 graduate administrative assistant at 916-752-9062.

Graduate Adviser. Consult Genetics Graduate Group Office.

Courses in Genetics (GGG)

Graduate Courses

201A. Transmission Genetics (3) I. Lepchik Lecture—3 hours. Prerequisite: Genetics 100, introductory statistics and calculus. Study of segregation, linkage, and mapping and the modifications of Mendel's original genetic model.

201B. Cytogenetics (3) I. Dvorak and Murray Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Study of cytogenetics including meiosis, recombination, chromosomes, haploidy, aneuploidy, trisomies, monosomies, autopolyploids and intra- and interspecific manipulation.

201C. Molecular Genetics (3) I. Gasser, Williamson 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) III. St. Clair 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.

202. Scientific Professionalism and Integrity (1) I. Yoder Lecture—1 hour. Basic skills required of contemporary scientists will be reviewed. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Responsibilities of scientists to communicate results faithfully and thoughtfully will be emphasized. (SU grading only.)

205. Molecular Genetics Laboratory (5) I, II, III. Privalsky and staff Laboratory—5 hours. Prerequisite: Genetics 100 (may be taken concurrently) or the equivalent, enrolled in Genetics Graduate Group, consent of instructor. A laboratory course designed to convey the fundamental methodologies in both molecular and cellular genetics. An emphasis on experimental design, techniques, and manipulation. May be repeated for credit up to two times for credit. (SU grading only.)

207L. Research Methods in Plant Genetics Laboratory (2-5) I, II, III. Yoder and staff Laboratory—5-15 hours. Prerequisite: course 207 (may be taken concurrently). A working knowledge of contemporary methodologies in plant genetics is obtained through participation in research programs of the various Plant Genetics Affinity Group members. (SU grading only.)

281. Seminar in History of Genetics (2) I. Griesemer (Philosophy) Seminar—2 hours. Prerequisite: Genetics 100. The development of modern genetic theories beginning with Mendel.

282A. 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.

282B. Seminar in Quantitative Genetics (1-3) II. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the inheritance of continuous characters. Offered in alternate years.

282C. Seminar in Developmental Genetics (1-3) I. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the development and control of genes and developmental processes. Offered in alternate years.

282D. 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.

283. 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.

285. Seminar in Molecular Genetics (1-3) I. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the structure, modification and expression of genes.

287. Seminar in Plant Genetics (1-3) II. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the current status of genetics in plant biology. Offered in alternate years.
Geographic Information Systems

(Continued)

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 Geomatics. (SU grading only.)

299. Research (1-12) I, II, III. Members of the Group (Chairperson in charge)
(SU grading only.)

Geographic Information Systems

(With 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, resource management, public utility planning, emergency response, geographic information systems, cartography, geomatics, archaeology, military exercises, and computer-aided design. Prerequisites include Mathematics 16A-16B, Statistics 15 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:

Geographic Information Systems..............................10
Applied Biological Systems Technology 160, 181..........................10
Select 8 or more units from the following courses
Agricultural Systems and Environment 121, Geography 105, 106, 107, Hydrologic Science 186.

Minor Adviser: R. Plant, W. Wellendorf

B.S. Major Requirements:

Preparatory Subject Matter.................................57-64
Geography 1, 2, and 3........................................16
Statistics 13 or the equivalent..............................4
Mathematics 16A-16B, 21A, 21B, or 21C...........................9-12
Computer Science Engineering 10 or 30....................3-4
Chemistry 2A, 2B, 2C.............................................15
Biological Sciences 1A..............................................5
Biological Sciences 1B or Biological Sciences 1C; or Geology 60-60L, or Physics 6A and 6B..........................5-8

Depth Subject Matter...............................43-45
Geography 105, 106, 118, 151..........................20
Two courses from Geography 110, 112, 116, 117, 162, 173..........................7-8
One course from Geography 121-127.......................3-4
Four additional upper division, letter-graded units in Geography......................4
Nine additional upper division units chosen in consultation with the undergraduate adviser..........................9

Total Units for the Major.................................100-109

Recommended

Geography 4; Physics 8A, 8B, and 8C; Chemistry 6A and 6B.

Addendum

The B.S. major provides a wide diversity of possible electives, including geomorphology, climatology, zoology, geography, plant geography, statistical geography, weather studies, and mathematical geography. An individual program may emphasize one or more of these electives and is planned in consultation with the major adviser.

Minor Program Requirements:

Letters and Science students who do not major in Geography may fulfill the requirements for a minor in the field by successfully completing the minimum units as follows. When choices of individual courses are required, these must be made in consultation with the major adviser.

Geography..................................................19-20

Minor I (General)
Geography 151, plus one course from each of the following four groups:
Geography 108, 115, or 173
Geography 170 or 171
Geography 155, 160, or 161
Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

Minor II (Physical)
Geography 102, 108, 115, and 173, plus one course from Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

Minor III (Cultural)
Geography 170, 171, and 173, plus one course from each of the following two groups: Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127, and Geography 143, 172, or 175

Minor IV (Economic)
Geography 110 and 141, plus one course from each of the following three groups:
Geography 142, 143, or 156
Geography 160, 161, or 170
Geography 110, 122A or 122B, 123, 124, 125A, 125B, 126, or 127

Minor V (Environmental/Resource)
Geography 160, 161, 162, and 173

Minor VI (World Regional)
Geography 121, 122A or 122B, 123, 124, 125A or 125B, 126 or 127

Major Adviser. See Class Schedule and Room Directory.
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. Allen

2G. Introduction to Cultural Geography: Discussion (1) I. Allen
   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. General Education credit with concurrent enrollment in course 2: Contemporary Societies.

3. Climate and Weather (4) I. Shelton; III. The Staff
   Lecture—3 hours; discussion—1 hour. Basic concepts of climate and weather; energy and moisture exchanges, atmospheric pressure, global circulation and winds; instruments for obtaining climatological data; weather maps; severe storms; global, regional, and local climate and weather; climatic change; climate of California.

4. Maps and Map Interpretation (3) I. Bahre

5. Introduction to Urban and Economic Geography (3) I. Dingemans
   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. General Education credit with concurrent enrollment in course 5G: Contemporary Societies.

5G. Economic and Urban Geography: Discussion (1) I. Dingemans
   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. General Education credit with concurrent enrollment in course 5: Contemporary Societies.

10. The World’s Regions (3) II. Dingemans; III. Allan
    Lecture—3 hours. The major geographic regions of the world: their origins, physical environments, cultures and economies; their interactions and global roles. Designed for non-majors.

50. Geography and Environmental and Regional Planning (3) III. Dingemans
    Lecture—3 hours. Principles of spatial planning for regional change. Policies for environmental, economic, and social modifications. Illustrated case studies include U.S. city planning, USSR industrial and population shifts, European regional plans, Chinese agricultural and environmental programs.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
    Prerequisite: consent of instructor; primarily for lower division students. (PnP grading only)

99. Independent Study (1-5) I, II, III. The Staff (Chairperson in charge)
    Prerequisite: consent of instructor; primarily for lower division students. (PnP grading only)

Upper Division Courses

102. Field Course in Physical Geography (4) III. The Staff
    Lecture and field trip—normally one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methods and field study. Systematic mapping and analysis of elements of the natural landscape.

104. Field Course in Urban Geography (4) III. Allan
    Lecture—1 hour: full-day field trip. Field analysis of selected urban problems in California. Special attention to regional interrelationships, functional structure, and land-use activities as specifically related to the core of the city, changing residential and retail patterns, and urban encroachment on agricultural lands.

105. Cartography (4) II. The Staff
    Lecture—1 hour: laboratory—8 hours. Prerequisite: course 4 or consent of instructor. Compilation and generalization of base-map data; symbolization and processing of map data; cartographic design and lettering techniques; map reproduction.

106. Aerial Photo Interpretation and Remote Sensing (4) II. The Staff
    Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or consent of instructor. Basic photogrammetry, sensors and platforms, aerial-photo interpretation, and remote-sensing applications.

107. Advances in Cartography (4) III. The Staff
    Lecture—1 hour; laboratory—8 hours. Prerequisite: course 105. Advanced principles and techniques of cartographic representation. Emphasis on scribbling, plate-making, process photography, color separation, and color proofing. Use of contemporary cartographic and photographic equipment utilized in producing maps.

108. Analysis of Landforms (4) I. The Staff
    Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landforms and geomorphic processes. Topics include structural landforms, rock weathering and soil genesis, hillside processes, fluvial, glacial, and coastal landforms.

110. Quantitative Spatial Analysis (4) I. Dingemans
    Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 5, and Statistics 13 or 102 recommended. Methods for geographic research and location planning; quantitative summary and analysis of spatial data patterns and trends; optimal-location solutions; includes correlation, regression, and use of pre-packaged computer programs.

117. Quaternary Environments (3) I. Elliott-Fisk
    Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1A or consent of instructor. Introduction to the character, timing, and magnitude of environmental changes during the Quaternary (Pleistocene and Holocene). Analysis of methods of paleo-environment identification. Survey of the Quaternary record for selected regions.

118. Mountain Geocology: Physical Geography (4) II. The Staff
    Lecture—3 hours; term paper. Prerequisite: course 1 or other introductory natural science course. Broad overview of world mountain systems, including tectonics and structure, climate and vegetation, geomorphic processes and natural hazards. Will integrate relevant section of cognate disciplines to focus on three-dimensional character of mountain regions — a physical geography of mountains.

120. Deserts of California and the Southwest (3) III. 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, Hispanic-Americans, and Anglo-Americans. Offered in alternate years.

120L. Field Excursion to California and Southwestern Deserts (3) III. Jett
    Fieldwork—60 hours minimum (1 week). Field excursion to examine physical and human geography of selected desert areas in California and/or Nevada, Arizona, and Utah. May be taken for credit limited enrollment; permission given to students having completed course 120. (PnP grading only) 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 various spatial distributions within and between the two countries.

122A. Mexico and Central America (4) II. Bahre
    Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy from Mexico to Panama and in the Caribbean. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of Middle America. Approach will be cultural-historical and ecological. Offered in alternate years.

122B. South America (4) I. Bahre
    Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy in the South American countries. Emphasis on understanding the diverse natural and cultural landscapes of South America. The approach will be cultural/historical and ecological. Offered in alternate years.

123. Western Europe (3) III. 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.

124. The Soviet Union and Eastern Europe (4) III. Dingemans
    Lecture—3 hours; discussion—1 hour. Prerequisite: an introductory course in the social sciences; course 2 or 5 recommended. Human use of the land in the Soviet Union and Eastern Europe. Location and nature of resources, agriculture, industry, and cities. Emphasis on modification of traditional landscapes by the Soviet model of planning for regional development. General Education credit: Contemporary Societies.

125A. North Africa and the Middle East (4) II. Grivetti
    Lecture—4 hours. Prerequisite: courses 1 and 2, or consent of instructor. Geographic conditions of the Islamic world of North Africa and Southwest Asia; climatic and physical features; cultural areas, settlement patterns, and the influence of Islam; economic patterns and desert environments resulting from the interaction of these forces. Emphasis will also be put on
these aspects as they pertain to the problems of regions dispersed both within and between nations.

142. Geography of Agriculture (4) II. Monsen
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.
Monsen
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) II. 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 environment as a product of history, planning policy, transportation systems, and residential structure. General Education credit: Contemporary Societies.

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

162. Geography of Water Resources (4) III.
Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Geographical survey of water on the land; needs for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements.

168. Mountain Geocology: Human Geography (4) I. Monsen
Lecture—3 hours; term paper. Prerequisite: course 118, 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 Himalayas; also Andes, Alpes, and Rocky Mountains, providing historical perspective and discussion of current environmental crises.

170. Cultural Ecology (4) I. Jett
Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographic theories of environment-man relations. Ecological relations of gatherers, fishers, hunters, and farmers; their environmental impacts; their domestic plants and animals. General Education credit: Contemporary Societies.

171. Cultural Geography (4) I. 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 parallelities, in other disciplines. General Education credit: Contemporary Societies.

173. Humans and Vegetation Change (4) II.
Bahre
Lecture—3 hours; term paper. Prerequisite: course 1 or Biological Sciences 1B. Consent of instructor. Role of humans in modifying the earth's vegetation. Emphasis on cultural plant geography, factors of plant distribution, classification and mapping of vegetation, world vegetation patterns, human impact on major regions, and case studies of land use and vegetation change.

175. Geography of Food and Diet (4) II. Grivetti
Lecture—4 hours. Prerequisite: course 2 or Anthropology 2: Nutrition recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Offered in alternate years.

192. Student Internship in Geography (2-4) I, II, III.
The Staff
Internship—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 knowledge 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).

Graduate Courses

200. Research Trends in Geography (1). I. The Staff
Chairperson in charge Seminar—1 hour. Major current research themes and trends in geography. (SU grading only.)

200C. Theory and Practice of Geography (4) II.
Monsen
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.

201. Sources and General Literature of Geography (4) I, II, III.
The Staff
Discussion—4 hours. Prerequisite: graduate status 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.
Monsen
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; intensive 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. Allan
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. Shelton
Seminar—3 hours.

295. Seminar in Urban Geography (4) I. Dingemans
Seminar—3 hours.

296. Seminar in Agricultural Geography (4) II. Monsen
Seminar—3 hours.

298. Group Study (1-5) I, II, III.
The Staff
Chairperson in charge (P/NP grading only).

Geology

(College of Letters and Science)

Howard W. Day, Ph.D., Chairperson of the Department

Department Office, 174 Physics-Geology Building (916-752-0560)

Faculty

Roland Bürgmann, Ph.D., Assistant Professor
William H. Casey, Ph.D., Associate Professor (Land, Air and Water Resources)
Sandra J. Carlson, Ph.D., Associate Professor
Richard Cowan, 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., Associate 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
Edridge M. Moore, Ph.D., Professor
Jeffrey F. Mount, Ph.D., Professor
Peter Seiffert, Ph.D., Professor
Howard J. Spero, Ph.D., Associate Professor
Robert J. Weiss, Ph.D., Professor
Geert J. Vermeij, Ph.D., Professor
Kenneth L. Verouz, Ph.D., Academic Senate Distinguished Teaching Award

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

Geoogy 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. It is the study of this historical evolution through "deep time" that fundamentally distinguishes geology from most of the other physical sciences. The study of the processes that drive the 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 the people 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 developing professional geologists or continuing their geological studies at the graduate level should select the Bachelor of Science degree program. The Bachelor of Arts program is designed for students interested in an
interdisciplinary program of study, or who plan to go into professional teaching. Both programs include twelve units of upper division electives that provide students an opportunity to emphasize an aspect of the field of particular interest to them. The electives and course work can vary, with some courses being selected as part of the regular curriculum and others being chosen by the student's advisor. The courses are designed to complement the students' interests and career goals.

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 precollege 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 usually required for many positions. In particular, positions requiring graduate studies in geology are in demand. Additional education beyond the bachelor's degree is required for those seeking advanced positions in the field.

A.B. Major Requirements:

Preparatory Subject Matter

Geology 3, 5L, 50L, 60L, 60L............ 14
Mathematics 16A-16B or 21A-21B........... 6-8
Chemistry 2A-2B.......................... 10
Physics 5A-5B or 7A-7B.................... 12
Statistics 31 or 131 or 32 or 102............ 3-4

Depth Subject Matter

Geology 100, 100L, 101, 101L, 103, 107,
107L, 108, 109, 109L.................... 24

Additional upper division courses from
upper division courses in geology.

Upper division courses in related fields may satisfy this requirement if approved by the major advisor.............. 12

Total Units for the Major...................... 77-80

Recommended

Chemistry 2C or Hydrologic Science 134, Physics 5C.

B.S. Major Requirements:

Preparatory Subject Matter

Geology 3, 5L, 50L, 60L, 60L............ 14
Mathematics 21A-21B-21C................. 10
Chemistry 2A-2B, Hydrologic Science 134 or
Chemistry 2C............................ 13-15
Physics 5A-5B-5C or 7A-7B-7C or 9A-9B-9C
12
Statistics 32 or 102......................... 3-4

Depth Subject Matter

Geology 100, 100L, 101, 101L, 102, 103,
105, 106, 107L, 108, 109, 109L, 110...
10-42

Additional upper division electives chosen
from Geology 130–190 courses, Hydrologic
Science 145A, 145B and related fields
approved in advance by major advisor.

No more than 3 units upper division
elective credit for Geology 113–129 courses.
Maximum of 6 units upper division
elective credit for Geology 194A-
194B or 194A-194B........................ 12

Total Units for the Major...................... 108-111

Recommended

One or more of the following courses, depending upon
emphasis in geology: Mathematics 212, 222, 22B,
Statistics 104, 106, 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 geologic subject
emphasis listed below. On transcripts the minor will
appear as a minor in Geology.

<table>
<thead>
<tr>
<th>Units</th>
<th>General Geology emphasis</th>
<th>Geology 50 and 50L (or 1, 1G, and 1L)</th>
<th>Geology 100, 101, 107 or 108, 109</th>
<th>Geology 113-1138 or 116-116G or 120</th>
<th>Minor Adviser. R. Cowen, R.J. Twiss</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Geology 50 and 50L</td>
<td>100, 101, 107 or 108, 109</td>
<td>111</td>
<td>120</td>
<td>R. Cowen, R.J. Twiss</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>Engineering Geology emphasis</th>
<th>Geology 50 and 50L</th>
<th>Civil Engineering 171, 171L</th>
<th>Three courses chosen from Geology 134, 161, 162, 163, Hydrologic Science 103, 145, Soil Science 118, 120</th>
<th>Minor Adviser. R. Cowen, R.J. Twiss</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-22</td>
<td>Engineering Geology</td>
<td>50 and 50L</td>
<td>171, 171L</td>
<td>134, 161, 162, 163, 103, 145, 118, 120</td>
<td>R. Cowen, R.J. Twiss</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>Geochemistry emphasis</th>
<th>Geology 60, 60L, 129, 146</th>
<th>Chemistry 110C</th>
<th>Chemistry majors may substitute one of the elective courses (or Chemistry 110C)</th>
<th>Minor Adviser. R. Cowen, R.J. Twiss</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>Geochemistry</td>
<td>60, 60L, 129, 146</td>
<td>110C</td>
<td>110C</td>
<td>R. Cowen, R.J. Twiss</td>
</tr>
</tbody>
</table>

| Units | Oceanography emphasis | Geology 103, 103L | One course chosen from: Environmental Studies 100, 151, Geology 151, 152, Hydrologic Science 136 | Minor Adviser, H.J. Sparo |
|-------|-----------------------|------------------|----------------------------|---------------------------------|-------------------------------|
| 20-25 | Oceanography          | 103, 103L        | 100, 151, 152, 136         | 136                             | H. J. Sparo                    |

<table>
<thead>
<tr>
<th>Units</th>
<th>Palaeobiology emphasis</th>
<th>Geology 107 and 107L</th>
<th>Geology 151 or 152</th>
<th>At least eight additional units from the following: Anthropology 151 or 152, Botany 116, 140, 141, 103, Geology 105, 150C, Zoology 105, 112, 125, 148, 8-9</th>
<th>Minor Adviser, R. Cowen</th>
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<td>20-21</td>
<td>Palaeobiology</td>
<td>107 and 107L</td>
<td>151</td>
<td>152</td>
<td>R. Cowen</td>
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11. Earth Laboratory (1) L, R. Cowen. Laboratory—3 hours. Prerequisite: course 1 (preferably taken concurrently). Introduction to Earth materials (minerals and rocks, chemical deformation, faults and folds), landforms, and the processes that form them. Not open for credit to students who have taken course 50L.

3. History of Life (3) L, R. 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. General Education credit with concurrent enrollment in course 3G: Nature and Environment.


3L. History of Life Laboratory (1) L, R. 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.


17. Earthquakes and Other Earth Hazards (2) L, R. 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) L, Moore. 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.

43. Form, Function, and Evolution: The Molluscan Shell (3) L, R. Rull, Verosub. 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. General Education credit: Nature and Environment.

50. Physical Geology (3) L, McClean. 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 collisional tectonics. Students with credit for course 1 or the equivalent may receive only 2 units for course 50.

50L. Physical Geology Laboratory (2) L, McClean. 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) L, Day. Lecture—3 hours. Prerequisite: Chemistry 2A or 2AH. Crystallography, physical and chemical structure and properties of minerals; mineral genesis.
Upper Division Courses

100. Earth Dynamics I: Extensional and Translational Processes (3) I. Twiss
Lecture—3 hours. Prerequisite: courses 50-50L, Mathematical Methods 21A or 16A (may be taken concurrently), or consent of instructor. The structure of the earth. General tectonics and structural features of the Earth. Geophysical and structural signatures of extensional and compressional deformation. Seismicity and focal mechanisms. Mid-ocean ridges and continental rifts. Strike-slip faulting. Application to California tectonics. Not open for credit to students who have completed course 105L.

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). Preparation 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 collisional terranes. Not open for credit to students who have completed course 105L.

101. Earth Dynamics II: Convergent and Collisional Processes (3) II. Moores
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 belts, mountain belts. Topics include décollement faults, folds, seismic Benioff zones, gravity and isostasy. Examples of collisions and resulting mountain belts. Examples drawn from western North America. Not open for credit to students who have completed course 105L.

101L. Earth Dynamics II: Structure/Tectonics Laboratory (2) II. Moores
Laboratory and fieldwork—6 hours; six days of field trips on four separate weekends required. Prerequisites: courses 50L 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-deformation analysis of topographic and geologic maps; tectonic analysis of convergent and collisional terranes. Not open for credit to students who have completed course 105L.

102N. Earth Dynamics III: Plate Kinematics and Dynamics (3) II. Bergmann
Lecture—2 hours. Prerequisite: course 101, Mathematics 21C or 16C (may be taken concurrently). Preparation of instructor. Geodynamics and the workings of plate tectonics. Kinetics of plate motions and interactions between plates. Frames of reference and hotspots. Plate tectonics and geodynamic processes such as subduction, plate driving forces, thermal structure of the Earth, tectonic convection in the Earth. Not open for credit to students who have completed course 108.

103. Field Geology (3) III. Lesher
Fieldwork and laboratory—6 hours. Prerequisite: course 101L or consent of instructor. Field mapping projects and writing geological reports. Five days field work during spring break; two to three days on weekends during the quarter. 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. Lesher
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.

106N. Earth Materials: Metamorphic Rocks (4) III. Lesher
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.

107. Earth History: Paleobiology (3) III. Vermeij
Lecture—4 hours. Prerequisite: course 105L or Biological Sciences 18B. 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 evolutionary role of organisms and of the communities of fossil organisms in field and laboratory.

108N. Earth History: Paleoclimates (3) III. Spero
Lecture—3 hours. Prerequisite: courses 1 or Geology/Enviromental Chemistry 2A; or consent of instructor. Geologic and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate systems 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.

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, climate, 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.

109L. Earth History: Sediments and Strata Laboratory (2) II. Mount
Laboratory—6 hours (includes four 1-day field trips). Prerequisite: course 109. Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subaerial analysis of depocentric basins. Not open for credit to students who have completed course 106.

110. Summer Field Geology (8) Summer Extra Session. The Staff
Fieldwork-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 application 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 courses 113.

113. The Solar System (3) III. Kellogg

113G. The Solar System: Discussion (1) III. Kellogg
Discussion—1 hour. Prerequisite: course 113 concurrently. Small discussion groups and preparation of papers for course 113. General Education credit with concurrent enrollment in course 113: Nature and Environment.

114N. Evolution and the Fossil Record (4) II. Vermeij
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or Evolution and Ecology 140. Patterns of evolution recorded in the fossil record. Models of organic evolution. Origination and extinction of taxa. The Neo-Darwinian synthesis and its impact on the interpretation of the fossil record. General Education credit: Nature and Environment. (Former course 144.)

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. General Education credit: Nature and Environment. (Former course 131.)

116. The Oceans (3) I. Cowen; 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.) General Education credit with concurrent enrollment in course 116G: Nature and Environment.

116G. The Oceans: Discussion (2) I. Cowen; II. Spero
Discussion—2 hours. Prerequisite: courses 116E/Environmental Studies 116E. An introductory method applied to discovery of the processes, biota and history of the ocean. Group discussion and preparation of papers. (Same course as Environmental Studies 116G.) General Education credit with concurrent enrollment in course 116E: Nature and Environment.

120. Volcanoes (4) I. Schiffman
Lecture—3 hours; discussion/labouratory—3 hours. Prerequisite: upper division standing and course 1 or 105. Study of how volcanoes, their eruptions, and their eruptive products shape our planet's crust, influence its oceans, atmosphere, and biota, and provide essential human resources, including mineral deposits and geothermal energy.

128. Sample Preparation and Techniques for Petrology (1) II. Winter
Laboratory—3 hours. Prerequisite: course 60-60L. Introduction to petrographic laboratory techniques for petrologists. 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) III. Lesher
Lecture—3 hours. Prerequisite: course 105L. Sources, 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. Geologic aspects of land use and development planning, with emphasis on waste disposal, land stability, earthquake prediction. Analytic techniques, presentation of reports, and legal aspects of selected case studies.

135. Rivers of California: Geology and Land Use (3) III. Mount
Lecture—2 hours; discussion/labouratory—3 hours. Prerequisite: courses 1, and 15 or 16L. Analysis of the conflict between geologic processes and the urbanization of an area's water resources. Mining, logging, and dam construction. Case studies of Sierra Nevada watersheds. Field study includes two raft trips on Sierran rivers and visit to Auburn Dam site. General Education credit: Nature and Environment.

143. Advanced Igneous Petrology (5) III. Lesher
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 105N, Mathematics 16C or 21C, Chemistry

*Course not offered this academic year.
2C. Physical and chemical properties of magnetic environments of igneous rock formation. Laboratory study of representative igneous rocks. Not open for credit to students who have completed course 123.

144N. Sedimentary Petrology (5) I. Mount Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 105N, 106N, 129. Petrography of sediments and sedimentary rocks. Textural, mineralogical and geochemical evolution of sediments during burial. Importance of ground water and energy minerals. Laboratory exercises emphasize study of sediments and rocks in thin section. Not open for credit to students who have completed course 124.

145N. Advanced Metamorphic Petrology (5) II. Day Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106N; Hydrologic Science 134 or Chemistry 2C; Mathematics 160C 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.

146N. Isotope Geochemistry (3) II. Law, and applications of the major physical and chemical processes 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 isochrons. 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—4 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, anoxic circulation, currents, waves, tides, mixing, major oceanic oceanic cycles. Offered in alternate years. (Same course as Environmental Studies 150A.)

150B. Geologic Oceanography (3) II. McClain, Spero Lecture—3 hours. Prerequisite: course 50 or 116. Introduction to the origin and evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean 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 course in general ecology or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf, benthic, deep-sea, and polar 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 Invertebrates (4) I. Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 107, 109L. Morphology, systematics, evolution, and behavior of animal phyla of invertebrates. Offered in alternate years. Not open for credit to students who have completed course 111A.

152N. Paleobiology of Protists (4) II. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 109L or Biological Sciences 1A or consent of instructor. Morphology, systematic 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 8C; or consent of instructor. Principles of geophysical and seismological methods. Use of gravity, magnetic, electrical resistivity, electromagnetism, and seismic measurements to determine structure of the Earth's crust. Interpretation of data using seismometers. Survey of well-legging techniques. Seismology and earthquake. 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 8C; or consent of instructor. Theories and use of physics in the study of the solid earth. Gravity, magnetism, palaeomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and 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 8C; or consent of instructor. Principles of fluid flow as applied to problems in geologic and hydrologic 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: course 101, 101L; Mathematics 21B or 118; Physics 5A or 7A or 8A; 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 experimental observation. Emphasis on interpretation of 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 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 to a total of six units, including units received for course 185.

190. Seminar in Geology (1) I, II, III. Bürgmann, Verosub 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. May be repeated for credit for a total of 10 units. (P/NP grading only.)

194A-194B. Senior Thesis (3-3) I-III. The Staff (Chairperson in charge) Prerequisite: open to geology majors who have completed 125 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.)

194A-194B. Senior Honors Project (3-3) I-III. The Staff (Chairperson in charge) Independent study—9 hours. Prerequisite: open to geology majors who have completed 125 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 course 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 include: principles 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 tectonic processes and volcanism. Geodetic measurement techniques such as triangulation, triangulation, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and interpretation. Inversion of geodetic data and mechanical models of crustal deformation.

215N. Stable Isotope Geochemistry (3) II. Criss Lecture—3 hours. Prerequisite: Chemistry 110A, Mathematics 226B, 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, paleotemperatures, igneous rocks and carbonates, and fluid-rock interaction. Offered in alternate years. (Former course 215B.)

216. Tectonics (3) I. Moors 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) I. Kellogg 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—2 hours. Prerequisite: courses 100, 100L, 101, 101L, 170; or consent of instructor. Recent advances in the understanding of structural architectures in brittle 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 5A or 5A, or consent of instructor; Mathematics 21B or 22B 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) III. Moors Lecture—2 hours; laboratory—3 hours. Prerequisite: course 144 or consent of instructor. Advanced petrographic analysis of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks during diagenesis, burial, and uplift. Laboratory work emphasizes this section analysis of rocks. May be repeated for credit when topic differs. Offered in alternate years.

227N. Stable Isotope Biogeochecmy (3) III. Spero Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Application of stable isotope techniques to paleoclimatic, paleoecological, 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, biostatigraphy of the ocean basin, evolution of ocean basins and margins, and sea-level changes and sea-level; variability. May be repeated twice for credit.
230. Advanced Mineralogy (3) I. Lecture—3 hours. Prerequisite: introductory mineralogy and differential equations or consent of instructor. Crystalllography and crystal chemistry of rock-forming mineral and high pressure phases. Mechanism of phase formation and emphasis on experimental techniques and methods of design and executing experiments on Earth-forming mineral and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered in alternate years.

235. Experimental Petrology (3) I. 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 mineral and rocks. Offered in alternate years.

240. Geophysical Analysis of the Earth (3) I. Kellogg Lecture—3 hours. Prerequisite: Earth Sciences and Resources 201, Physics 98, Mathematics 228. Physics of the earth's crust, mantle, and core. Applications of potential theory to interpret geophysical data and solve geophysical problems. Examination of the earth's geomagnetic field. Seismology. Laboratory sessions on the use of the surface wave seismometer, an electronic microcomputer, and a 2-channel recorder. Offered in alternate years.


244. Physical Chemistry of Metamorphic Processes (3) I. Day Lecture—3 hours. Prerequisite: course 145, Chemistry 110A, or consent of instructor. Physical chemical principles of metamorphic mineral assemblages and methods of interpretation of the behavior of mineral processes. Offered in alternate years.

247. Metamorphic Petrology Seminar (3) I. Day Seminar—3 hours. Prerequisite: course 145; course 244 recommended. Advanced topics in metamorphic petrology (e.g., mass transport processes, tectonic setting, geothermometry, structural, metamorphic belts, regional studies). May be repeated for credit when topic differs. Offered in alternate years. (SU grading only.)

245. Advanced Geophysical Analysis of the Earth (3) I. Criss Seminar—3 hours. Prerequisite: course 115 or consent of instructor. Critical review of selected topics in geology including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotopes, geology, and geochemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.

249. Advanced Problems in Geodynamics (3) I. Moores Seminar—3 hours. Prerequisite: courses 100 and 101 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., heat conduction, 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. (SU grading only.)

250. Advanced Problems in Tectonics (3) I. Moores Seminar—3 hours. Prerequisite: course 101 or consent of instructor. Seminar dealing with problems in tectonics of selected regions. 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. Offered in alternate years. (SU grading only.)

252. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

253. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)
Minor Program Requirements:
The Department offers a German Language and Literature minor in which 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 the student's interests in German (e.g., 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 Literature............20-24
Choose courses numbered from German 100 through 108B and literature courses that are taught in German.............20-24
One lower division course from German 48 to 52A, 52B, 52C may be counted.

Major Adviser, P. Schaefler.

Prerequisite Credit. Credit normally will not be given on the lower division level for a course that is the prerequisite for an upper-division course or for successfully completed Honors and Honors Program. The honors program comprises two quarters of upper division 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.

The Master of Arts Degree. The Department offers programs of study leading to the M.A. degree. Further information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

The Degree of Doctor of Philosophy. The Department offers programs of study and research leading to the Ph.D. degree in German literature. Additional degree options for a designated emphasis are available through study within the division projects in German literature and cultural history.

Critical Theory, and Feminist Theory. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

Graduate Advisers, G. Finney, K. Manges.

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 4.

Discussion—5 hours; laboratory—2-1/2 hours. 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. Other students will receive a letter grade unless a P/NP petition is filed.)

1H. Elementary Honors German (5) I, II, III. Henderson in charge.
Lecture/discussion—5 hours. Prerequisite: overall high school GPA of 3.5 or GPA of 3.5 in German for students with prior knowledge of German. Accelerated and considerably expanded introduction to German language, short literary texts, and culture accompanied by computer-assisted grammar instruction. Material covered in courses 1H and 2H is the equivalent of that covered in courses 1, 2, and 3.

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. 12-hour introduction of course 1 in areas of grammar and basic language skills.

Lecture/discussion—5 hours. Prerequisite: completion of course 1H with minimum GPA of 3.5 or GPA of 3.5 for incoming students. Completion of the accelerated and expanded first-year program with special emphasis on four skills in a cultural context, literary texts, and computer-assisted grammar instruction.

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar and continuing practice of all language skills through cultural readings.

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 4.

5. Basic Reading German (3) I. The Staff.
Discussion—3 hours. 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.

6. Intermediate Reading German (3) I, II. The Staff.
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.)

7. Advanced Reading German (3) I. The Staff.
Discussion—3 hours. Prerequisite: successful completion of course 11 or the equivalent. Continuation of course 11, with specialized exposure to upper-division and graduate students on individualized transition projects within each student's field of academic specialization. Systematic review of reading grammar in terms of advanced reading (P/NP grading only).

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 vocabulary through readings of modern texts. Not open for credit to students who have completed course 4. (Former course 4.)

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.)

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.)

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. General Education credit: Civilization and Culture.

12. 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 Romance civilization in Wagner's "total art-. . .
German

work" concept and The Ring of the Nibelung cycle may not be counted toward major in German. General Education credit: Civilization and Culture.

49. Freshman Colloquium (2) II. The Staff.
Chairperson in charge: Germaine S. R. P. 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 commu-
nist and post-communist German literature; mas-
culine "versus" feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; exercising post-holocaust national guilt and individual frustration—Germany's new European mission.

10. 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 arts and literature. Frequent short written reports and in-class expository presentations. General Education credit: Civilization and Culture.

51. Introduction to Literary Analysis (4) I. Finney.
Lecture/discussion—4 hours. Prerequisite: course 22.
Introductory study of various genres of German lit-
erature with an emphasis on the interrelationship between form and content and the impact on contemporary literary appreciation.

52A. Great Books of German Culture in English Translation: The Age of Faith (4) I. The Staff.
Chairperson in charge: Germaine S. R. Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50 recommended. The transformation of ideas resulting from the German cultural experience and its expression within the context of the general Western development from Chorismagisch through medieval chivalry to Luther and Giesel-

haußen. Knowledge of German not required. General Education credit: Civilization and Culture.

52B. Great Books of German Culture in English Translation: The Age of Reason (4) II. The Staff.
Chairperson in charge: Germaine S. R.
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50 recommended. The significant cross-currents in the history of ideas as these shaped the German cultural experience, from the Reformation and the waning of Holy Roman Empire, through the Enlightenment and Lessing, to Weimar Classicism and its 19th century secularization in Romantic idealism. Knowledge of German not required. General Education credit: Civilization and Culture.

98C. Special Study for Undergraduates (1-5) I, II, III.
The Staff.
Prerequisite: permission of instructor. Primary for lower division students. (P/NP grading only.)

Upper Division Courses

100. Intensive Conversational German (4) III.
The Staff.
Discussion—4 hours. Prerequisite: course 4. Intensive conversational practice to achieve accurate pronunciation and language fluency.

101A. Survey of German Literature, 800-1800 (4) I. McConnell.
Lecture—2 hours; discussion—1 hour. Prerequisite: course 51 and consent of instructor. 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) II. The Staff.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 51 or consent of instructor. Introduction to various periods of German literature from the 19th century 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, II, III.
The Staff.
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. McConnell.
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—2 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 105. Survey of the development of the German language and study of its structure in historical perspective.

107. Modern German Syntax (4) III.
Benware.
Discussion—3 hours; term paper. Prerequisite: course 105 or the equivalent. Syntax of the modern German language. Linguistics 1 recommended. Examination of the major pro-
lems 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 Standard language, Lengngussprache. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the contiguous German-speaking areas of Europe.

109A. Business German (4) I. Henderson.
Lecture/discussion—4 hours. Prerequisite: course 22 or consent of instructor. Specialized advanced language course using business-oriented information and publications at the basis for discussions, role-
play, reports, conversations 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 business 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: upper division standing or consent of instructor. Knowledge of German not required. Analyses in Eng-
lish of German literature from the Middle Ages through the Reformation (Nibelungenlied, Gottfried's Tristan and Isolde, Poesie der Nazen, lyric poetry, selections from Johann von Tepl, Conrad Celtis, Sebastian Brant, Erasmus, Luther). General Education credit: Civilization and Culture.

111A. H. Major Writers in Translation (4) II. The Staff.
Lecture—2 hours; discussion—1 hour; term paper. Prerequisites: sophomore standing; course 52A or 52B or 52C recommended. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement. Each in:

(A) Goethe; (B) C. E. Hoffmann; (C) Thomas Mann; (D) Franz Kafka; (E) Berthold Brecht; (F) Christel Wolf; (G) Günter Grass; (H) Friedrich Schiller. General Education credit for 111A or 111E: Civilization and Culture.

111C. Topics in German Literature (4) I, III. The Staff.
Discussion—3 hours; term paper. Prerequisites: course 50 and 52A or 52B or 52C recommended. Investigation of significant themes and issues within their Euro-
pean context: (A) Women in Literature; (B) Anti-Hero Figures in Literature; (C) Literary Fairytale; Knowl-
dge of German not required. May be repeated in different subject area. General Education credit for 111A, 112B: Civilization and Culture.

113. Goethe's Faust (4) II. Bernd, Schaefer.
Discussion—3 hours; term paper. In-depth 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. General Education credit: Civilization and Culture.

114. The Faust Tradition Before and After Goethe (4) I. The Staff.
Lecture—3 hours; term paper. Examines predecessors of Goethe's "Faust" (the Faustian theme in the Marlowe's Tragedy of D. F. and some successors (Mann's novel of 1947) in order to underscore key varieties of this provocative and pervasive theme. Knowledge of German not required. Offered in alternate years. General Education credit: Civilization and Culture.

115A. German Literature Since 1945 (4) I. Menges.
Lecture—3 hours; written reports—1 hour. 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, Johnes, Meier, Weinle, and poets like Celan, Enzensberger, and Aichinger. General Education credit: Civilization and Culture.

115B. German Literature Since 1945 (4) II. Kuhn.
Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading of major writers including the post-war generation 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 Strumritter, Seghers, Wolf, Kant, Hacks.

116. From Goethe's Werther to Today's Werther (4) II. The Staff.
Lecture—3 hours; discussion—1 hour; written reports. Prerequisite: course 51 or 52B recommended. Comparison of Germany's first international best-seller, Goethe's The Sufferings of Young Werther (1774) with its later counterparts, culminating in Plessdorf's novel of 1973, The New Sufferings of Young W.. General Education credit: Civilization and Culture.

117A. The Tristan Tradition: Medieval, Musical, Modern (4) III. McConnell.
Lecture—3 hours; term paper. Prerequisites: courses 51, 52A, and Music 10 recommended. Three different modes of the Tristan and Isolde legend: the medieval epic poem of Gottfried von Strassburg (1210), the music drama of Wegner (1859) and Thomas Mann's parodic novel (1931) on their intellectual environment and interrelationship. General Education credit: Civilization and Culture.

Lecture—3 hours; term paper. Prerequisites: course 51 or 52A or Music 10 recommended. Knowledge of German not required. Three modes of the Nibelungen legend: the Medieval epic poem Nibelungenlied, the Germanic Volkstümliche drama Ring of the Nibelungen, and Thomas Mann's Blood of
117C. Parzival Tradition: Medieval, Musical, Modern (4) III. McConnell
Lecture—3 hours; term paper. Prerequisite: Music 10 and course 51 recommended. Three modes of the Parzival legend and the medieval epic. Parzival, Wagner's music drama Parzival and Thomas Mann's The Magic Mountain in their intellectual environment and interrelationship. Knowledge of German not required. General Education credit: Civilization and Culture.

118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire) (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B). 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. General Education credit: Civilization and Culture.

118B. Welmar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B). Expressionism in graphic arts, literature, film, New Objectivity, Brecht, and Bahaus considered in the shadow of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. Offered in alternate years. General Education credit: Civilization and Culture.

118C. Germany Under the Third Reich (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: German 118B and History 147B recommended. 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 aesthetics. Everyday life in Hitler's Germany; consent, disenchantment, opposition, and resistance; Jews in Germany; the Holocaust. General Education credit: Civilization and Culture.

118E. Contemporary German Culture (4) I. The Staff
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 videocassettes. Knowledge of German not required. Offered in alternate years. General Education credit: Civilization and Culture.

118F. From German Fiction to German Film (4) II. The Staff
Lecture—3 hours; discussion—1 hour; term paper. Examination of 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 transfers. General Education credit: Civilization and Culture.

120. Survey of German Culture (4) III. Fetter
Lecture—3 hours; discussion—1 hour; prerequisite: course 22 or the equivalent. Introduction to a number of significant themes and issues within their European context: (A) Frauen in der Literatur; (B) Der Künstler als literarischer Held und Antiheld.

129. Postwar Women Writers (4) III. Finney
Lecture/Discussion—3 hours; term paper. Prerequisite: course 22. Survey of major women writers in German since 1945. Considers such issues as the existence of "female writing" and of a feminist aesthetics. Writers include Seghers, Bachmann, Wolf, Kirsch, Morgner, Wohmann, Stelzner, and Schwagler.

130. Modernity and Its Discontents: The Tradition of German Cultural Critique (4) III. The Staff
Lecture—2 hours; discussion—1 hour; four short papers. Prerequisite: History 43 or 4C. Philosophical and aesthetic tradition of Kulturkritik, from Romanticism to present. Authors include Herder, Schiller, Novalis, Hegel, Marx, Nietzsche, Freud, Spengler, Klages, Heidegger, Gelsen, The Frankfurt School. Illustrations from landscape and city representations. Knowledge of German not required. Offered in alternate years. General Education credit: Civilization and Culture.

131. German Lyric Poetry (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 22. Study of the genre of lyric poetry from late Middle Ages through Romanticism. Classically, in the 18th century, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period.

132. The German Novel (4) I. Bernd
Lecture—3 hours; term paper. Prerequisite: course 22. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representa-tive authors from Goethe to Kafka.

133. The German Drama (4) III. Bernd
Lecture—2 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.

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 poli-
sics in German literary history from the time of Walther von der Vogelweide in the Middle Ages, through the Reformations, the period of Romanticism, and the Twentieth Century. General Education credit: Civilization and Culture.

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. General Education credit: Civilization and Culture.

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, including Volker Schlöndorff, Rainer Werner Fassbinder, Werner Herzog, Hans-Jürgen Syberberg, Wim Wenders, Margarethe von Trotta, Helke Sander, Helma Sanders-Brahms, and Jutta Brückner.

145. 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 Germany and German-speaking countries. Discussion of contents. Critical approaches. Writing of summaries, rebuttals, comments.

150. Contemporary German Literature (4) I. Kuhn
Lecture—3 hours; term paper. Prerequisite: course 103 or the equivalent. Readings in contemporary literature, including texts by Chris Roa Wolf, Helga Königsdorf, Monika Maron, Günter Strass, Peter Schneider, Günter de Bruyn. Offered in alternate years.

168. Die Melatiertürung (4) III. The Staff
Lecture/Discussion—3 hours; listening—1 hour. Prerequisite: course 22. The music-drama Die Melatiertürung von Nürnberg against the backdrop of the city's cultural history, the practice of Melatiertürung and the historical Hans Sachs, to show the relationship of words to music, and the resulting music-drama as an enlivening humanistic work. Offered in alternate years.

167. Ribaldrin 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 ribaldy, i.e., earthy humor which cropped up to everyday life; satires for its own sake, more often as sporal satire or the promotion of causes such as the Reformations. Offered in alternate years.

168. Multiculturalism in German Literature (4) III. Schaeffer
Lecture/Discussion—3 hours; term paper/discussion—1 hour. Prerequisite: course 22 or consent of
238. Narrative and Narrative Theory (4) I. Finney Seminar—3 hours; term paper. Studies, in a theoretical and historical context, major elements of 19th- and 20th-century narrative, such as techniques of framing, refracting, and montage; narrative perspective, mimetic and mimetic; focus 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. A special emphasis on the use of verse 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 Novel (4) II. Bernd Seminar—3 hours; term paper. The major German Novelists. A special 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 Realist, with special emphasis on a selection of major novels of his generation. May be repeated for credit with consent of instructor.

244. Gender and Comedy (4) I. Finney Seminar—3 hours; term paper. Studies in genre and gender: gender and comedy. Comedy as male and female writers from the 18th century to the present day. Authors include Lessing, Kleist, Böchner, Eberescherbach, Hauptmann, Holm, Zille, Feuchtersleben, and Lehmann. A research paper is required.

252. The Writings of Lessing (4) I. The Staff Seminar—3 hours; term paper. Study of Lessing’s thesis of literature with particular emphasis upon his critical attacks on French drama.

253. Goethe (4) II. The Staff 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. Heine. von Kleist (4) I. 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 Novelm. 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’s Fiction (4) II. The Staff Seminar—3 hours; term paper. Study of Kafka’s narrative techniques with special emphasis on 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 concept developed by Brecht and Gorky against the background of contemporaneous developments in psychology, the visual arts, philosophy, and music. Authors include Gorky, Heinrich, Schiller, 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)

270B. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge)

270C. Basic Research for the Dissertation (4) I. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270D. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270E. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270F. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270G. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270H. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270I. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270J. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270K. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.

270L. The Middle Ages in German Literature (4) III. McConnell Seminar—3 hours; term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations in linguistic and literary problems. May be repeated for credit with consent of instructor.
the age of classicism. May be repeated for credit with consent of instructor.

295. Poetic Realism in German Literature (4). I. Bern. 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) (SU grading only)

299D. Special Study for the Doctoral Dissertation (1-12), I, II, III. The Staff (Chairperson in charge) (SU grading only)

299T. Special Study for the Master’s Thesis (6), I, II, III. The Staff. Independent study—5 hours; term paper/discussion—1 hour. Prerequisite: acceptance into M.A. Plan I Thesis Option. Intensive research and tutorial guidance for candidates accepted into Plan I of the Master’s program, culminating in a complete draft of the Thesis text (min. 30 pp.) scheduled for final submittal between June and September of the same year. (SU 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 all new teaching assistants. (SU 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 all new teaching assistants. (SU 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 all new teaching assistants. (SU 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. On-going consultation with Language Teaching Supervisor concerning application of technique and innovations within Teaching Assistant’s classroom responsibilities. Required of all Teaching Assistants after first year of appointment. May be repeated for credit. (SU 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; internship 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 (618-752-0776)

Faculty

Arnold J. Bauer, Ph.D., Professor
Cynthia L. Brantley, Ph.D., Associate Professor
Beverly Bosser, Ph.D., Assistant Professor
Daniel R. Brower, Jr., Ph.D., Professor
Paula E. Findlen, Ph.D., Associate Professor
William W. Hagen, Ph.D., Professor
Karen M. Hattunen, Ph.D., Professor
Phyllis G. Jessel, Ph.D., Assistant Professor
Catharine 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
Don C. Price, Ph.D., Professor
Ruth E. Rosen, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Michael Saile, 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. Bowes, Ph.D., Professor Emeritus
David Brody, Ph.D., Professor Emeritus
Paul Goodman, Ph.D., Professor Emeritus
W. Turrentine Jackson, Ph.D., Professor Emeritus
Robert C. Crumley, Ph.D., Professor Emeritus
Manfred P. Fleischer, Ph.D., Professor Emeritus
Rollo 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 is designed to develop critical intelligence and to foster 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 the history of one geographic area or time period of their choosing. The purpose of Plan II is to encourage 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 history 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 many history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A.B. Major Requirements:

Preparatory Subject Matter

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Five lower division courses, including at least two from each of the following fields:

- a. Western Civilization: History 4A, 4B, 4C, 4D, 5A, 5B
- b. Asian Civilization: History 8, 9A, 9B
- d. Africa: History 15

Depth Subject Matter—Plan I

<table>
<thead>
<tr>
<th>Units</th>
<th>40-41</th>
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</table>

Four upper division courses from one of the fields of concentration listed below.

Three upper division courses from one of the other fields listed.

Two upper division courses from a field or fields other than those satisfying the two preceding requirements.

One course from the following: History 101, 102, or 103 (in field of concentration).

Total Units for the Major, Plan I

<table>
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<tr>
<th>Units</th>
<th>80-81</th>
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</thead>
</table>

Depth Subject Matter—Plan II

<table>
<thead>
<tr>
<th>Units</th>
<th>42</th>
</tr>
</thead>
</table>

Four upper division courses from one of the fields of concentration listed below.

Three upper division courses from one of the other fields listed.

History 101 (in field of concentration).

History 103 in field of concentration.

Total Units for the Major, Plan II

<table>
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<th>Units</th>
<th>62</th>
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</table>

Fields of Concentration


*Course not offered this academic year.*
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. 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. J.A. Bauer, F. Findlen, W. Hagen, S. Mann, B. Metcalf, 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, 17A, 17B, 17A, 17B, 17C, 174A, 174B, 174C, 175A, 175B, 175C, 175E, 176B, 177A, 177B, 180A, 180B, 180A, 180B. 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

4. History of Western Civilization (4). II. J. Jelict
  Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture.

4B. History of Western Civilization (4). II. III.
  Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture.

4C. History of Western Civilization (4). II. III.
  Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. General Education credit: Civilization and Culture.

8. History of Indian Civilization (4). II. The Staff
  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, art and literature that reflect cultural interaction and change. General Education credit: Civilization and Culture.

9A. History of East Asian Civilization (4). III.
  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 included. General Education credit: Civilization and Culture.

9B. History of East Asian Civilization (4). I.
  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.

10. World History of the Twentieth Century (4).
    II. 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. General Education credit: Contemporary Societies.

15. Introduction to African History (4).
    II. Brandt, Taylor
    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 colorization, and African independent states.

17A. History of the United States (4). I, II.
    Halttusen, Pierson
    Lecture—3 hours; discussion—1 hour. The experience of the American people from the Colonial Era to the Civil War. General Education credit: Civilization and Culture.

17B. History of the United States (4). I, II, III.
    The Staff
    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. General Education credit: Civilization and Culture.

25. Thematic History Seminar (4). II. 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). I. 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. General Education credit: Civilization and Culture.

72A. Social History of American Women and the Family (4). I. Rosen
    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. General Education credit: Civilization and Culture.

72B. Social History of American Women and the Family (4). II. Rosen
    Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family in twenty-first century America, emphasizing female reformers and revolutionaries, working class women, consumerism, the role of gender in "postmodern" change in family life, and the emerging women's movement. General Education credit: Civilization and Culture or Contemporary Societies.

    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.

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: one year of writing in one of the history departments. Study of the history of historiographical 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 critical essay 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, 1787-1866; (M) United States since 1866; (N) Japan; (O) Africa; (P) Christianity and Culture in Europe, 50-1850; (Q) India; (R) Muslim Societies; (S) 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.

103A. 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 topic in 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; term paper. Prerequisite: course 104A. Research in preparation of a senior honors thesis under the direction of a faculty advisor. (Deferred grading only; pending completion of sequence.)

104C. Honors Tutorial (4) The Staff
Tutorial—4 hours; term paper. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty advisor.

110. Themes in World History (4) Lecture—3 hours; discussion—1 hour. Prerequisite: upper-division standing. Six or eight units in history 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.

111A. Ancient History (4) III. 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.

111B. Ancient History (4) II. Spyridakis
Lecture—3 hours; discussion or paper (student option). Political, cultural and intellectual study of the Greek world from Mycenaean-Mycenaean period to end of Hellenistic Age.

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 AD.

115A. History of West Africa (4) II. 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.

115B. History of East and Central Africa (4) 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 (written) and Political Science 138.

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.

116. African History: Special Themes (4) The Staff
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.

121A. Medieval History (4) III. Jackson
Lecture/discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century.

121B. Medieval History (4) The Staff
Lecture/discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century.

121C. Medieval History (4) The Staff
Lecture/discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance.

122. Selected Themes in Medieval History (4) The Staff
Lecture—3 hours; term paper. Each offering will focus on a single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings will be drawn from original sources in English translation and modern works. May be repeated for credit.

125. Topics in Early Modern European History (4) III. St. Lawrence
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 Spain, and the age of exploration. May be repeated for credit.

130A. Christianity and Culture in Europe: 50-1450 (4) II. Justesse
Lecture—3 hours; written report or research paper. History of the church in medieval Europe and its impact on the history of the church in the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics.

130B. Christianity and Culture in Europe: 1450-1600 (4) II. Justesse
Lecture—3 hours; written report or research paper. History of the church in Europe and its impact on the history of the church in the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics.

130C. Christianity and Culture in Europe: 1600-1800 (4) III. St. Lawrence
Lecture—3 hours; written report or research paper. Survey of the cultural, political and religious development of Europe in the 17th century. May be repeated for credit.

131A. Early Modern European History (4) II. Stuart
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 4C, 115A recommended. European History from about 1350 to about 1500.

131B. Early Modern European History (4) II. Stuart
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 115A recommended. Western European history from about 1500 to about 1650.

131C. Early Modern European History (4) II. Stuart
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 115A recommended. Western European history from about 1650 to about 1789.

133. The Age of Ideas (4) The Staff
Lecture—3 hours; written reports. Enlightenment and its background in the eighteenth century.

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.

135A. History of Science to the 18th Century (4) I. 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.

135B. History of Science, 18th to 20th Centuries (4) II. 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 the emergence of broad, evolutionary principles that serve more than one science.

136. Scientific Revolution (4) II. Findlen
Lecture/discussion—3 hours; term paper. Prerequisite: course 135A or 135B recommended. History of science in Western Europe (1400-1750). Emphasis on the scientific revolution and the changing definitions of science in the age of Copernicus, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific method.

136A. Russian History: The Rise of the First Empire, 1500-1881 (4) III. Brower
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. Expansion of the Russian state in Muscovite and tsarist Russia. Emphasis on the development of absolute 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. General Education credit: Civilization and Culture.

136B. Russian History: The Russian Revolution, 1860-1917 (4) I. 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. General Education credit: Civilization and Culture.

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.

139A. Medieval and Renaissance Medicine (4) III. Findlen
Lecture/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. General Education credit: Civilization and Culture.

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 medi-
icines in attitudes toward poverty, women, race, disease. Offered in alternate years.

**140A. The Rise of Capitalism in Europe** (4) III.
Hagen
Lecture—3 hours; term paper. Prerequisite: course 24B or 4C. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1800; the transition to modern capitalism via industrial revolution. Interplay of social, political, cultural, and economic history. Offered in alternate years. General Education credit: Civilization and Culture.

141A. France Since 1815 (4) II. Kudlick
Lecture—3 hours.

142. Why the Holocaust? (4) II. 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; national question in central Europe; antisemitism and German politics; Nazism and mass murder; responses by victims and bystanders.

143. History of Eastern Europe and the Balkans (4) II. Hagen
Lecture—3 hours. 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; nationalism (4) II. Kudlick 1765-1914; the twentieth century, including an analysis of the contemporary scene.

144. History of Germany since 1648 (4) II.
Hagen
Lecture—3 hours; essays. Social and political history of Germany in the ages of absolutism and the Enlightenment, industrialization and national unification, the World Wars, and since 1945.

145. War and Revolution in Europe, 1789-1918 (4) III. Margadant
Lecture—3 hours; term paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I.

146A. Europe in the Twentieth Century (4) I.
Willis
Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939.

146B. Europe in the Twentieth Century (4) II.
Willis
Lecture—3 hours; term paper. Survey of the history of Europe to 1950.

147B. European Intellectual History, 1800-1920 (4) II. Sailer
Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks, from Enlightenment and economic thought to socialism. Social and intellectual reactions to social change. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and F. Nietzsche. General Education credit: Civilization and Culture.

147B. European Intellectual History, 1800-1920 (4) II. Sailer
Lecture—3 hours; term paper. Cultural and intellectual watershed of the late nineteenth and early twentieth centuries. Emergence of modern art and literature; the rise of the new social sciences. Focus on the work of Baudelaire, Wagner, Nietzsche, Freud, Weber and Kafka. General Education credit: Civilization and Culture.

147C. European Intellectual History, 1920-1970 (4) II. Sailer
Lecture—3 hours; term paper. European thought and culture since World War I. Coverage includes literature and politics: Communism and Western Marxism; fascism; psychoanalysis; structuralism; feminism. Particular attention to Lenin, Brecht, Hitler, Sadre, Camus, Beckett, Marcuse, Foucault, Woolf and de Beauvoir. General Education credit: Civilization and Culture.

148A. Women and Society in Europe: 1500-1789 (4) II. 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 historical contexts as well as on discussions of women in the writings of political theorists and social commentators.

148B. Women and Society in Europe: 1789-1920 (4) II. Kudlick
Lecture—3 hours; term paper. Prerequisite: course 4C and 148A recommended. Perception 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. General Education credit: Civilization and Culture.

151A. England: The Middle Ages (4) III. Justice
Lecture—3 hours; term paper. Prerequisite: course 4A recommended. Emphasis on England the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Scandinavian institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wyclif.

151B. England: The Early Modern Centuries (4) III. 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 economic and colonial empire; the rise of the parliaments; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton.

151C. Eighteenth-Century England (4) I.
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 for the elevation of the industrial revolution.

151D. Industrial England (4) II.
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 for the elevation of the industrial revolution.

161A. History of the Colonial Spanish Americas (4) I.
Bauer
Lecture/discussion—3 hours; written reports. Pre- Colombian 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. General Education credit: Civilization and Culture.

161B. Latin American History (4) II. Bauer
Lecture/discussion—3 hours; written reports. Evolution of modern Latin America: export economy, oligarchical rule; reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides.

162. History of the Andean Region (4) II. C. Walker
Lecture/discussion—3 hours; written 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.

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.

163B. History of Brazil (4) III. The Staff
Lecture—3 hours; written reports. History of Brazil from 1889 to the present. Offered in alternate years.

164. History of Chile (4) II. Bauer
Lecture—3 hours; term paper. Prerequisite: course 161A, 161B, or 16B recommended. Emphasis on the history of the Chilean political economy from 1930 to the present. Development (modernization, Marxism, Neo-Liberals); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. Offered in alternate years.

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. General Education credit: Contemporary Societies.

166A. History of Mexico to 1848 (4) II. Bauer
Lecture/discussion—3 hours; written or oral reports. Political, economic, and social development of pre-Columbian, colonial, and national Mexico to 1848. Offered in alternate years.

166B. History of Mexico Since 1848 (4) III. The Staff
Lecture/discussion—3 hours; written or oral reports. History of Mexico from 1848 to the present. Offered in alternate years.

168. History of Inter-American Relations (4) II. 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 communismo latino.

168A. Mexican-American History (4) II. The Staff
Lecture/discussion—3 hours; written or oral reports. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture, and social history of the Southwest United States from about 1800 to 1910. General Education credit: Civilization and Culture.

169B. Mexican-American History (4) II. The Staff
Lecture/discussion—3 hours; written or oral reports. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture, and social history of the Southwest United States from about 1800 to 1910. General Education credit: Civilization and Culture.

170A. Colonial America (4) I. Taylor
Lecture—3 hours; term paper. Colonial society from 1607 to the American Revolution, with emphasis on the development of the Spanish-speaking population of the Southern United States from about 1600 to 1812. General Education credit: Civilization and Culture.

170B. The American Revolution (4) I. The Staff
Lecture—3 hours; term paper. Analysis of the Revolutionary period with emphasis on the struggle of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period.

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.

171A. The Jacksonian Era (4) I. The Staff
Lecture—3 hours. Political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850.

171B. U.S. Civil War: Politics and Society (4) III.
The Staff
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).

174A. The Emergence of Modern America, 1876-1914 (4) I. The Staff
Lecture—3 hours; term paper. Rise of modern business and labor organizations, changing political institutions and the culmination and decline of Victorian culture, and the reaction of muckrakers, Progressives, socialists, feminists and social reformers to industrialization and urbanization.

174B. America in World War I: 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 issues such as government regulation of the economy, welfare capitalism, and class, racial, ethnic and gender conflicts.

174C. The United States Since World War II, 1946 to the Present (4) III. M. Smith
Lecture—3 hours; term paper. America's struggle to respond to new complexities in foreign relations.

*Course not offered this academic year.*
social tensions, family changes and media. Emphasis on such topics as: Cold War; anticommmunist crusade; civil rights, feminist and environmentalist movements; Nehru, Chinese agriculture; Vietnam; Watergate; and the moral major.

*174D. Selected Themes in Twentieth-Century American History (4) The Staff Lecture—3 hours; term paper. Prerequisite: course 173 or the equivalent or consent of instructor. Interpretative over a single topic in twentieth-century America with emphasis on the phases and processes of historical change.

*175A. Intellectual History of the United States (4) The Staff Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 174A or 179; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820s to about 1870. Major term paper. Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

*175B. Intellectual History of the United States (4) The Staff Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 174A or 179; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820s to about 1870. Major term paper. Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

176A. Cultural and Social History of the United States (4) III. Hatunten 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.

176B. Cultural and Social History of the United States (4) II. Hatunten 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.


177B. History of Black People and American Race Relations (4) W. Walker Lecture—3 hours; discussion—1 hour. Prerequisite: course 174A or 174B. History of black people in the United States from the African background to Reconstruction. General Education credit: Civilization and Culture.

180A. Growth of American Politics to 1815 (4) The Staff Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B.

180B. Growth of American Politics, 1815-1850 (4) II. The Staff Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A.

*180C. Growth of American Politics, 1850 to the Present (4) The Staff Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B.

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 the present. Partial completion of course 180B.

182. The Frontier Experience: Trans-Mississippi West (4) The Staff 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.

183B. The Frontier Experience: Trans-Mississippi West (4) II. Taylor Lecture—3 hours; written and/or oral reports. Spread of the mining frontier, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West.

185A. History of Science in America (4) The Staff Lecture—3 hours; written and/or oral reports. Spread of the mining frontier, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West.

185B. History of Technology in America (4) Smith Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical analysis of technological and cultural interchange, creative processes, institutions, ideas, and relationships between technology and society from colonial times to present.

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 rise of 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. General Education credit: Civilization and Culture.

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. General Education credit: Contemporary Societies.

189A. History of California (4) III. The Staff Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission as a frontier institution; relations of the California Peninsula; the Donner Party; the Mormon pioneers and trail; the Bear Flag Revolt and Mexican War.

189B. History of California (4) IV. 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 reforms.

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; the New Deal; depression and World War II; role of minorities; contemporary politics.

191A. Classical China (4) The Staff 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.

191B. High Imperial China (4). I. Bossert Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of Tang, Song, and Ming with analysis of society, culture and thought.

191C. Late Imperial China (4) I. Mann Lecture—2 hours; discussion—1 hour; term paper. 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 Chinese life as well as popular culture. Offered in alternate years.

191D. Nineteenth Century China: The Empire Confronts the West (4) II. Bossert Lecture—2 hours; discussion—1 hour; term paper. Prerequisites: courses 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.

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 Con-}
emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power.

1943. Business and Labor in Modern Japan (4) I. The Staff Lecture—3 hours; term paper or paper. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in alternate years.

1946. 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.

196A. Medieval India (4) I. Metcalf Lecture—3 hours; discussion—1 hour; written reports. Survey of history of India in the millennium preceding arrival of British in the eighteenth century, focusing on reaction of the civilizations of Hinduism and Islam and on the changing nature of the state.

196B. Modern India (4) II. 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.

1977. Tutoring in History (2) I. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—3 hours. Prerequisite: enrollment as a History major with senior standing and consent of department chairman. Tutoring of students in writing research papers. 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-S. 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 1860; (G) China since 1860; (H) Britain; (I) Latin America since 1810; (J) American History to 1877; (K) United States, 1877-1886; (L) United States since 1886; (M) Modern Japan; (Q) Cross-Cultural Women’s History; (B) History of Science and Medicine. 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 different subject area is studied.

203. Seminar Research (4) I, II. The Staff Seminar—3 hours; term paper. 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.

204A. Historiography (4) I. Brower (Chairperson in charge) Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Introduction to major works of historical scholarship from the Greeks to the present.

211. Ancient History (4) The Staff Seminar—3 hours; term paper. Prerequisites: 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; term paper. Prerequisites: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

227. Russian History (4) The Staff Seminar—3 hours; Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1650.

245. Modern European History (4) II. 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. Beuer 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 201-J 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) II-I. 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.)


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 (SU only 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) (SU only grading only)

299D. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU only grading only)

*Course not offered this academic year.

Professional Courses

290. Teaching History in the Community College (3) I. The Staff Lecture—discussion—laboratory—6 hours. Prerequisite: graduate standing. Designed for MAT students. Methods for the presentation of history at the community college and secondary school level. (SU grading only.)

399. Introductory Seminar for Teaching Assistants (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: must be enrolled in History 390. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (SU grading only.)

390. Teaching History in College (2) I, II, III. The Staff Discussion—2 hours. Designed for teaching assistants with particular emphasis on problems and procedures encountered by teachers of lower division classes at the university. (SU grading only.)

History and Philosophy of Science

(College of Letters and Science) James R. Griesemer, Ph.D., Program Director Program Office, 339 Social Sciences and Humanities Building 916-752-0912

Committee in Charge

Michael R. Dietrich, Ph.D. (History and Philosophy of Science)
Paula E. Findlen, Ph.D. (History)
James R. Griesemer, Ph.D. (Philosophy)
Michael Smith, Ph.D. (History)
Paul Tellier, Ph.D. (Philosophy)

The Program. 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.

Minor Program Requirements:

UNITS

History and Philosophy of Science..........................24

Philosophy 104.................................................4

History 135A or 135B ........................................4

Four courses from the list 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, 130A, 130B, 185A, 185B, 185C, 186B
(b) Philosophy 106, 107, 108, 109, 110, 111
(c) History and Philosophy of Science 20, 130A, 130B, 150, 160

Minor adviser. M. Dietrich, 234 Social Sciences and Humanities 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) I. 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 Pato, Newton, and Einstein; also cosmological schemes of astrologers, alchemists, Christian mystics, women, and Native Americans. General Education credit: Civilization and Culture.
Horticulture (A Graduate Group)

David W. Burger, Ph.D., Chairperson of the Group
Graduate Study. The Graduate Group in Horticulture offers programs of study leading to the M.S. degree. The programs provide opportunities for specialized study in 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.

Preparation. A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes coursework in general botany, chemistry, genetics, etc. Students may be admitted with credits in these areas 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)
Lecture—1 hour; lecture/discussion—2 hours. Prereq.: Plant Biology 111, 112, or Plant Science 102. 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. Offered in alternate years. Not open for credit to students who have taken Plant Science 203.

251. Modeling Horticultural Systems (3) Prereq.: Plant Science 101, 102, or equivalent. Introduces students to systems modeling. Primary emphasis is on the application of mathematical techniques to the optimization of horticultural systems. Applications to various areas of horticulture will be explored. Students will receive hands-on experience.

290. Seminar (1-3) Prereq.: graduate standing at UC. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (5 units grading only.)

Human Development

(College of Agricultural and Environmental Sciences)

L.V. Harper, Ph.D., Chairperson of the Division

Faculty

Curtis R. Acredolo, Ph.D., Adjunct Associate Professor
Carolyn Aldwin, Ph.D., Associate Professor
Keith Barton, Ph.D., Professor
Branda Bryant, Ph.D., Professor
James Chisholm, Ph.D., Associate Professor
Lawrence Harper, Ph.D., Professor
Rosedale Kraft, Ph.D., Associate Professor
Beth Ober, Ph.D., Associate Professor
Carol Rodino, Ph.D., Associate Professor
Emeriti Faculty

Glenn Dawe, Ph.D., Professor Emeritus
Emmy Werner, Ph.D., Professor Emeritus

The Major Program

Human development explores the developmental processes in humans throughout the lifespan. Cognitive and personality/social development are studied from various perspectives.

The Program. Human development majors complete a group of preparatory courses in psychology, biological sciences, and human development. Advanced courses offered include courses in social, developmental, and educational psychology. Students interested in research may participate in research projects or may be hired as research assistants.

Internships and Career Alternatives. At least one practicum course is required. A second practicum course or supervised internship course can be used to fulfill internship 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 and bilingual students. Human development graduates fill a wide variety of positions in preschool and elementary settings, as well as governmental jobs related to social welfare and recreation. Those who emphasize the biological aspects of human development can apply to medical school or pursue training for para-medical positions within the health sciences. Human development prepares students for a variety of advanced degrees in the behavioral sciences, education, child guidance, social welfare, health sciences, or research in human development. Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree 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....................................................4-12

Additional English (choose from English 102, 103, 104)...................3-4

Preparatory Subject Matter..................................................38-44

Anthropology 1, 2, and 16......................................................13
Biology (Two courses from the following; one is required) ...............4-12

1 Chemistry 2A is recommended prerequisite for Biological Sciences 1A. Biological Sciences 1A is recommended prerequisite for Biological Sciences 1B.

Genetics (Biological and Cellular Biology 10 or Biological Sciences 101)...........................................4

Human development (Human Development 30)..........................4

Course not offered this academic year.
Nutrition (Nutrition 10 or 101)..............3-5
Physiology (Neurobiology, Physiology and Behavior 10 or 101)..............4-5
Psychology (Psychology 1 or 15)..............3-4
Statistics (Economics 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, 17C, 72A, 72B, and Political Science 135)..............16

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
Four additional upper division courses chosen from the Human Development courses or from a list of restricted electives (in consultation with a faculty advisor)..............16

Unrestricted Electives..............39-72
Total Units for the Degree..............180

Major Advisor. C. Rocking, C. Aldwin.
Related Major Program. See the major in Applied Behavioral Sciences.

Minor Program Requirements:

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<th>UNITS</th>
<th>Aging and Adult Development</th>
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<td></td>
<td>Human Development 100C, 160, 191</td>
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<td>Community Health 163</td>
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<td>Human Development 110, Applied Behavioral Sciences 173</td>
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<td>Practicum, 2 units minimum</td>
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Minor Advisor. C. Aldwin, B. Ober.

Graduate Study. 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 Applied Behavioral Sciences 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 systems; 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. (PnP grading only.)

13. Parenting (4) Ill. 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. General Education credit: Civilization and Culture.

15. Family and the Life Cycle (4). 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 to students who have completed courses 100A, 100B, 110 and/or Psychology 112, 114, and 115. General Education credit: Contemporary Societies.

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. General Education credit: Human Values and Environment.

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. (PnP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   (PnP grading only)

Upper Division Courses

100A. Infancy and Early Childhood (4). I, II, III. The Staff
   Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Examination 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). I, II, III. The Staff
   Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Examination of the psychological, emotional, and social development of children, middle childhood through adolescence.

100C. Adulthood and Aging (4). I, II, III. The Staff
   Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Examination of the psychological, emotional, and social development of adults. Emphasis on normative patterns of development which characterize "successful aging."

   Lecture—4 hours. Prerequisite: courses 100A and 100B, or Psychology 112. Theories of cognitive development including developmental views of perception, learning, memory, attention, and reasoning. (PnP grading only.)

102. Social and Personality Development (4). II. Rodning
   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). I. Werner
   Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S.

110. Contemporary American Family (4). I, II. The Staff
   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 issues and problems. 

120. Research Methods in Human Development (4). I, II. The Staff
   Lecture—3 hours; laboratory—discussion—1 hour. Prerequisite: courses 100A and 100B, or consent of instructor. Research design and analysis, basic statistics, research methodology, and ethics. Research on areas of human development (i.e., infancy, learning, cognition, personality). (PnP grading only.)

121. Psychological Assessment (4). I, II. 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, II. Bryant
   Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Discussion of psychoses, neuroses, behavior disorders, and learning difficulties in children.

131. Developmental Disabilities (4). I, II. The Staff
   Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities, education, and socialization. Introduction to community resources.

132. Individual Differences in Giftedness (4). I, II. 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 individuals.

140. Communication and Interaction with Young Children (2). I, II. The Staff
   Lecture—2 hours. Prerequisite: courses 30A, 100A, and 140L (may be taken concurrently 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 Study Center.

140L. Laboratory in Early Childhood (3-6). I, II. Stockman
   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. (PnP grading only.)

141. Field Studies with Children and Adolescents (4-6). I, II. Kraft: III. The Staff
   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, II. Bryant
   Discussion—1 1/2 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). I, II. Aldwin
   Fieldwork—8-12 hours; discussion—1.5 hours. Prerequisite: course 100C or 180 may be taken concurrently. To apply theory and research to human development and aging, to work with older adults in a variety of settings, to develop skills relevant to that application. Students will also develop a small research project. Offered alternate quarter of one year, then in spring quarter the next year.

150. Supervision and Administration of Early Childhood Education Programs (4). I, II. The Staff
   Lecture—40 hours total. Prerequisite: course 140 or prior experience in an early childhood education program. History of early childhood programs in California; federal, state, and local regulations. Implications of different regulations for funds and budgets, policy making mechanisms, professional and legal responsibilities, staff development, and professional attitudes and issues. Offered in alternate years.

*Course not offered this academic year.
151. Shared Child Care (4) I. Werner Lecture—4 hours. Prerequisite: courses 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. The Staff 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.

162. Issues in Aging (3) I. The Staff 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, III. 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.)

*191. Proseminar: Issues in Aging (2) I. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing and permission of the instructor. Discussion of selected critical issues in aging.

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 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/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 verbal aspects of development from conception to the age of five years.

200B. Middle Childhood and Adolescence (4) II. The Staff 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 social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on the 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 alternate years.

210. Theories of Behavioral Development (3) III. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in behavioral sciences. Consideration of ontogenetic and phylogenetic 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) II. The Staff Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the behavioral sciences. Consideration of parallels between processes of organismic development and behavioral development in children and non-human mammals.

212. Adaptation and Aging (3) I. Alwin 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) III. Pfiffner 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 concerning cross-cultural perspectives on childhood. Introduction to 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.). Offered in alternate years.

217. Development of Cortical and Perceptual Laterality (3) II. 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 relationships of this development to thinking and behavior. Offered in alternate years.

220. Research Methods in Human Growth and Development (3) I. The Staff Lecture—3 hours. Prerequisite: Statistics 13 or equivalent and at least two upper division courses in human biology or developmental psychology. Theory and research methods in biological, cognitive, and social/emotional development from prenatal period to death.

221. Psychological Assessment of Children (4) III. Bartos 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) III. 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 serving children and their families. Offered in alternate years.

225. Behavioral Development and Food Intake (4) III. Politt 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. Kreft II, Alwin Lecture—2 hours; seminar—1 hour. 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) I. 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 that occur in the central nervous system occurring with aging. Offered in alternate years.

237. Parent-Child Interaction (3) III. The Staff Lecture—3 hours. Prerequisite: consent of instructor; upper division course in the family recommended. Current theory and research on parent-child interaction and behavior in other animals and other cultures, child-rearing 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) I. 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.

246. Sex, Evolution, and Development (4) I. Chisholm Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development or related field. An evolutionary and cross-cultural perspective on the family, with special emphasis on life history theory and parental investment theory and their relevance for understanding the development of alternative mating and parenting strategies in humans.

250. Seminar (3, 5) 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 Lecture—1 hour. Prerequisite: graduate standing and consent of instructor. Supervising instructors lead research discussions with graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (SU grading only.)

291. Research Issues in Human Development (3) I. Kraft II, Alwin Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development.

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)
Human Development (A Graduate Group)

Rosemarie Kraft, Ph.D., Chairperson of the Group
Office, 1303 Hart Hall (916-752-1926)

Faculty. Core faculty are housed in the Division of Human Development, Department of Applied Behavioral Sciences. Students may also choose to work with faculty members in the departments of Anthropology, Behavioral Biology, Neuroscience, Nutrition, Psychology, Physiology; the Division of Education; 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 aim of the program is to provide students with a coordinated postgraduate lifespan study of human behavioral development and to educate students in the theories, methods, and accumulating research that provide the basis for current understanding and expanding knowledge of the development of human behavior. The program has a three-pronged structure: (1) It incorporates study in three domains of human development—biological, cognitive, socio-emotional; (2) It organizes the study of human development across the lifespan from conception through aging; and (3) It emphasizes the internal and external contexts within which human development takes place—cultural institutions such as families, schools, and hospitals, and other contextual conditions such as government/social policy, nutrition, disease, and health/mental health. 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)

Georges Van Den Abbeele, Ph.D., Program Director
Program Office (916-752-9634)

Committee in Charge

Conrad Atkinson, A.S., honors (Art Studio)
Marc E. Blanchard, Alg. de lettres (Comparative Literature, French)
JoAnn Cannon, Ph.D. (Italian)
Winfried Schulte, Ph.D. (English)
John Stewart, Ph.D. (African American and African Studies)

The Program of Study

Courses in the Humanities Program are designed to provide instruction in interdisciplinary areas which do not fit readily into existing departments or programs.

Courses in Humanities (HUM)

Lower Division Course

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 part of the 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.

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. General Education credit: Civilization and Culture.

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 art for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and data base management (design, application, and evaluation, and search strategies).

160. Topics in the Humanities (4) I, II, III.
The Staff
Lecture/discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics vary. May be repeated once for credit.

198. Directed Group Study (1-4) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PIN grading only.)

199. Special Study for Advanced Undergraduates (1-4) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PIN grading only.)

Graduate Courses

250. Topics in Humanities (4) I, II, III.
The Staff
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
Prerequisite: Program Director in charge. Individual research in the humanities resulting in a formal written research report. (SU grading only.)

Hydrologic Science

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Land, Air and Water Resources, Hydrologic Science Section.

The Major Program

Hydrologic Science 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 the chemistry of water. 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 collecting and analyzing field data and forecasting future system behavior.

Contemporary hydrologic problems include more efficient 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, multidisciplinary 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, government, and dealing with water resources, including the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricultural 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 0-6

See college requirement.

Breadth/General Education 18-24

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, 51 3

Applications of computers, Engineering 5 or the equivalent 3

Depth Subject Matter 44-54

Hydrologic Science 100 5

Probability and statistics, Civil and Environmental Engineering 114 or Statistics 132A or 130B 8

Hydrologic Science 103 5

Hydrologic Science 145 6

Select from Atmospheric Science 133, Civil and Environmental Engineering 142, 142L, Geography 182, Hydrologic Science 141, 147 6

Subsurface hydrology 10-12

Select from Applied Science Engineering 115, Civil and Environmental Engineering 144, Geology 105, 106, Hydrologic Science 145, 148, Soil Science 107, 120 8

Water quality 10-12

Select from Civil and Environmental Engineering 140, 140L, Environmental Studies 110, Hydrologic Science 122, 128, 134, 136, Soil Science 111 8

Water policy and social awareness 6-8

Select from Agricultural Economics 147, 147L, Environmental Studies 160, 161, 170, Geography 160, 161, 170, Geology 134, Hydrologic Science 150 8

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, but are not limited to, Water Quality, Irrigation and Drainage, Groundwater Hydrology, and Surface Hydrology. Coursework for these areas may be taken from Hydro-
logic Science, Soil Science, Geology, Atmospheric Science, Environmental Toxicology, and Environmental Studies, in addition to advanced courses in Mathematics, Chemistry, and Statistics.

Unrestricted Electives 2-20
Including units earned from 192 and 199 courses.

Total Units for the Degree 180

Major Advisor. Mr. Grimmer.

Minor Program. The Hydrologic Science Section of the Department of Land, Air and Water Resources offers the following minor program. The minor in Hydrologic Science is designed for natural science students who have an interest in water/environmental issues. The interested student should have completed preparatory coursework in calculus (Mathematics 16B), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 5A), and biology (Biological Sciences 1A).

Minor Program Requirements:
Coursework in the minor provides fundamental skills and knowledge of the hydrologic sciences. The program is sufficiently flexible for students to pursue particular water issues or problems of interest to them.

Hydrologic Science

Hydrologic Science 100 ... Three depth courses: Select one course from each pair below (the alternate course may be chosen as an elective) ... Hydrologic Science 140 or 145 (b) Hydrologic Science 122 or 136 (c) Hydrologic Science 150 or Environmental Studies 161

Two elective courses: Select two courses from the following: 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 Vehmeyer Hall or 122 Hoagland Hall (916-752-1660).

Lower Division Courses
21. Water Pollution (4) II. Knight
Lecture—3 hours, laboratory-3 hours. 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. General Education credit: Nature and Environment.

92. Hydrologic Science Internship (1-12) I, II, III. The Staff
Internship—3-36 hours. Prerequisite: lower division students, 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). Grimmer
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Physics 5A, and 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. General Education credit: Nature and Environment.

103. Introduction to Fluid Mechanics (3). Parlane
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. Schwank
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.

113. Water Quality, Soil Salinity and Reclamation (4). Biggar
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2B, Soil Science 100, course 100 recommended; or consent of instructor. Irrigation and drainage problems associated with soil quality parameters, water analysis and salinity control in relation to soil and plant factors; reclamation of soil and disposal of waste water and their effects on receiving waters; local and regional problems in relation to salinity control and water quality. Not open for credit to students who have completed Water Science 103.

115. Irrigation and Drainage Systems (4) II. Wallender, Grimm, Hills
Lecture—4 hours. Prerequisite: Engineering 103A or course 103. Engineering and scientific principles applied to the design of surface, sprinkler and micro irrigation systems; study of economic, biological, and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Biological Systems Engineering 145.) Not open for credit to students who have completed Water Science 145.

117. Irrigation Water Management (3) III. Hopmans
Lecture—2 hours; discussion—1 hour. Prerequisite: course 110 or 124, or consent of instructor. 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 will be 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 ionic 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, water and soil 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
Lecture—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. Hseio
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. Interactions with soil and water environments and their application in crop and environmental management, including 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 103.

134. Aqueous Geochemistry (3) III. Casey
Lecture—3 hours. Prerequisite: Chemistry 2; upper division students. Acid-base equilibria, metal hydroxyls and complexion, mineral solubilities, and rate laws to describe natural processes. Intended to complement course 136: Chemistry of the Hydrosphere.

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; course 134 recommended. 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.

141. Hydrology (4) II. Puente
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 5B or 5B, Mathematics 16B or 21B; course 100 recommended. Study of the processes that constitute the hydrologic cycle: precipitation, infiltration, evaporation, transpiration, surface runoff, and ground water runoff. Not open for credit to students who have completed Water Science 141.

143. Analytical Hydrology and Watershed Management (3) II. Parlane
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 (D1). Marish
Lecture—3 hours. Prerequisite: course 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 (3) II. Fogg
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 145A or Civil and Environmental Engineering 144. Physical and chemical processes in contaminant transport, with emphasis on effects of aquifer complex processes. Groundwater geologic 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.

150. Water Law and Water Institutions (3) III. The Staff

186. Environmental Remote Sensing (3) II. Ustin
Lecture—3 hours. Prerequisite: upper division course in earth 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, the course examines applications in hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry and agriculture.

192. Hydrologic Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—36 hours. Prerequisite: completion of 84
units and consent of instructor. Work experience off and on campus in 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

Lecture—1 hour; paper. Prerequisite: open to students in the Hydrologic Science 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. (SU grading only.)

210. Hydrologic Modeling of the Vadose Zone (3) III. Hopmans
Lecture—2 hours; discussion—1 hour. Prerequisite: Soil Science 107, Mathematics 228, 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 into model for credit to students who have taken Water Science 100 or Hydrologic Science Graduate Course 210. Offered in alternate years.

212. Evapotranspiration (3) III. Parlorge
Lecture—3 hours. Prerequisite: course 103. Review of review of evaporation, evapotranspiration, idealization, 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.

222. The Biology of Streams (5) III. The Staff
Discussion—2 hours; seminar—1 hour; laboratory—6 hours (includes field trips). Prerequisite: courses in aquatic zoology, limnology, and hydrology. Course will cover various environmental factors to the ecology and productivity of flowing freshwater systems. Emphasis is placed on relationships between stream organisms and their environment by means of integrated field and lecture activities. Offered in alternate years.

235. Advanced Topics in Water and Soil Chemistry (5) III. The Staff
Lecture—3 hours. Prerequisite: a course in physical chemistry and soil chemistry or consent of instructor. Advanced course in water chemistry, emphasizing principles governing interactions of ionic constituents in waters and soils. Topics include electrokinetics, properties of clays, membrane phenomena, rate processes and thermodynamic applications to the water soil systems. Not open for credit to students who have completed Water Science 215. Offered in alternate years.

246. Hydrochemical Models (3) II. Tani
Lecture—2 hours; laboratory—3 hours. Prerequisite: background in applied chemistry and PC and model-building techniques. Application of mathematical and computer models to chemical problems. Emphasis on process on model development, transport, rate and equilibrium analysis. Application of analytical and computer models to chemical problems. Not open for credit to students who have completed Water Science 217.

243. Water Resource Planning and Management (3) I. Mariko
Lecture—3 hours. Prerequisite: course 141 or the equivalent. Advanced, numerical analyses recommended. Application of mathematical and computer models to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjoint use of water and groundwater. Water quality management. Irrigation planning and operation models. Not open for credit to students who have completed Water Science 206. (Former course Water Science 208.)

244. Multi-phase Transport in Soils (3) II. Grimmer
Lecture—3 hours. Prerequisite: course 103 or Engineering 102A or Civil and Environmental Engineering 141A. An introduction to multi-phase flow in soils and the application to infiltration and immiscible displacement problems. Gas phase transport and entrainment during infiltration, and oil-water-gas displacement will be considered. Offered in alternate years. Not open for credit to students who have completed Hydrologic Science Graduate Course 240 or Biological Systems Engineering 240. (Former course Hydrologic Science Graduate Course 240.)

245. Advanced Soil Physics (3) III. Nielsen
Lecture—3 hours. Prerequisite: Mathematics 229 or consent of instructor; Soil Science 107 and 207 recommended. Theoretical and applied aspects of the simultaneous transport and retention of water, solutes, heat, and gases in unsaturated soils. Emphasis given to current soil physics research topics of general interest in soil, water, and engineering sciences. Offered in alternate years. Not open for credit to students who have completed Water Science 250.

264. Modeling of Hydrologic Processes (3) III. Puente
Lecture—3 hours. Prerequisite: course 141 or the equivalent. An introduction to the fundamentals of hydrologic processes. Emphasis is given to current soil physics research topics of general interest in soil, water, and engineering sciences. Offered in alternate years. Not open for credit to students who have completed Water Science 250.

265. Numerical Modeling of Groundwater Systems (3) III. Fogg
Lecture—3 hours. Prerequisite: course 145A or Civil Engineering 144 and course 145B, Mathematics 228. Fundamental differences in finite element methods in modeling groundwater flow and transport. Fundamentals and comparison with other methods. Models used in the geosciences, engineering, and biology. Offered in alternate years. Not open for credit to students who have completed Hydrologic Science Graduate Course 220. (Former course Hydrologic Science Graduate Course 220.)

273. Introduction to Geostatistics (3) I. Fogg
Lecture—3 hours. Prerequisite: Statistics 120A and 130B, or the equivalent. Statistical treatment of spatial data with emphasis on geostatistics problems. Topics include theory of random functions, variogram analysis, Kriging, OKing, indicator geostatistics, and stochastic simulation of spatial variability. Demarcation and use of several hydrogeostatistical software included. Not open for credit to students who have completed Hydrologic Science Graduate Course 230. Offered in alternate years.

277. 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. Offered in alternate years. Not open for credit to students who have completed Hydrologic Science Graduate Course 215 or Water Science 255.

290. Seminar (1) I, II, III. The Staff
Lecture—1 hour. Prerequisite: standing letter. Critical review of hydrologic science problems and issues, oral presentation of research. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: standing letter. Not open for credit to students who have completed Hydrologic Science Graduate Course 215 or Water Science 255.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: standing letter. Not open for credit to students who have completed Hydrologic Science Graduate Course 215 or Water Science 255.

*Course not offered this academic year.

Hydrologic Science (A Graduate Group)

Graham E. Fogg, Ph.D., Chairperson of the Group

Group Office, 113 Veihmeyer Hall
(917-752-6810/0450)

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 Science is a unique interdisciplinary program offering M.S. and Ph.D. degrees. Coursework for the degrees is available from many programs, including, among others, Hydrologic Science, Civil and Environmental Engineering, Geology, and Soil Science. Education in the Group is designed to broaden 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 science involves the geologic, atmospheric and oceanic sciences, as well as engineering and other applied physical sciences. Basic to the Hydrologic Science program is a core curriculum of courses in fluid dynamics, hydrologic sciences, hydroelectricity, hydrochemistry, hydrologic techniques, and hydrologic policy. The program has degree options in Hydrobiology, Hydrochemistry and Hydrology. The Hydrology option includes specialization in surface hydrology, subsurface hydrology, irrigation and drainage, and water resources management. The surfacessubhydrology specialization includes hydrogeology and vadosezone hydrology.

Preparation. Applicants to the program are expected to have completed or 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. Coursework in addition to the above is typically taken in the most appropriate departments.

Graduate Adviser, M.E. Grimmer and M.B. Parlinage (Land, Air and Water Resources).

Immunology (A Graduate Group)

M. Eric Gershwin, M.D., Chairperson of the Group

Group Office, 1202E Meyer Hall (917-752-2512)

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 multi-disciplinary 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, molecular immunology, immunohematology, and advanced immunology. In addition to these general requirements, more specialized preparation in at least one of the following is required: (a) immunology and medical microbiology; (b) zoological specialties (cell biology); (c) medical specialties (pathology, veterinary medicine, medical microbiology); (d) zoological specialties (cell biology); (e) medical specialties (pathology, veterinary medicine, medical microbiology). All courses will be evaluated by the Academic Senate Committee for courses of instruction.

The deadline for applications is the end of the second week of the term prior to 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.

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### Individual Major

(Constitute 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.

Proposals for individual majors should be submitted before the fourth quarter prior to graduation. Specific requirements for each college are shown below. Application forms are available in program offices.

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### College of Agricultural and Environmental Sciences

(Advising Center, 228 Mira Hall 916-752-0100)

#### B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Category</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition requirement</td>
<td>0-8</td>
</tr>
<tr>
<td>See College requirement</td>
<td></td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>(variable)</td>
</tr>
<tr>
<td>Lower division courses basic to the program</td>
<td></td>
</tr>
<tr>
<td>or as required by the student's major</td>
<td></td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td></td>
</tr>
<tr>
<td>Lower division courses basic to the program</td>
<td></td>
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<tr>
<td>or as required by the student's major</td>
<td></td>
</tr>
<tr>
<td>Breadth/General Education</td>
<td>6-24</td>
</tr>
<tr>
<td>Satisfaction of General Education requirement</td>
<td></td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>45-54</td>
</tr>
<tr>
<td>Upper division coursework must include:</td>
<td></td>
</tr>
<tr>
<td>a. related coursework from two or more</td>
<td></td>
</tr>
<tr>
<td>campus departments focused on a single</td>
<td></td>
</tr>
<tr>
<td>educational theme, and</td>
<td></td>
</tr>
<tr>
<td>b. at least 30 units must be taken from</td>
<td></td>
</tr>
<tr>
<td>courses provided by the College of</td>
<td></td>
</tr>
<tr>
<td>Agricultural and Environmental Sciences</td>
<td></td>
</tr>
</tbody>
</table>

Note: The completed proposal should be submitted to the Individual Major Committee at least four quarters prior to graduation; otherwise graduation may be delayed.

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### unrestricted Electives

<table>
<thead>
<tr>
<th>Total Units for the Degree</th>
<th>180</th>
</tr>
</thead>
</table>

#### Master Adviser

A. Stillman (Neurobiology, Physiology and Behavior). The individual major proposal must be developed in consultation with the Academic Advising Center and two or more faculty members prior to final review by the Individual Major Committee for the College.

Incorporating transfer students applying for an individual major will be admitted into the Exploratory Program.

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### Integrated Studies

(College of Letters and Science)

#### College of Letters and Science

Program Office, 220 Social Sciences and Humanities Building (Dean's Office), (916-752-0390)

#### Committee in Charge

David Baskie, Ph.D. (Chairperson) (Mathematics); Michael J. Dietrich, Ph.D. (History and Philosophy of Science); Jay Helms, Ph.D. (Economics); Arnold Stilman, Ph.D. (Neurobiology, Physiology and Behavior); Marian Ury, Ph.D. (Comparative Literature).

#### A.B. and B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(variable)</td>
<td>(variable)</td>
<td>(variable)</td>
</tr>
</tbody>
</table>

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#### Student Proposal

A student submits to the Dean's Office a major proposal and an essay, discussing educational purposes, personal and/or professional objectives, along with faculty letters of recommendation. After initial review, the Faculty Committee on Individual Majors evaluates the proposal and provides final action.

#### Major Advisers

Selected by student. Principal Adviser: a faculty member in a department or program in the College of Letters and Science who major field of emphasis. Secondary Adviser: a faculty member from another area of interest.

#### Honors Program

The proposal committee for the major shall consist of the Committee chairperson and two or more faculty members. Students are eligible for honors if they have completed a minimum of 90 units with a minimum GPA of 3.5 and have a grade of A in the major course(s). Students who are eligible for honors shall have completed at least 120 units. Honors shall be awarded for a minimum of 15 units of upper-division work.

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### Integrated Studies

(College of Letters and Science)

Nora A. McGuinness, Ph.D., Program Director
Program Office, 816 Sprout Hall (916-752-3777)

#### Committee in Charge

Richard T. Curley, Ph.D. (Anthropology); Douglas W. McColl, Ph.D. (Psychology); Nora A. McGuinness, Ph.D. (Integrated Studies); Jay E. Meckling, Ph.D. (American Studies); Chairperson

Nora A. McGuinness, Ph.D. (Integrated Studies); Jay E. Meckling, Ph.D. (American Studies); Chairperson

Kenneth L. Verouh, Ph.D. (Geology)
Daniel J. Wick, Ph.D. (Summer Session)
280  International Agricultural Development

Faculty
Richard T. Curley, Ph.D., Lecturer (Anthropology)
Dena J. Dingesmege, Ph.D., Associate Professor (Geography)
Gail S. Goodman, Ph.D., Professor (Psychology)
Heinrich Gahler, M.D., Adjunct Professor (Internal Medicine)
Jerold A. Last, Ph.D., Professor (Internal Medicine, Biological Chemistry)
Douglas W. McColm, Ph.D., Professor (Physics)
Nora A. McGuinness, Ph.D., Academic Coordinator (Integrated Studies)
Jarus S. Manning, Ph.D., Professor (Microbiology)
Jay Markling, Ph.D., Professor (American Studies)
Galvino Segura, Ph.D., Assistant Professor (Political Science)
Kenneth A. Shackel, Ph.D., Associate Professor (Psychology)
Kenneth L. Veronis, Ph.D., Professor (Geology)
Gary M. Walton, Ph.D., Professor (Economics, Management)

The Program of Study
Integrated Studies is an invitational freshman honors residential program, offering specially designed courses in humanities, natural sciences, and social sciences. The program encourages cross-disciplinary interests in its faculty and students. It values close contact between student and professor both in the classroom and in the residence hall. Integrated Studies courses fulfill college breadth requirements and lower division General Education requirements. Enrollment is limited to 1985-86, 68 students will be admitted to the program. Class sizes are limited to 25.) Students enroll in at least three Integrated Studies courses during the year. Students not admitted to the Program may not register for Integrated Studies courses.

Courses in Integrated Studies (IST)

1A. Nature and the Environment: Physica (4)
Ilse McColm
Lecture—2 hours; discussion—2 hours. Introductory course on the history, philosophy and methodology of physics from 589 B.C. to the present day. Changes in ideas about the physical universe explored. Problem solving not emphasized. General Education credit: Nature and Environment.

1B. Nature and the Environment: Origins of the Universe (4)
Ilse McColm
Lecture—3 hours; discussion—1 hour. Knowledge of the origins of the universe, of matter, of galaxies, stars, and planets, and of the earth and the variety of life forms that have evolved on this planet. General Education credit: Nature and Environment.

1C. Nature and the Environment: Molecules to Humans (4)
Ilse McColm
Lecture—3 hours; discussion—1 hour. Prerequisite: high school chemistry. Intended for liberal arts students. Integrates the principles of chemistry, biochemistry, genetics and molecular biology. Students are expected to achieve a fair scientific literacy in all of the subjects.

2A. Civilization and Culture: Mathematics and Civilization (4)
Ilse McColm
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.

2B. Civilization and Culture: Theology (4)
Ilse McColm
Lecture—3 hours; discussion—1 hour. Major issues in theology, including the existence and nature of God, the nature and destiny of the human species, free will, and morality from both a western and eastern perspective. General Education credit: Civilization and Culture.

2C. Civilization and Culture: Origins of Western Civilization (4)
Ilse McColm
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 ethical and political thought. Readings include selections from Near Eastern texts and from Greek literature.

2D. Civilization and Culture: Literature and Writing (4)
Ilse McColm
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. General Education credit: Civilization and Culture.

2E. Civilization and Culture: Playing Shakespeare (4)
Ilse McColm
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. Contemporary Societies: History in Our Time (4)
Ilse McColm
Lecture—3 hours; discussion—1 hour. Major political, economic, historical, and ideological changes in the global community since the 1970s. General Education credit: Contemporary Societies.

3B. Society Through Literature: Modern Europe (4)
Ilse McColm
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. General Education credit: Civilization and Culture.

3C. Society Through Literature: Modern China (4)
Ilse McColm
Lecture—3 hours; discussion—1 hour. China's twentieth-century experience: national humiliation, invasion, isolation, oppression, and the overthrow of ancient values, as reflected in short stories, novels, poetry, and film. General Education credit: Civilization and Culture.

3D. Contemporary Societies: Speech, Privacy, and Conscience (4)
Ilse McColm
Lecture—3 hours; discussion—1 hour. Analysis of the constitutional rights of speech, privacy and conscience as limits on majority decision-making. Specific topics to be covered include pornography, "hate" speech, broadcast codes, book censorship, sexual and association privacy, abortion, and euthanasia. General Education credit: Contemporary Societies.

3E. Contemporary Societies: Sociology (4)
Ilse McColm
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. (PNP grading only.

8A. Special Topics In Natural Science and Mathematics (4)
Ilse McColm
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. General Education credit: Natural History.

8B. Special Topics In Humanities (4)
Ilse McColm
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. General Education credit: Civilization and Culture.

8C. Special Topics In the Social Sciences (4)
Ilse McColm
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. General Education credit: Contemporary Societies.

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. (PNP 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 upon the art and craft of teaching. (PNP grading only)

Internal Medicine
See Medicine, School of

International Agricultural Development
(College of Agricultural and Environmental Sciences)
International Agricultural Development is an interdisciplinary major in the Applied Behavioral Sciences 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 technologically 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 students 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.

*Course not offered this academic year.
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

Comprehension Requirement.................0-8
See College requirement

Preparatory Subject Matter...............39-43
(Choose other Social Sciences or Nat-

ural Science core)

Social Sciences core

Chemistry (Chemistry 10).................4
Science (Biological Sciences 10, Agricultural

System and Environment 2, Animal Sci-
ence 1, Nutrition 10, Soil Science 10)....15
Social sciences (Applied Behavioral Sci-
ences 1, Anthropology 2, Political Sci-
ence 2, Sociology 1, history 4C).......16
Statistics (Agricultural Systems and Environ-
ment 120 or Statistics 13 or Sociology

46A).....................................4

Natural Science core

Biological sciences (Animal Science 2, Bio-

logical Sciences 1A, 1B, 1C, 101, Agricultural

Systems and Environment 2)...........15
Chemistry (Chemistry 2A, 2B, 8A, 8B)....16
Mathematics (Mathematics 2A or 21A)....3-4
Physics (Physics 1A)......................3
Statistics (Agricultural Systems and Environ-
ment 120 or Engineering: Computer Sci-
ence 10)...............................4

Area of General Education Requirement

Satisfaction of General Education require-

ment

Depth Subject Matter.........................39

International Agricultural Development 10...

110, 111..................................9
International agricultural development (In-
ternational Agricultural Development

101, 141, 190, 191, 195, 198; Agricultural

Systems and Environment 110A, 110B,
110C)................................2
Economics and social sciences: Economics

1A-1B and two upper division courses re-

evant to development (Agricultural Eco-

nomics 100A, 100B, 106, 113 or 136, 140,
145, 147, 150, 176; Economics 100,
110A, 115A, 115B, Anthropology 126,
131, 135; Applied Behavioral Science

153; Political Science 126, 146, 148A-

148C, 148D, 148G, 148H)........16

Primary Field of Specialization.............60

Natural Sciences or Social Sciences: Courses

chosen by student, with an advisor in that specialization, to include
additional preparation required for a par-
ticular 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., anthropol-
gey, geography, history, or political sci-
ence area studies courses).

Unrestricted Electives........................1-34

Students not possessing a
reading/speaking ability in a foreign lan-
guage will be encouraged to use these
electives for language study or to attend
intensive language school.

Total Units for the Degree...................180

Specilization Adviser

A student pursuing specialization in various areas of specializa-
tion and with interests in International Agricultural Development is available from the Major Adviser.

Major Adviser S. B. Brush (Applied Behavioral Sciences)

Minor Program Requirements:

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, Interna-
tional Agricultural Development 103, 141,
190, 195, Economics 115A-115B.............4

Minor Adviser S. B. Brush (1961 Hart Hall)

Graduate Study. A program of study and research
leading to the M.S. degree is available in International
Agricultural Development. Detailed information regard-
ing graduate study may be obtained by writing to the
Coordinator of Graduate Recruitment (I.A.D.); Graduate Studies, UC Davis.

Graduate Advisers S.B. Brush, (Applied Behavioral Sciences); D.J. Boyd (Anthropology); K.G. Casman (Agronomy and Range Science); L.S. Janis (Agricultural Economics)

Related Courses. See Agricultural 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
Applied Behavioral Science, Advising Center in 1003 Hart Hall (916-752-2244)

Lower Division Courses

10. Introduction to International Agricultural Development II. Brush

Lecture—3 hours; discussion—1 hour. Theories, prac-
tices and institutions relating to agricultural development;
the interaction of changing social, cultural and economic conditions across the stages of
economic development; impact of new agricultural technology on underdeveloped regions.
General Education credit: Contemporary Societies.

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

101. Tropical Crop Agriculture (4) II. The Staff

Lecture—4 hours. Prerequisite: Plant Science 2 or Biological
Sciences 1C, and Soil Science 100 or
Agronomy 100. Environment and management fac-
tors affecting plant agriculture and farming systems in
the tropics. Crops are considered in relation to shifting
cultivation, rice-based cropping systems, annual
cropping, polycropping and monoculture of perennial
species.

102. Limited Resource Animal Agriculture (4) III. Brown (Animal Sciences)

Lecture—3 hours; laboratory—3 hours; one all-day
Saturday field trip required. Prerequisite: Animal Sci-
cence 2. Environmentally and economically sound
methods are presented to meet objectives of limited
resource animal agriculture system. Range systems,
small farms, Third World systems and suburban
enterprises are considered. (Same course as Animal
Sciences 102).

103. Social Change and Agricultural Development (4) III. The Staff

Lecture/discussion—4 hours. Prerequisite: introductory
social science course (Anthropology, Sociology,
Economics, International Agricultural Develop-
ment). How social and cultural factors influence technologi-
ical change in agriculture; theories of diffusion of inno-
vations; social impact analysis and technology assessment.
Offered in alternate years.

110. Agricultural Production Economics (4) I. The Staff

Lecture—4 hours. Prerequisite: upper division status
and an introductory course in microeconomics (Eco-

nomics 1A). Economic analysis of agricultural pro-
duction in low income countries, from field-level data
collection to national policy. Emphasis is given to con-
struction and use of farm models in project evalu-

ations.

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, price determination, and market news. Emphasis is given to evaluation of interventions in marketing systems to speed economic development.

141. Technology for Agriculture in Developing Regions (3). Chancelor (Agricultural Engineering)

Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture. Man- animal- and engine-powered devices, Energy requirements, size-scale, costs, support infrastructure development, and productivity potentials. (Same course as Applied Biological Systems Technology 141)

190. Proseminar In International Agricultural Development (1) I, II, III. The Staff

Seminar—1 hour. Presentation and discussion of cur-
tent topics in international agricultural development by visiting lecturers, staff and students. May be re-
peated 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
countries—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 (1) I, II, 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. May be repeated for credit.

200. Analysis and Determinants of Cropping Systems (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101, Agricultural Science and Management
150 (or comparable statistics course). Cropping sys-
tems as a function of farmer objectives, resource availabil-
ity, environment, and yield potential. Interactions among
management strategies, resource use efficiency, and
the agroecosystem; stability, diversity, and
subsustainability of cropping systems.

201. The Economics of Small Farms and Farming Systems (4) II. Jarvis

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics 100A. Economic perspective
on small farm development. Establishes a basis for predicting farmers' responses to changes in the econ-
omic environment, and for proposing government

*Course not offered this academic year.
to increase small farm production and improve farmer and national welfare. 202. Soil, Systems and Agricultural Development (4) I. Orlove (Design), Brush (Applied Behavioral Sciences) Lecture—3 hours; discussion—1 hour. Prerequisite: upper division coursework 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 new development processes; agrarian movements and revolution; evaluation of theories of rural development; application of social analysis to design and implementation of agricultural and rural economic programs.

203. Management Systems for Agricultural Development (4) II. Wolf Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or 201 preferable, 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.

206. Food and Nutrition Strategies in Developing Countries (4) J. Jarvis Lecture—3 hours; discussion—1 hour. Prerequisite: Agriculture Economics 109A. Identifies important technical 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.

209. Seminar In International Agricultural Development (1-2) I, II, III. The Staff Seminar—1-2 hours. Prerequisite: consent of instructor. Topics in international agricultural development. (SU grading only)

211. 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 international agricultural development in lesser developed nations. Variable credit. May be repeated once for credit.

212. Graduate Internship (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: participation in H. Humphrey Fellow Program or consent of instructor. Individualized design supervised internship, off or on campus. In community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (SU grading only)

218. Directed Group Study (1-5) I, II, III. The Staff (Graduate Group Chairperson in charge) (SU grading only)

299. Research (1-12) I, II, III. The Staff (Graduate Group Chairperson in charge) (SU grading only)

International Agricultural Development (A Graduate Group) — Chairperson of the Group

Group Office, 1302 Hart Hall (916-752-1926)

Faculty. The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, of Art, Letters and Science, and the School of Veterinary Medicine.

Graduate Study. The International Agricultural Development program prepares U.S. and foreign students for careers in agricultural and rural development around the world. Many of its faculty members have had international experience in development. The philosophy guiding the program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirteen different specializations are offered. In addition, to apply their specialized knowledge, graduates should be capable of understanding and working with people in developing nations and have a comprehension of how technological, social, economic, and political variables affect the development process that they should have insight into individual and group motivations and be able to discern ways to initiate change.

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 provided with an in-depth technical and biologic improvement in agricultural methods and to encourage social innovations where appropriate.

Graduate Adviser. Contact the Group Office.

International Relations

(College of Letters and Science)

Emily G. Goldman, Ph.D., Program Director
Program Office, Social Sciences and Humanities Building (916-752-3363)

Committee in Charge

Michael R. Caputo, Ph.D. (Agricultural Economics)
Dennis J. Dingemans, Ph.D. (Geography)
Dennis J. Dutchie, Ph.D. (Italian)
Emily G. Goldman, Ph.D. (Political Science)
Jack A. Goldstone, Ph.D. (Sociology)
Jeanette Money, Ph.D. (Political Science)
Julie A. Nelson Ph.D. (Economics)
Miroslav Nickev, Ph.D. (Political Science)
Carole A. Smith, Ph.D. (Anthropology)
Charles Walter, Ph.D. (History)
Geoffrey Wandelsofski-Smith, Ph.D. (Political Science)

The Major Program

Problems of structure. Human rights, energy and mineral resources, 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 has become an exciting and relevant highly 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 a core of four courses in economics and political science required of all majors, and an additional set of eight courses chosen from one of four clusters which encompass major topical areas in combination with regional emphases: I. World Trade and Development. II. International Relations of the Third World. III. Global Resources and Environment. IV. World Politics. 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 the Internship and Career Adviser 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 opportunities for International Relations majors (see also the UC Davis Washington Center listing).

International relations graduates are prepared for employment in governmental agencies abroad (such as the Foreign Service), with state agencies, or international or governmental organizations (such as the United Nations) for those 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.

Preparatory Requirements. Before declaring a major in International Relations, 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):

Economics 1A, 1B, 1C..10 units
Geography 10..3 units
History 4C..4 units
Political Science 3..4 units

A.B. Major Requirements:

UNITs

Preparatory Subject Matter..24-55
Economics 1A, 1B..10
Geography 10..3
History 4C..4
Political Science 3..4

One course selected from Anthropology 2, Environmental Studies 50, Geology 80, History 4B, 9A, 9B, 10, 15, 17C, International Agricultural Development 10, Political Science 1...3-4

Approximately 24 to 30 units (or equivalent fluency) in one modern foreign language (see adviser for details)...0-30

Recommended: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)

Depth Subject Matter..48-50
Economics 115A or 115B..4
Economics 160A-160B (Cluster I) or 162 (Clusters II, III, IV)...4-8

Cluster I: students note prerequisites for courses 160A-160B...

Political Science 123..4
Political Science 130..4
Cluster emphasis...

Choose one from the four clusters shown below. Courses must be in addition to those applied toward requirements above.

Total Units for the Major..72-105

Course List for Cluster Emphasis

Cluster I: World Trade and Development

(Heavy economic emphasis; suitable particularly for students who seek careers in international business or international organizations)

Economics 100 or 104
Economics 101 or 105
Economics 160A-160B

Economics 160A fulfills one core requirement; Economics 160B fulfills a cluster requirement.

One course to be selected from:

Economics 115A or 115B (whichever course is not used to fulfill the core requirement above)

Two courses to be selected from:

Anthropology 122, 126, 131, 135
Geography 141, 142
Political Science 124, 178
Sociology 135, 141, 145

Two regional courses from Cluster A (History)

Cluster II: International Relations of the Third World

(Focuses on problems of development of the Third World in recent times)

One course to be selected from each of four subjects:

Anthropology 123A, 124, 126, 127, 131, 135

Course not offered this academic year.
Courses in International Relations (IRE)

Lower Division Courses

96. Directed Group Study (1-5) I, II, III
Prerequisite: consent of instructor. (P/NP grading only)

96. Special Study for Undervarates (1-5) I, II, III
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 a different topic is studied.

192. International Internship (1-12) I, II, III
The Staff (Committee Chairperson in charge) Internship—9-36 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-II. 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 the direction of a faculty advisor. (Deferred grading only, pending completion of course sequence.)

198. Directed Group Study (1-5) I, II, III
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduate (1-5) I, II, III
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

Internship

See Internship Program below; also UC Davis Washington Center

Internship Program

Jeanne B. Shelby, Acting Director
The Internship and Career Center 2nd Floor, Voorhies Hall (916-752-2865)

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
Marcia Kirk, 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.

Italian

(College of Letters and Science)
JoAnn Cannon, Ph.D., Program Director
Department Office (French and Italian), 515 Sproul Hall (916-752-0830)

Faculty
JoAnn Cannon, Ph.D., Professor
Denis J. Dutschke, Ph.D., Professor
Gustavo Foscarini, M.A., Lecturer
Juliana Schiessari, Ph.D., Associate Professor

The Major and Minor Programs

The major in Italian is designed to provide 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 Internship Program, and the Summer Sessions International (Naples), 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 program.

A.B. Major Requirements:

| Subject Matter | UNITS
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
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<tr>
<td>Italian 1, 2, 3, 4, 5, and 9 (or the equivalent)</td>
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Depth Subject Matter

<table>
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<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian 101 and 105</td>
<td>8</td>
</tr>
</tbody>
</table>

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 advisor.
A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or by courses in related fields: art history, art, music, comparative literature, European, English, historical, 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 abroad in Italian with the Education Abroad Program or college Latin or a Romance Language.

Major Adviser: J. Cannon.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Italian 101 and 105.</td>
</tr>
</tbody>
</table>

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 in 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, which will include a research paper and a comprehensive examination. See also sections on University and College requirements.

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 (5.1) I, II, III. Fossari 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 comprehension. Students who have successfully completed elementary 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. Fossari 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. Fossari 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 2 or the equivalent. Review of grammar and syntax throughout the first-year curriculum, 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.

6A. 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)

6B. Italian Conversation (3) II. The Staff Discussion—3 hours. Prerequisite: course 6A. 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 6. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Students who have taken contemporary Italian literature and culture, as well as a means of strengthening the student's command of the Italian language.

50. Studies in Cinema in Italian (4) I, 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. General Education credit: Civilization and Culture.

90X. Lower Division Seminar (1-21). 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, and written assignments, or special activities such as film screenings or laboratory work.

99. Directed Group Study (1-9). 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, II. The Staff Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

104. Italian Translation and Style (4) II. 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, through 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 major authors, works, and movements of the Medieval, Renaissance, and Early Modern periods in Italy.

107. Survey of Italian Culture and Institutions (4) I, II. Fossari 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 on achievements in literature, the arts, philosophy, and social-political institutions. To be taught in English.

112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4) I. Dutschke Lecture/discussion—3 hours; term paper. Prerequisite: course 101 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, Cavallino, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors. Offered in alternate years.

113. Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4) III. Dutschke Lecture/discussion—3 hours; term paper—1 hour. Prerequisite: course 101 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.

114. Boccaccio, Decameron, and the Renaissance Novella (4) II. Dutschke Lecture/discussion—3 hours; term paper. Prerequisites: course 9 or consent of instructor. Study of the development of the short story in Italy, as exemplified in Giovanni Boccacchio's Decameron, in his predecessors and Renaissance followers. Offered in alternate years.

115A. Studies in the Cinquecento (4) III. Schiessi Lecture/discussion—3 hours, term paper. Prerequisites: 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, Ariosto, Castiglione, and Tasso. Offered in alternate years.

115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino (4) III. The Staff Lecture/discussion—3 hours, term paper. Prerequisites: course 115A, and continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursion on Galilei's role in the formation of a modern literary standard.

115C. Italian Drama from Machiavelli to the Enlightenment (4) I. Schiessi Lecture/discussion—3 hours, term paper. Prerequisite: course 9 or consent of instructor. Examination of comic and tragic forms of Italian drama in the context 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.

115D. Early Modern Italian Lyric (4) I. Schiessi Lecture/discussion—3 hours, term paper. Prerequisite: course 9 or consent of instructor. Examination of the poem and its tradition influenced by new critical representations 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.

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, Bettini, Garrabosco, and Alfieri. Offered in alternate years.

118B. Italian Literature of the Twentieth Century: The Novel (4, 3) I. Schiessi Lecture/discussion—3 hours, term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Swevo to the present. Emphasis on the work of Swevo, Levi, Moravia, Pavesi, and Vittorini.

120A. 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. Poetic analysis of the development of the novel from Swevo to the present. Emphasis on the work of Swevo, Levi, Moravia, Pavesi, and Vittorini.

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. Critical analysis of the development of the novel from Swevo to the present. Emphasis on the work of Swevo, Levi, Moravia, Pavesi, and Vittorini.

131. Autobiography in Italy (4) III. Schiessi 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 constructional tradition and the problem of women's self-representation. Authors studied may include Petrarca, Tasso, Casanova, Alfieri, Zevok, Sibila Amarco and Primo Levi. Offered in alternate years.

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,
Land, Air and Water Resources

Eremiti Faculty
Francis E. Broadbent, Ph.D., Professor Emeritus
Richard G. Bursa, 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. Muma, Ph.D., Professor Emeritus
H. Michael Reinsenauer, Ph.D., Professor Emeritus
Victor Rendig, Ph.D., Professor Emeritus
Henry O. Walker, Ed.D, Senior Lecturer Emeritus
Lynn D. Whittig, Ph.D., Professor Emeritus

Faculty
Atmospheric Science Unit
Office: 151 Hoagland Hall (916-752-1406)
John J. Carroll III, Ph.D., Professor (Meteorology)
Robert G. Flocchini, Ph.D., Professor
(Environmetal and Resource Sciences)
Richard D. Groth, Ph.D., Professor
(Atmospheric Science)
Teresa R. Nathan, Ph.D., Associate Professor
(Atmospheric Science)
Kyaw Tha Paw U, Ph.D., Professor
(Atmospheric Science)
Richard H. Shaw, Ph.D., Professor
(Meteorology)
Marilyn L. Shetton, Ph.D., Professor (Atmospheric Science)
Richard L. Snyder, Ph.D., Lecturer
(Atmospheric Science)
Su-Tai Soong, Ph.D., Associate Professor
(Atmospheric Science)
Bryan C. Weare, Ph.D., Professor (Meteorology)

Emeriti Faculty
Thomas A. Cailh, Ph.D., Professor Emeritus
Kinsell L. Coulson, Ph.D., Professor Emeritus

Faculty
Hydrologic Science Unit
Office: 113 Voelmeier Hall (916-752-0453)
Graham E. Fogg, Ph.D., Associate Professor
(Hydrogeology)
David A. Gildhammer, Ph.D., Lecturer (Hydrologic Science)
Stephen Grattan, Ph.D., Lecturer (Hydrologic Science)
Mark E. Grismer, Ph.D., Professor (Dissertkine Sciences, Biological and Agricultural Engineering)
Blaine R. Honsenberg, Ph.D., Lecturer (Hydrologic Science)
Jan W. Hopmans, Ph.D., Associate Professor (Water Management)
Theodore C. Haisle, Ph.D., Professor (Hydrologic Science)
Miguel A. Manflo, Ph.D., Professor (Hydrologic Science, Civil and Environmental Engineering)
Edward A. McBean, Ph.D., Professor (Hydrologic Science)
Marc B. Parlange, Ph.D., Associate Professor (Biological and Agricultural Engineering, Hydrologic Science)
Terry L. Richard, M.S., Lecturer (Hydrologic Science)
Carlos E. Puerto, Ph.D., Associate Professor (Hydrology)
Lawrence J. Schriner, Ph.D., Lecturer (Hydrologic Science)
Kenneth C. Taml, M.S., Professor (Hydrologic Science)
Susan Ustis, Ph.D., Assistant Professor (Environmental and Resource Sciences)
Wesley W. Wellander, Ph.D., Professor (Hydrologic Science, Biological and Agricultural Engineering)

Emeriti Faculty
James W. Biggar, Ph.D., Professor Emeritus
Robert H. Burg, M.S., Professor Emeritus
Donald W. Grimes, Ph.D., Lecturer Emeritus
Robert M. Hagan, Ph.D., Professor Emeritus
Deardra W. Henderson, Ph.D., Professor Emeritus
Allen W. Knight, Ph.D., Professor Emeritus
Donald R. Nielsen, Ph.D., Professor Emeritus
William O. Prout, Jr., Ph.D., Lecturer Emeritus
Landscape Architecture

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Environmental Design.

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. The curriculum balances creativity and visual and spatial skills with technical expertise and a thorough background in physical, social, 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.

Career Alternatives. Graduates may find jobs in private landscape architecture firms or public agencies and corporations employing landscape architects. The landscape architecture major provides the student with adequate 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.)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition Requirement</td>
<td>5-6</td>
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<tr>
<td>See College requirement.</td>
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<td>Preparatory Subject Matter</td>
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<tr>
<td>Biological sciences (Biology Sciences 1A, 1B, 1C)</td>
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<tr>
<td>Biological Sciences 2A</td>
<td>5</td>
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<tr>
<td>Chemistry 2A</td>
<td>4-5</td>
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<tr>
<td>Physics 1A, 2A</td>
<td>4-5</td>
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<td>Art (Art Studio 2, 16)</td>
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<td>Three-dimensional design (Art Studio 5, 142, Design 125)</td>
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<td>Earth sciences (Geography 1, Geology 1, Soil Science 10)</td>
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<tr>
<td>Economics 1A, 1B Agricultural Economics 147</td>
<td>3-4</td>
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<td>Mathematics (Mathematics 16A, 36, Statistics 13)</td>
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<td>Social sciences (Anthropology 2, Geography 1, Psychology 1, 16, Sociology 1)</td>
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<td>Humanities elective</td>
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<td>Environmental plants, Environmental Horticulture</td>
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<tr>
<td>Introductory landscape architecture, Landscape Architecture 11, 21, 22, 23, 40, 19</td>
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<td>Depth Subject Matter</td>
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<tr>
<td>Landscape Architecture studies, Landscape Architecture 111, 112, 113, 181 or 182, 183, 184, 185, 186</td>
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<tr>
<td>Environmental plants and planting design, Environmental Horticulture 105, 103, Landscape Architecture 155, 156, 158</td>
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<td>Communication for architects, Landscape Architecture 122</td>
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<tr>
<td>History of Landscape Architecture, Landscape Architecture 140</td>
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<tr>
<td>Landscape construction and materials, Landscape Architecture 131, 132, 133, 134</td>
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<td>Ecological/sustainable landscape architecture, Landscape Architecture 193, 194</td>
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<tr>
<td>Environmental Horticulture 105, 103, 104</td>
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<td>Senior project in landscape architecture, Landscape Architecture 193A, 193B</td>
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<td>Senior seminar in landscape architecture, three quarters (Landscape Architecture 190)</td>
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<td>Internship (Landscape Architecture 192) recommended</td>
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<td>Breadth Subject Matter</td>
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<td>Resource sciences, two upper division courses with approval of adviser</td>
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<tr>
<td>Ecology (Environmental Studies 100, 101, 110, 111, 112, 113, 114, 115, 116)</td>
<td>3-5</td>
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<td>Environmental awareness (Psychology 144)</td>
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<td>Unrestricted Electives</td>
<td>19-37</td>
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<tr>
<td>Total Units for the Major</td>
<td>180</td>
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<tr>
<td>Major Adviser. S. McNeil</td>
<td></td>
</tr>
</tbody>
</table>

Advising Center is located in 152 Walker Hall (916-752-1166).

Graduate Study. Refer to the Graduate Studies section in this catalog.

Courses in Landscape Architecture (LDA)

Lower Division Courses

11. Landscape Studio: Introduction (4) II.

The Staff

Studio—8 hours. Prerequisite: courses 21 and 40 (may be taken concurrently). Introductory studio problems in landscape architectural design emphasizing exposure to design arts, human factors, and natural resource planning. Emphasis is placed on functional and aesthetic considerations for small scale projects.

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.

22. Landscape Graphic Communication (4) II.

The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 21 or the equivalent. Graphic representation of landscape architectural designs. Emphasis will include sketching, perspective, rendering techniques, sheet layout, lettering and type use, and color use.


The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 22. Landscape architectural communications explored through the computer. Includes computer-aided drafting, drawing, rendering, desktop publishing, and photorealistic simulation.

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. General Education credit: Civilization and Culture.

Upper Division Courses

111. Intermediate Landscape Architecture (4) I.

McNeil and Owens

Studio—8 hours; two all-day field trips. Prerequisite: courses 21, 23, 40, and 103, and junior standing in landscape architecture. Studio project on site analysis and site planning, including the siting of structures, design of circulation systems, outdoor facilities and open spaces. Emphasis on energy-conserving and culturally responsive design considerations.

112. Intermediate Landscape Architecture (4) II.

McNeil and Owens

Studio—8 hours; two all-day field trips. Prerequisite: course 111. Studio projects focus on visual, spatial, aesthetic and symbolic landscape characteristics of site design. Emphasis on relationship between form and meaning.

113. Intermediate Landscape Architecture (4) III.

Thayer and Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 112. Introduction to regional landscape analysis techniques and methods. Studio projects in the analysis, planning, and design of intermediate-scale and large-scale landscapes.

120. Advanced Computer Applications (4) Summer.

Thayer and Staff

Studio—6 hours; two all-day field trips. Prerequisite: course 23. Advanced concepts in multimedia and graphic presentation of landscape architecture projects, to include preparation of proposals, reports, audio-visual productions, and mixed-media presentations. Limited enrollment.

131. Landscape Construction: Materials and Detailing (4) I.

The Staff

Studio—8 hours; two all-day field trips. Prerequisite: courses 11, 23, open to majors in Landscape Architecture. Introduction to landscape construction with a focus on the materials and detailing of concrete, stone, and wood. Preparation of cost estimates and specifications will be introduced.

132. Landscape Construction: Site Engineering (4) II.

Thayer and Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 131. Topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, section plans and profiles and cut and fill calculations. Limited enrollment.

133. Landscape Construction: Advanced Systems (4) III.

Thayer and Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 132. Advanced study of materials and meth-
190. Prosemin in Landscape Architecture (1) I, II, III. Thayer Seminar—1 hour. Lecture and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only)

192. Internship in Landscape Architecture (1-12) I, II, III. The Staff Internship. Prerequisite: senior standing in Landscape Architecture major. 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) I. Schenker Studio—6 hours. Prerequisite: senior standing in Landscape Architecture major. Senior 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 (3) II. Schenker Studio—6 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)

197. Tutoring in Landscape Architecture (1-5) I, II, III. The Staff Tutoring—3-5 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) I, II, 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, planning, and management. Normative theories of design are related to social and environmental sciences. Offered in alternate years.

202. Methods in Design and Landscape Research (4) I. McNiel 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 as well as teaching research methods. Lectures provide an historical overview of research methodology. Offered in alternate years.

203. Perceptions of Environmental Quality (4) I, II. Thayer Seminar—4 hours. Prerequisite: Psychology 144 or consent of instructor. Examines human perceptual responses to the physical environment beginning with aesthetic judgments 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/environmen
tal perception, cognition, and behavior. Offered in alternate years.

204. Case Studies in Landscape Design and Research (4) I, II. Ovens 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-landscape situations where creative activity and/or basic research is the primary product. Offered in alternate years.

210. Advanced Landscape Architecture Studio (4) Laboratory—8 hours. Prerequisite: course 113 or the equivalent; graduate standing or consent of instructor. Explores students to real-world, designed-landscape 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) 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) 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 development and the potential for sustainable 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) I. The Staff Seminar—3 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Focuses 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. (SU 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 or with professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff Prerequisite: graduate standing and consent of instructor. (SU grading only)

299. Directed Individual Research for Graduate Students (1-5) I, II, III. The Staff Prerequisite: graduate standing and consent of instructor. (SU grading only)

Latin

See Classics
Law, School of

Bruce A. Wolk, J.D., Dean
Rex R. Penczrazier, J.D., Associate Dean (Academic Affairs and Research)
Antonia E. Bernhard, J.D., Assistant Dean (Student Affairs)
George Creed, LLB, M.S.L.S., Director (Law Library)
Deans 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
Joel C. Dobris, LLB, Professor
Holly G. Doremus, J.D., Acting Professor
Hilary C. Durbin, J.D., LL.B., Professor
Floyd F. Feeney, LLB, Professor
Arturo Gándara, J.D., Acting Professor
Michael J. Glennon, J.D., Professor
Gary S. Green, J.D., Professor
George S. Grossman, LLB, M.S.L.S., Professor
Sarah D. Gray, Ph.D., Professor (Human Physiology)
Robert W. Hillman, J.D., Professor
Edward L. Imwinkelried, J.D., Professor
Margaret Z. Johns, J.D., Senior Lecturer and Director of Legal Writing
Kevin R. Johnson, J.D., Professor
Ellen R. Jordan, J.D., Professor
Friedrich K. Juenger, J.D., Professor
Leslie A. Kurtz, J.D., Professor
Evelyn A. Lewis, J.D., Acting Professor
Michael Murphy, J.D., Professor
John B. Oakley, J.D., Lecturer
Amagda Perez, J.D., Lecturer
Rex R. Penczrazier, J.D., Professor
John P. Pollock, J.D., Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Senior Lecturer
Martha S. West, J.D., Professor
Carol C. White, J.D., Professor
Bruce A. Wolk, J.D., Professor
Richard C. Wydick, LLB, Professor

Emeriti Faculty
Homer G. Angelo, J.D., LL.M., Professor Emeritus
Edward L. Barrett, Jr., J.D., Professor Emeritus
Plorian Berloa, B.C.L., LL.M., Professor Emeritus
Danae J. Dylus, J.D., Professor Emeritus
Daniel W. Fessler, J.D., S.J.D., Professor Emeritus
James E. Hogan, LL.B., Professor Emeritus
Pierre R. Loiselle, LL.B., LL.M., Professor Emeritus
Robert J. Perras, J.D., LL.M., S.J.D., Professor Emeritus
Edward R. Rabin, LL.B., Professor Emeritus
Moritz 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 classes can be found at the end of the School of Law section at the front of the catalog. For current 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. (SJU 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, conversion, 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 noneconomic transactions. Inquiry is made into the means by which traditional doctrines adjust—or fail 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 (Jinder of claims and parties); preparation for trial through pleading, discovery, and pretrial; devices for resolving actions issues and 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 (2-2) Discussion—2-2 hours. Legal concepts which apply to actions brought by litigants who seek relief for injury. Intentional and unintentional invasions of personal 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.)

256. Constitutional Law I (4) Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of the United States Constitution, and the division of powers in the 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.

205. 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. Introduction in the form and substance of writing. A variety of written 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 exam.

Second and Third Year Courses

The second- and third-year courses fall into subject areas as shown:

(a) General courses: 212, 217, 222, 226, 239, 240, 241, 244, 250, 254, 258, 259, 266, 267, 268, 271, 280, 286, 292, 296
(b) Business Law: 210, 212, 215, 216, 228, 236, 243, 258, 269, 270, 274, 296
(c) Constitutional Law: 216, 286
(d) Criminal Law: 227, 245, 276, 290
(e) Estate Planning: 221, 223, 294
(f) Family Law: 225, 229, 234, 272, 273
(g) International Comparative and Foreign Law: 217, 230, 233, 248, 249, 252, 257, 279, 290, 291
(h) Labor and Employment Relations Law: 251, 255, 282
(i) Procedure and Jurisdiction: 242, 246, 275, 283
(k) Public Law: 222, 231, 235, 290
(m) Taxation: 214, 220, 238, 247
(n) Individual and Corporate Tax: 298, 299, 411, 416, 417, 418, 419, 415
(o) Clinical Programs: 420, 425, 430, 440, 450, 455, 460, 465, 470, 480

*209. Alternative Dispute Resolution: Techniques and Practice (2) Discussion—2 hours. Course focuses on the theory of alternative dispute resolution (ADR), History and evolution of alternatives to the judicial system for resolution of disputes. Particular emphasis on understanding the distinctions between (a) binding arbitration, (b) non-binding arbitration, (c) statutory arbitration, (d) contractual arbitration, (e) mediation, (f) private judging, and (g) neutralfication. Examines the question of whether or not to use a form of alternative dispute resolution and if such selection is made, tactics and strategies that may be applicable. The second portion of the course is clinic and students will be expected to participate in various forms of alternative dispute resolution procedures. Case scenarios provided by the instructors. Additionally, students encouraged (but not required) to attend OCR proceedings with the instructors in connection with their practice. Guest presentations from arbitrators and judges engaged in private judging. Limited enrollment.

*210. Business Reorganizations (2) Discussion—2 hours. Prerequisite: course 240 recommended. Focus is on businesses trying to survive when they are in substantial debt, exploring the structure of a plan of reorganization under Chapter 11 of the Bankruptcy Code. Focus is on the goals of a troubled debtor and the strategies or options available to meet them.

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, perception, 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, income statements, etc., with the purpose of warning 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 role 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. Mediation: Theory and Practice (3) Discussion—3 hours. This course teaches the basic, practical knowledge necessary to begin a mediation practice. Those who do not choose to work as mediators will have 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 attorneys, develop the ability to analyze disputes and understand how negotiations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes. Covers stages of mediation: contract stabilization, establishing contact with the parties (and explaining the process), developing the issues, working the conflict, resolving the conflict, and closure. Limited enrollment. (SJU grading only.)
214. Estate and Gift Tax (2) 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 management and directors, the role of the federal securities laws, and social responsibility.

216. Commercial Law: Article 9 (3) Discussion—3 hours. Prerequisite: course 243 recommended. Course covers security interests in personal property.

217. Institutional and Legal Aspects of International Telecommunications (2) Discussion—2 hours. Examines the impact of international law, treaties, and selected regional (European and other) on the development of telecommunication and space law. Links between international organizations such as the ITU, INMARSAT, Eutelsat, and Intelsat, national institutions such as NASA and the FCC, and private entities will be surveyed. Special legal problems such as business techniques, protection of hardware and software, industrial and intellectual property, piracy, freedom of information, restrictions on competition, and protection of privacy will be examined. Limited enrollment.

218. Constitutional Law II (3) Discussion—3 hours. Course primarily covers the First Amendment and the Equal Protection Clause. The course examines development of the doctrine 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, national origin, and other characteristics, alternative action, the problem of "frievous motives," state action, and the extent to which the equal protection clause prevents government from burdening the exercise of fundamental rights. Time permits, the Establishment Clause and the Free Exercise Clause will also be considered.

219. Evidence (4) Discussion—4 hours. The rules regarding the admissibility 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: intestacy succession; family protection and limits on the power of testamentary dispositions; revocation and revocability of wills; construction of wills; will substitutes; intestacy and testamentary private trusts. Depending on the instructor, the course may also cover more or fewer of the following topics: 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. Advanced Legislative Process Seminar with Clinical Components (3) Seminar—1 hour, discussion—2 hours. Prerequisite: prior or concurrent enrollment in course 231. In-depth study of the legislative process focusing on the jurisprudence of legislation; the role of the legislature, the legislative process, and the legislative culture. Students participate in an weekly 8-hour clinical activity at the Capitol conducted under both the direct supervision of a legislative practitioner and the indirect supervision of the Instructor. A pre-arranged clinical placement will be offered as part of the course; however, students may arrange for their own clinical if approved by the Instructor. Seminar concludes with seminar. Participants prepare a journal recounting their clinical experience for each day of the experience. Limited enrollment.

223. Estate Planning (2) Seminar—2 hours. Prerequisite: course 221. Selected topics in the estates and trusts area. Class presentation and research paper will satisfy the legal writing requirement. Limited enrollment.

224. Consumer Transaction (3) Discussion—2 hours. Prerequisite: selected consumer law problems, including a survey of state and federal regulatory efforts. Course coverage may include the following: common law and statutory approaches to fraud, unfair and deceptive trade practices, disclosure of information, consumer credit regulation, equal credit opportunity legislation, quality standards, enforcement by the creditor, consumer remedies, and attorney fees for representing consumers.

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, nulity, or death; and premarital contractual agreements. Also covered are nonmarital cohabitation, creditors' 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 media and news gathering, the regulation of broadcasting, free press/first amendment, and cable television, and the effect of the new technologies.


228. Business Planning (3) Discussion—3 hours. Prerequisite: course 220. 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, partnership, sale of premiums, execution and enforcement, sale of stock, interest, financially troubled businesses, and acquisitions, disposizioni, divisions, and liquidations of business. Class taught using the problem method.

229. Family Law Mediation (3) Discussion—3 hours. Prerequisite: course 225. Mediation has emerged as the 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 ocean 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. Legislative Process (3) Discussion—3 hours. Course covers fundamental elements of the legislative process, including legislative procedure; the role of the legislator, the legislative investigative power, lobbying; legislative executive relations; and the legislature's constitutional powers and limitations.

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. Strongly recommended as practical application of California legal doctrines.

233. Refugee Law Seminar (2) Seminar—2 hours. Prerequisite: course 292 recommended. Focus will be on legislation concerning the admission of refugees into the United States. Detailed study of the Refugee Act of 1980, the major piece of legislation dealing with the admission of refugees into the country, the international law that fueled passage of the Act, and the various regulations promulgated by the Attorney General implementing the Act. Analysis of the implementation of the Refugee Act and examination of some criticisms of immigration bureaucracy's implementation. Advanced legal writing requirement is satisfied as the basis for the final exam.

234. Family Law Practice (3) Seminar—2 hours; clinical—1 hour. Prerequisite: courses 225 and 272. Combined seminar and clinical course provides practical foundation in all aspects of family law. Students required to participate in an "on-campus" clinic (6 hours) and a "Pro Per" Assistance program in connection with Sacramento County Superior Court Family Law Division (6 hours) together with a weekly 2-hour seminar. Limited enrollment. (SU grading only.)

235. Administrative Law (3) Discussion—3 hours. State and Federal law related to administrative agencies. Topics include administrative due process, agency adjudication, rulemaking, delegation of authority, standing, and judicial review. Students will become conversant with the Federal Administrative Procedure Act and the 1981 Model State Administrative Procedure Act.

236. Securities Regulation (3) Discussion—3 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 regulatory schemes, stock 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 transactional securities fraud. Particular attention is devoted to problems of small issuers of securities.

237. Business Tax (4) Discussion—4 hours. Prerequisite: course 220. The owners of partnerships and subchapter S corporations (pass-through entities) are taxed on items of income, deduction, and loss, as if the owner incurred the item directly. Corporations and shareholders are subject to income tax at both the entity and shareholder levels. This course examines the identity, organization, operation, and dissolution of pass-through entities to enable students to understand the effects of transactions. Also examined are the formation, capitalization, operation, and liquidation of regular corporations subject to the double tax regime of subchapter C of the Internal Revenue Code.

238. Individual Responsibility and the Law (2) Discussion—2 hours. Consideration of what it is to be a "good lawyer." Exploring issues such as "zealous advocacy," professional detachment, and professional expertise, and the prevailing norms on these topics. Understanding how these norms affect society, the client, and the lawyer. While these issues of "public policy," we will approach the standpoint of
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 a multidisciplinary perspective. 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, legislatures, 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.

246. Federal Jurisdiction (3)
Discussion—2 hours. Study of the subject matter jurisdiction of federal courts. Constitutional and statutory law 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 legislation and programs and the New Left. 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, legislatures, 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.

247. Advanced Business Tax (3)
Discussion—3 hours. Prerequisite: course 220 and 228. Continued course 220. Focuses on the federal income tax considerations involved in the transfer of business assets including corporate liquidation as an asset acquisition technique, corporate reorganizations, divisive reorganizations, and the transfer of corporate attributes in an organization transaction. Also examines tax planning for affiliated groups of corporations.

248. International Law (3)
Discussion—3 hours. Prerequisite: course 217 recommended. The course covers basic international law concepts such as statehood and recognition; treaty law and customary international law; use of force; human rights and war crimes; extraterritoriality and non-use between international law and national law; and the jurisprudence of international law.

249. Comparative Law (2)
Discussion—2 hours. Comparison of methods and sources of law across civil law, common law, and the public international law. The topics include recognition, identification, and interpretation of the principal civil codes; analysis and study of problems arising in international transactions.

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 question 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 lawsuit? 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 one or two legal papers. Limited enrollment.

251. Labor Law (3)
Discussion—3 hours. Survey of the legislative, administrative, and judicial regulation of labor relations. The course covers the history of labor law, the scope and content of the law, the role of labor unions, recognition and recognition, the negotiation and administration of collective bargaining agreements, collective bargaining, strikes, picketing, boycotts, and employer interference with union activities. Limited enrollment.

252. International Litigation and Arbitration (3)
Discussion—3 hours. Current developments in international law, conflicts of law, civil procedure, arbitration, and comparative law in the context of transnational commerce. The course considers the role of national courts in international 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. Benefitting from the work of Warren and Rosemarie Warren, students will examine the impact of economic, political and social forces on legal change. Students will work in small groups, under the supervision of the professor, to conduct a case study of a topic selected by the professor. Students will develop a legal research paper in consultation with the professor. Limited enrollment.

255. Law of the Environment (3)
Discussion—3 hours. Course covers the fundamental principles of environmental law, the role of government in the protection of the environment, and the legal regulation of pollution. The course also covers the legal implications of the use of natural resources, including land and water, and the legal implications of the use of air and noise.

256. Land Use Planning and California Environmental Quality Act (2)
Discussion—2 hours. An examination of the methods and techniques used in land use planning and development. Topics include zoning, general plans, and related environmental and local government regulations. In addition, all planning will apply the California Environmental Quality Act and its application to 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 president's direct executive agreements, arms sales and military assistance, the recognition of foreign states, the negotiation of treaties, the scope of the international law, and the legal system of various countries. Grading will be based on active class participation and one or two legal papers. Limited enrollment.

258A. Professional Responsibility (1)
Discussion—1 hour. Study of ethical duties and responsibilities under the American Bar Association's 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. (SAU grading only.)

258B. Professional Responsibility (2)
Discussion—2 hours. Study of attorneys' ethical duties and responsibilities to clients, the public, and the legal system. Application of the American Bar Association's Model Code of Professional Responsibility and the Model Rules of Professional Conduct and Code of Judicial Conduct. California law will be studied in more detail than in course 258A and current issues affecting the profession also discussed.

259. Feminist Legal Theory Seminar (2)
Seminar—2 hours. Readings selected from the field of feminist legal theory and the development of the relationship between legal theory and practice in support of women's rights. Students will be assigned readings and will be expected to 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 handicap. Course will be 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 and fair employment laws will also be discussed.

261. Judicial Process Seminar (2)
Seminar—2 hours. This seminar is designed for those who are interested in the judicial process and who wish to learn more about the judicial process and its role in society. The seminar will cover the judicial process from a practical perspective, and will discuss the role of law in society and the role of judges in society.
282. Antitrust (3)
Discussion—3 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

283. Trial Practice and Procedure (2)
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 reading, and trial scenarios. The laboratory will be held on Tuesday, Wednesday, or Thursday evening. Limited enrollment. (SU grading only.)

284. Water Law (3)
Discussion—3 hours. Property rights in surface waters, including riparianism, priority appropriation and federal reserved rights; water administration institutions, including the federal reclamation program; the law of interstate water and property rights in ground water in the State of Washington and the law and policy.

285. Natural Resources Law (2)
Seminar—2 hours. Legal aspects of “ecosystem management,” as currently being developed in the Sierra Nevada mountain range of California. Although national forest lands will be the principal areas considered, some attention will be given to privately owned lands such as those in the Tahoe area. Limited enrollment, with preference to students who have completed course 267.

286. Wildlife Protection Law (2)
Seminar—2 hours. Course will encompass federal and state laws directed at wildlife protection, as well as international norms. Required paper will satisfy the advanced legal writing requirement.

287. Civil Rights Law (2)
Discussion—2 hours. Survey of federal civil rights laws. Includes civil remedies for racial discrimination and civil rights violations, specifically actions under Title VI of the Civil Rights Act of 1964, Title VII of the Civil Rights Act of 1968, and Title II of the Civil Rights Act of 1964.

288. Jewish Law Seminar (2)
Discussion—2 hours. The term “Jewish Law” refers to those subjects that would normally be taught in an American Jewish 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 of the rabbis. It is based on the concept of “interest” to Jewish persons and students of Jewish law. Limited enrollment, with preference to students who have completed course 267.

289. Basic Finance (3)
Discussion—3 hours. Prerequisite: law basic finance course required, or consent of instructor. Gives students exposure to basic methods of valuation that are part of the standard inventory in good business school. Students with a non-law basic finance course will not be admitted, except with consent of instructor.

270. International Business Transactions (2)
Discussion—2 hours. Study of solutions of selected legal problems arising from international business transactions. Topics include the international sales contract, transfer of technology, regulation of bribery, development of joint ventures, repatriation of profits, the General Agreement on Tariffs and Trade, and the regulation of dumping and government subsidies.

271. Insurance Law (2)
Discussion—2 hours. The insurance contract and its evolution; law, property, accident and other risks insured against; construction and enforcement of the various types of policies; statutory and regulatory controls.

272. Family Law (3)
Discussion—3 hours. For students with substantial interest in family law, to examine psychological and sociological aspects of parent-child relationships. Who is a “parent”? How does the law create, dismantle, and reconstruct parent-child relationships? Should the law reflect a gender-based approach or a sex-based approach? How are disputes opposed to co-op Livestock, 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, and birth control, alternative reproductive techniques, same sex parenting, and child support and custody. The relevance of social science and mental health experts to these issues is considered.

273. Current Issues in Family and Matrimonial Property (2)
Seminar—2 hours. Prerequisite: course 225, course 230 or 272, or consent of instructor. 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. The 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 approved at the discretion of instructor to satisfy the legal writing requirement.

274. Intellectual Property (3)
Discussion—3 hours. Study of the protection of intellectual property and unfair competition. Among the topics considered are copyrights, trade secrets, trademarks, misleading and false advertising, and copyrights.

275. Complex Litigation (3)
Discussion—3 hours. Issues that frequently arise in large, complex litigation involving multiple classes and multiple claims. The class treatment of cases introduced in the first-year civil procedure course, with emphasis on issues currently being litigated. Topics include complex class actions, trade secrets, trademarks, misleading and false advertising, and copyrights.

276. Jewish Justice Process (2)
Discussion—2 hours. Legal and philosophical bases of a separate Jewish justice process; police investigation, apprehension and diversion; probation intake and detention; juvenile court hearing and disposition; Jewish corrections. Major emphasis is placed on the role of counsel at each phase of the process. Guest speakers and field trips. Advanced legal writing requirement may be satisfied at the discretion of the instructor.

277. Prenatal 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 exam. Limited enrollment.

278. 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 human rights 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.

279. 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. (SU grading only.)

280. Energy Law (2)
Discussion—2 hours. Prerequisite: course 235. Introduction to regulation of the energy sector. Topics to be covered include regulation of natural monopolies, regulation of electricity and natural gas, legal aspects of the development of conventional and alternative energy sources, and international dimensions of energy development and regulation.

281. Remedies (3)
Discussion—3 hours. Survey of modern American remedies law, in both state and federal courts. Topics include money damages, injunctive relief, restitution, contempt power, attorneys’ fees; and equitable defenses such as estoppel and laches. Additional attention to specific obstacles to remedies against governmental officials and entities such as sovereign immunity, official immunity, and abstention.

282. Advanced Criminal Procedure (3)
Discussion—3 hours. Essential to those who wish to handle criminal cases. In particular, it treats bail, pretrial detention, plea bargaining, trial by jury, and sentencing.

283. Environmental Law (3)
Discussion—3 hours. Introduction to the law dealing with the environmental impact of governmental decisions, with emphasis on the National Environmental Policy Act, to federal and state law dealing with air and water quality, and to federal and state law protecting endangered species.

284. 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 1990’s. 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 legal issues, and addresses legal issues posed by the various options presented under the label of “health care reform” and the emerging "integrated delivery system" of the health care industry.

285. Land Use 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 federal natural resources and uses found on federal lands (minerals, timber, range, wildlife, recreation and preservation).

286. Advanced Constitutional Law Seminar (2)
Seminar—2 hours; paper required. Explores in-depth analysis of specific 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 and implications 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.

287. Tax Law (2)
Discussion—2 hours. Government efforts to assess and manage environmental risk, to regulate the release of toxic chemicals to the environment and to clean up existing toxic dump sites are vast, as well as efforts to recover for personal injury and property damage for such releases (environmental "toxic torts").

288. International Environmental Law (3)
Seminar—3 hours. Prerequisite: course 248. Problem-oriented seminar will focus on current issues con-
carning the protection of international environment, including global warming, biodiversity, endangered species, cultural and historical heritage, ocean dumping and related topics. Will satisfy the advanced legal writing requirement.

291. International Trade Law and Latin American (3)
Discussion—3 hours. Cover 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 (GATT), the Uruguay Round of 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 an 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), entity of nonimmigrant (temporary) visitors and immigrants into the United States; the worldwide quota and preference systems; familial and employment relationship critical to securing favored immigrant status; deportation and denial of alien or lawful status to persons otherwise subject to deportation; available defenses to deportation and exclusion proceedings; immigration consequences of criminal conviction; refusal to register; administrative appeals; federal and state judicial relief; citizenship and naturalization.

293. Public Interest Law Seminar (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 public interest lawyers in various fields may satisfy advanced legal writing requirement. Limited enrollment.

294. Problems In Fiduciary Administration (2)
Seminar—2 hours. Prerequisite: course 221. Selected topics in the area of fiduciary administration of estates and trusts. Required class presentation and research paper will 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 basic legal infrastructure of the securities laws; 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 and Entertainment Law (3)
Discussion—3 hours. Most of course will involve a discussion and consideration of the law of copyright, with emphasis on its application to motion pictures, music, television, and theater. The rest of the course will involve a study of other legal problems in the entertainment industry, including appropriation, protection of titles, characters, group names, slogans, and the rights of privacy and publicity.

297. Dispute Resolution and Lawyers (2)
Discussion—2 hours. Not open to students previously or currently enrolled in courses of 202 or 203. 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 settlement, negotiation, arbitration and mediation. Limited enrollment.

298. Group Study (1-4)
Groups of students (not fewer than 4 or more than 10) with common interest in studying a stated legal problem or area of knowledge and 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) the 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 noted on the program 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 paper to the seminar subject to the faculty board; (7) SU grading basis only unless the entire group requests letter grades in advance.

299. Research in Legal Problems (1-4)
Students who 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 one individual project per semester; (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (SU grading only) Students, with prior approval of a professor and an associate dean, may satisfy advanced legal writing requirement. Limited enrollment.

300. Problems in Fiduciary Administration (2)
Discussion—2 hours. Prerequisite: course 221. Selected topics in the area of fiduciary administration of estates and trusts. Required class presentation and research paper will satisfy the advanced legal writing requirement. Limited enrollment.

301. Environmental Law and Lott Court Competition (1)
Discussion—2 hours. Participates 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 interscholastic competition. (SU 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 interscholastic competition. (SU 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 interscholastic competition. Limited enrollment. (SU grading only)

411. Journal of International Law and Policy (1)
The Editor-in-Chief of the Journal receives one credit for each semester that he or she serves. Any person may receive this credit in any one semester. (SU grading only)

412. Carr Intraseasonal 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 presented over by judges and criticized by experienced litigators. Limited enrollment. (SU grading only)

413. Intraseasonal Trial Advocacy Competition (1-3)
Prerequisite: consent of appropriate faculty adviser. Participation in intraseasonal moot court and litigation skills competitions is limited to students actually representing the School in the intraseasonal competitions. Competition must be taken by the appropriate faculty adviser. The faculty adviser may condition the award of academic credit for any particular competition on the student's agreement that extra-curricular work may be reasonable to justify the credit. May satisfy advanced legal writing requirement. (SU grading only)

414. Moot Court Board (1)
Prerequisite: course 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 advisors to Moot Court Board. Limited enrollment. (SU 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 instructors. Students receive one credit for serving on the Board, awarded upon approval of the faculty adviser. (SU 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 editorial 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 in the first semester. Two units are earned in the second semester upon completing a full-length draft. One unit is earned second semester if only a membership draft is completed. (SU grading only)

417. Law Review Editor (2)
Editors must have completed an editorship in a previous volume and must be recommended for 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. Student may receive one credit in each of the second semesters for service as an editor. In exceptional cases, students may petition to participate for one semester only and receive two credits. (SU grading only. Deferred grading pending completion of sequence.)

418. Enquiror Editor (1)
The Editor-In-Chief of Enquiror receives one credit for each semester of service. Only one person may receive this credit in any one semester. (SU 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 authorized work of rigorous intellectual effort of at least 20 typed, 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 must also be understood 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 project. (Grading may be on SU or letter-grade basis at the faculty supervisor's discretion.)
Linguistics

(College of Letters and Science)
Steven G. Ladipole, Program Director
Program Office, 922 Sproul Hall (916-752-9633)

Committee in Charge
Wilbur A. Benware, Ph.D. (Linguistics)
Diane Brentani, Ph.D. (Linguistics)
Patrick Farrell, Ph.D. (Linguistics)
Steven G. Ladipole, Ph.D. (Linguistics)
Martha Macri, Ph.D. (Anthropology, Native American Studies)
Maria I. Manoloc-Manao, Ph.D. (French)
Almerindo E. Ojeda, Ph.D. (Linguistics)
Mary Schleppegrell, Ph.D. (Linguistics)
Lenora A. Timm, Ph.D. (Linguistics)
Maximo Torreblanca, Ph.D. (Linguistics)

Faculty
Wilbur A. Benware, Ph.D. (Professor)
Diane Brentani, Ph.D. (Assistant Professor)
Neta D. Dron, Ph.D. (Adjunct Professor)
Patrick Farrell, Ph.D. (Assistant Professor)
Jeffrey King, Ph.D. (Associate Professor, Philosophy)
Steven G. Ladipole, Ph.D. (Associate Professor)
Debra L. Lomnitz, Ph.D. (Adjunct Professor, Psychology)
Martha Macri, Ph.D. (Assistant Professor, Anthropology, Native American Studies)

In addition to the above faculty members, graduate students enrolled in the Department of Linguistics are encouraged to participate in the research program.

Preparatory Subject Matter

Linguistics 1

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.

Depth Subject Matter

Linguistics 103A, 103B, 111, 112, 121, 131, 141, 151, 152

At least eight upper division units from the following courses:


The student should note that a number of these courses have prerequisites. Since it is usual to select some courses outside 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

46-68

Major Adviser: P. Farrell
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 is designed to provide the student with a basic knowledge of linguistic analysis. It would be appropriate for students interested in any aspect of language use.

Linguistics 1, 103A, 103B .................................................. 12
One course from Linguistics 111, 112, 121, 191, 141, 151, 152 ..................... 4
Additional units in appropriate 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 Deans Honors List, 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, Farnell, Timm, Bennwitz, Lapointe, Ojeda Lecture—3 hours; discussion—1 hour. Introduction to the study of language, its nature, diversity, and structure. General Education credit. Civilization and Culture.

2. 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.

3. Intermediate American Sign Language (5) II.
The Staff Recitation—4 hours; discussion—1 hour. Prerequisite: course 2. Introduction to advanced topics in American Sign Language.

4. Advanced American Sign Language (5) III.
The Staff Recitation—4 hours; discussion—1 hour. Prerequisite: course 3. Advanced topics in American Sign Language.

5. Oral English for Undergraduate ESL Students (3) I, II, III.
The Staff (Lowry in charge) Lecture—discussion—3 hours. Prerequisite: consent of instructor; limited primarily to students who have fulfilled their American English requirement.

6. 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 American English requirement.

Upper Division Courses

103A. Linguistic Analysis I: Phonetics, Phonology, Morphology (4).
Brentari Lecture—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).
Brentari Lecture—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).
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 history 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; discussion—1 hour. Prerequisite: courses 103A, 103B. Detailed examination of articulatory and acoustic phonetics. Not open for credit to students who have completed course 109.

121. Morphology (4) III.
Lapointe, Brentari 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 structures.

131. Introduction to Syntactic Theory (4) II.
Lapointe, Brentari Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to generative 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 deviant 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.

151. Historical Linguistics (4) III.
Brentari 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 109.

152. Language Universals and Typology (4) I.
The Staff Lecture—2 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
163. Language, Gender, and Society (4 II)

Timm

Lecture—3 hours; term paper. 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 170.

183. Spanish Language in the United States (4) III. Torreblanca

Lecture—3 hours; term paper. Prerequisite: course 1 or Spanish 111N; Spanish 23 or the equivalent. Linguistic features of the varieties of the Spanish language spoken throughout the United States: phonology, morphology, syntax, vocabulary. Main focus is the relationship between U.S. Spanish and other world varieties of Spanish, within a historical framework.

166. Foundations of Linguistics I (4) II. Timm

Lecture—3 hours; term paper. Prerequisite: course 1; Spanish 3 or the equivalent. The linguistic features of Chiapaneco Spanish, Spanish-English code-switching, regional and social diversity in Chiapaneco Spanish, and history of bilingualism, language choice and use, attitudes about Spanish and English, Spanish language maintenance, Chiapaneco bilingualism and education.

111. 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.

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.

175. Biological Basis of Language (4) III

Drews

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 the representation of language in the human brain.

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 organizations or institutions. Maximum of 4 units available toward major. (PNP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III

The Staff (Director in charge)

Individual 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. Please contact the Department about the status of this study. May be repeated for credit for up to 6 units. (P/N grade only.)

196. Directed Group Study in English as a Second Language (1-5) I, II, III. The Staff (Schleppegrell in charge)

Prerequisite: consent of instructor. Intended for upper division students. (P/N grade 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, with one of the department's regular courses. May be repeated for credit. (P/N grade only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/N grade only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (P/N grade only.)

Graduate Courses

203A. Modern Linguistic Theory: Structuralism (4) II. Mannay, Winter

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. Offered alternate years. Not open for credit to students who have completed course 225A.

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. Offered alternate years. Not open for credit to students who have completed course 225B.

211. Advanced Phonological Theory and Analysis (4) III. Brentari

Lecture—3 hours; term paper. Prerequisite: course 111. Critical evaluation of current phonological theories. Offered in alternate years. Not open for credit to students who have completed course 239.

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. Offered in alternate years. Not open for credit to students who have completed course 265.

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.

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 collaborative disciplines—psycholinguistics, sociolinguistics, and cognitive psychology—to English as a second language instruction.

281. Research on Second Language Acquisition (4) I. Menno

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 tools.

282. Individual and Social Aspects of Bilingualism (4) III. Timm

Lecture—3 hours; term paper. Broad overview of bilingual and multilingualism. Focus on sociocultural 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 (1-4) I, II, III. Schleppegrell

Tutoring—1-4 hours. Prerequisite: course 300, 301, or 302 (may be taken concurrently). Teaching classes for ESL student teachers. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teachers of English as a Second Language in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. (SU grade only.)

298. Directed Group Study (1-5) II, III, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Courses

300. The Teaching of English as a Foreign Language (4) I. Schleppegrell

Lecture—4 hours. Prerequisite: courses 300 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) II. Schleppegrell

Lecture—4 hours. Prerequisite: course 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 project research.

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 students 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. (SU grading only.)

Linguistics

(A Graduate Group)

Steven G. Lapointe, Ph.D., Chairperson of the Group

Graduate Office, 922 Sproul Hall (916-752-9953/1219)

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) generative analysis and theory in syntax, morphology, semantics, and phonology; (b) psycholinguistics and neurolinguistics; (c) psychology and neurolinguistics, and (d) linguist descriptive (contemporary or historical) of a particular language or group of languages.

In general, the M.A. in Linguistics at UC is intended to serve 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 of such professionals (such as TESOL, speech therapy, and foreign language teaching). The program is structured so as to place considerable emphasis on interdisciplinary studies, thereby increasing the breadth of the student'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 com-
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)
109-A. Topics in Chinese Literature (in English)
110. Great Writers of China: Texts and Context (in English)

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: Antiquity
2. Great Books of Western Culture: Middle Ages and Renaissance
3. Great Books of Western Culture: 1800-1945
4. Major Books of the Contemporary World: 1945-Present
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
16. Men and the Natural World
17. Ethnic Minority Writers in World Literature
33A. Literature of China and Japan
33B. Literature of India and Southeast Asia
120. Writing Nature: 1750 to the Present
126. Women Writers
138. Gender and Interpretation
140. Thematic and Structural Study of Literature

Dramatic Art

20. Introduction to Dramatic Art
156. Theatre and Drama: Aeschylus to Machiavelli
157. Theatre and Drama: Shakespeare to Schiller
158. Theatre and Drama: Ibsen to Albee
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

48. Myth and Saga in the Germanic Cultures
49. Friedrich Schiller
50. Survey of German Culture
51. Great Works of German Culture in English Translation: Age of Faith
52B. Great Works of German Culture in English Translation: Age of Reason
52C. Great Works of German Culture in English Translation: Age of Relativity
110. Older German Literature
11A-H. Studies of Major Writers
11A-C. Topics in German Literature
113. Goethe's Faust
114. The Faust Tradition before and after Goethe
115. German Literature since 1945
116. From Goethe's Werther to Today's Werthers
117A. The Tristam Tradition: Medieval, Musical, Modern
117B. The Nibelungen Tradition: Medieval, Musical, and Modern
117C. The Parzival Tradition: Medieval, Musical, and Modern
118A. Fin-de-siecle Vienna (The Swan Song of the Habsburg Empire)
119B. Weimar Culture: Defeat, the Roaring Twenties, the Nazi Triumph
116C. Germany under the Third Reich
118E. Contemporary German Culture
119. From German Fiction to Women Films
130. Modernity and its Discontents: The Tradition of German Cultural Critique
140. German Political Literature from the Middle Ages 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
104. Modern Japanese Literature: War and Revolution
105. Modern Japanese Literature: Hero and Anti-Hero
106. Japanese Culture through Films
107. Modern Japanese Autobiographies (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 Theatre
130. Contemporary Soviet Culture
133. 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, School of

Robert H. Smiley, Ph.D., Dean
Richard F. Castanias, Ph.D., Associate Dean
School Office, 106 AOB 4 (916-752-7362)

Faculty
Brad Barber, Ph.D., Assistant Professor
Nicole B. Biggs, Ph.D., Professor (Management, Sociology)
George Bittingmayer, Ph.D., Associate Professor
David S. Burch, Ph.D., Assistant Professor
Peter Clark, Ph.D., Professor
Courses in Management (MGT, MGP)

Lower Division Courses

11A. Elementary Accounting (4) II. Darrough
Lecture—3 hours; discussion—1 hour. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles. (Former course number 11A.)

11B. Elementary Accounting (4) II. Darrough
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Product costing; using accounting information for decision making; planning and performance evaluation. (Former course Economics 11B.)

Upper Division Course

100. Introduction to Financial Accounting (3) I. Lyon
Lecture—3 hours. Prerequisite: no prior knowledge of accounting is required. Course is open to all upper division undergraduate and graduate students, exclusive of 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. Introduction to the concepts and objectives underlying the preparation of financial statements. Topics include underlying accounting cycle, measurement, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations. Not open for credit to students who have completed former course 201A.

200B. Managerial Accounting (3) III. Maher
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. 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, for credit to students who have completed former course 201B.

201A. The Individual and Group Dynamics (3) I. Palmer
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. 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. Not open for credit to students who have completed former course 201B.

201B. Organizational Structure and Strategy (3) II. Biggart
Lecture—3 hours; group projects, experiential exercises. Prerequisite: student in the Graduate School of Management MBA program or consent of instructor. Analysis of the structural properties of organizational integrating 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. Not open for credit to students who have completed former course 202A.

202A. Markets and the Firm (3) III. Bittlanger
Lecture—3 hours; group projects, experiential exercises. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Exports, consumers, firms, 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. Not open for credit to students who have completed former course 201C.

202B. Business, Government, and the International Economy (3) III. Clark
Lecture—3 hours; discussion—1 hour. Prerequisite: course 202A. Product costing; using accounting information for decision making; planning and performance evaluation. (Former course Economics 11B.)

203A. Data Analysis for Managers (3) III. Tai
Lecture—3 hours; discussion—1 hour. Prerequisite: 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 analysis methods to problems in marketing, finance, accounting, production, operations, and public policy. Not open for credit to students who have completed former course 210A.

203B. Forecasting and Managerial Research Methods (3) III. Roeke
Lecture—3 hours. Prerequisite: course 203A or 403A or consent of instructor. Advanced statistical methods for managerial decision making, regression analysis, time series analysis and forecasting, design and analysis of experiments in management research. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Not open for credit to students who have completed former course 210B.

204. Marketing Management (3) III. Davis
Lecture—3 hours. Prerequisite: graduate standing and the satisfactory completion of an intermediate-level course in statistics. Covers the role of marketing for undergraduates with an undergraduate introductory course in marketing; or consent of instructor. Analysis of market opportunities, elements of market research, and marketing strategies, implementation, and control of the marketing process. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Not open for credit to students who have completed former course 210B.

205. Financial Theory and Policy (3) III. Alger
Lecture—3 hours. Prerequisite: graduate student and course 202A or 302A or 402A or 403A. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk management. Develops basic valuation principles for investments with long-term and short-term cash-flows. Also, extends these to derivative securities, asset portfolio, investment management and hedging. Not open for credit to students who have completed former course 204.

206. Decision Making and Management Science (3) III. Bunch
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Introduces 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. Not open for credit to students who have completed former course 211.

207. Management Information Systems (3) II. Topkis, Woduff
Lecture—3 hours. Prerequisite: graduate student or consent of instructor. Introduction to computer programing and data handling skills. Use of computer in organizations, emphasis on the practical aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Not open for credit to students who have completed former course 208.

(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. Law and Legal Process (3) The Staff
Lecture—3 hours. 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. Middle-level Management: Budgets, Controls and Ethics (3) I. The Staff
Lecture—3 hours. Prerequisite: undergraduate degree. Performance measures, budgetary controls and ethical pressures within 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 transfer 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, benefits and related issues, and non-traditional work arrangements.

228. Statistical Quality Control and Productivity Improvement (3) Rocke
Lecture—3 hours. Prerequisite: courses 210A and 210B or equivalent. Introduction to statistical 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.

*Course not offered this academic year.
226. 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. Discusses the proposed Free Trade Pact between the U.S., Canada, and Mexico.

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 structural 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, prices, 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. Sutan, Hurley
Lecture—3 hours. Prerequisite: first-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurement, and incentives which bear on the management of organizational. Real client organizations, in the private and public sectors, are assigned to students 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) Dolf
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 202, 205. Teaches basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers international trade distribution of strategies 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 international trade distribution of strategies of market research and competitor intelligence in diverse cultures.

248. Marketing Strategies (3) Hagerty
Lecture—3 hours. Prerequisite: course 202. 205. Teaches basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers international trade distribution of strategies of market research and competitor intelligence in diverse cultures.

248. 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, plan-

251. Management of Innovation (3) Dorf
Lecture—3 hours. Managing innovative enterprise in changing and competitive 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, quality control, cost control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queuing, 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 acquisitions, reorganization, analysis of investment, financial management, and theories of optimal capital structure.

261. Investment Analysis (3) Barber
Lecture—3 hours. Examines modern asset pricing theory and the implications of that theory for the analysis and valuation of stocks, bonds, and other financial instruments. Risky investments in capital markets, relationships between interest rates, monetary policy, government's role in capital markets, approaches to assessing changes in regulation in specific markets.

262. Money and Security Markets (3) Blattberg
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, and private investors invest in those markets. Relationship between interest rates, monetary policy, government's role in capital markets, approaches to assessing changes in regulation in specific markets.

263. Options and Futures Markets (3) Barber
Lecture—2 hours. Studies the behavior of options and futures markets; how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, commodities, financial futures contracts. Price determination in options and futures markets is also examined.

264. Business Taxation (3) Blumenfield
Lecture—3 hours. Analyzes the impact of business taxation on income, savings, 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.

267. The National and International Economy (3) Clark
Lecture—3 hours. Prerequisite: familiarity with basic macroeconomics concepts is required. Completion of an introductory course in macroeconomics is sufficient, but additional course may be helpful. Open to Graduate School of Management students. Non-GSM graduate students may enroll with consent of instructor. Provides a framework for the analysis of aggregate output, interest rates and the price level; the United States and the rest of the world; the U.S. economy to the economies of the rest of the world through the exchange rate and international trade.

268. Management Communications (3) Kennedy
Lecture—3 hours. The theories, strategies, and skills necessary for effective communication in manage-
ment. Students will learn to improve their business writing, and will deliver business presentations orally.

269. Case Studies in Corporate Finance (3) Barber
Lecture—3 hours. Prerequisite: course 210A, 207. Financial issues facing management to raise capital in financial markets. Unique course format uses case studies to analyze decisions which firms face.

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 policy makers.

271. Accounting and Budgeting for Management Control (3) Maher
Lecture—3 hours. Explores concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost, budget, 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 financial 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. Auditing and Accounting for Governmental and Nonprofit Entities (3) Mahler
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Preparation and evaluation performance of accounting and budgeting for entities such as hospitals, universities, and welfare agencies.

274. Auditing, Internal Control, and Public Accounting (3) Lyon
Lecture—3 hours. Concentrates on the 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.

275A-275B. Seminar in Finance and Accounting (3-3) II-III. Castanias, Barber, Lyon
Seminar—3 hours. Prerequisite: Economics 200A-200B. Foundation for recent developments in the theory of finance and accounting, and relevant empirical evidence. Seminar emphasizing the reading and discussion of academic articles.

277. Real Estate, Finance and Development (3) II. Staff
Lecture—3 hours. Prerequisite: course 210A and 207. Focus on single family, attached, detached, multi-family, 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.

278. 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 business and public sector.

281. Systems Analysis and Design (3) Woodruff
Lecture—3 hours. Design and specification of computer-based information systems. Applications of systems development life cycle, use requirements, and feasibility assessment, logical and physical system 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 implementations are made to problems in private and public management.

*Course not offered this academic year.
Master of Education (M.Ed.) (A Graduate Group)
James Griepsh, Ph.D., Chairperson of the Group
Office: 1303 Hai Hall (916-752-1026).
Faculty. This interdisciplinary graduate group consists of faculty from departments such as Biological and Agricultural Engineering, Applied Behavioral Sciences, Community Health, Consumer Science, Division of Education, Environmental Design, Environmental Horticulture, Human Development, Native American Studies, Plant Science, Psychology, Rhetoric and Communication, and Textiles and Clothing, and Vegetable Crops.
Graduate Study. The Master of Education Graduate Group is housed in the Department of Applied Behavioral Sciences. The M.Ed. degree requires students to complete 36 units 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 second quarter of graduate study. A research-based field project and comprehensive oral examination are required for completion of the degree.
Graduate Advisor. Contact Group Office.

Mathematics (College of Letters and Science)
Craig A. Tracey, Ph.D., Chairperson of the Department
Joel Hess, Ph.D., Vice-Chairperson of the Department (Graduate Matters)
Motolicio Malave, Ph.D., Vice-Chairperson of the Department (Undergraduate Matters)
Office, 585 Kerr Hall (916-752-9872).
Faculty
David W. Barnette, Ph.D., Professor
David J. Banks, Ph.D., Assistant Professor
Carlos R. Borrés, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor
Angela C. Caceres, Ph.D., Professor
James E. Diederich, Ph.D., Professor
Allan L. Edelson, Ph.D., Professor
Alison F. Elmore, Ph.D., Professor
Dimtri R. Fuchs, Ph.D., Professor
Janko Graver, Ph.D., Assistant Professor
Joel Hass, Ph.D., Professor
John K. Hunter, Ph.D., Professor
Arthur J. Krener, Ph.D., Professor
Kenji Lange, Ph.D., Assistant Professor
E. J. Miller, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Motolicio Malave, Ph.D., Professor
E. G. Perry, Ph.D., Associate Professor
Jeremy R. Queen, Ph.D., Assistant Professor
G. Thomas Salie, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Albert Schwarz, Ph.D., Professor
Evelyn M. Silver, Ph.D., Professor, Academic Senate Distinguished Teaching Award
David M. Stuart, Ph.D., Assistant Professor
D. Blake Temple, Ph.D., Professor
Abigail T. Thompson, Ph.D., Associate Professor
Craig A. Tracey, Ph.D., Professor
Roger J. Wets, Ph.D., Professor
Emeriti Faculty
Henry L. Alder, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
George A. Baker, Ph.D., Professor Emeritus
Dallas B. Banks, Ph.D., Professor Emeritus
Donald C. Bissonet, Ph.D., Professor Emeritus
Guilford D. Chakerian, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Douglas C. Culver, Ph.D., Professor Emeritus
Curtsie M. Forbus, Ph.D., Professor Emeritus
Robert D. Glau, Ph.D., Professor Emeritus
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Kurt Klein, Ph.D., Professor Emeritus
Melen R. Korn, Ph.D., Professor Emeritus
Gary J. Kurowski, Ph.D., Professor Emeritus
David E. Mead, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Donald A. Norton, Ph.D., Professor Emeritus
Washak F. Peiffer, Ph.D., Professor Emeritus
Sherman K. Stein, L.L.B. (Hon.), Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Robert W. Stringfellow, Ph.D., Professor Emeritus
Takuya Tamura, D.Sc., Professor Emeritus
Edward J. Tully, Jr., Ph.D., Professor Emeritus
Howard J. Wein, Ph.D., Professor Emeritus

The Major Programs
Mathematics is the study of abstract structures, space, change, and the interleavings of these concepts. It also is the language of the exact sciences.
The Program. Students majoring in mathematics may follow one of two program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing a required introductory course in calculus, students plan an upper division program in consultation with a faculty advisor. This individualized program can lead to graduate study in pure or applied mathematics, to a secondary level of teaching, or to other professional goals. It also reflects 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:

Preparatory Subject Matter .......................... 30-41
Mathematics 12A, 12B .................................. 8
Mathematics 14A, 14B, or 150A, 150B .................. 3
Computer Science Engineering 30 or Engineering 5 ............. 3
Physics 9A ........................................ 4
Additional non-Mathematics courses chosen from natural sciences ........... 3

Core Requirements ...................................... 65
Mathematics 108 ........................................ 4
Mathematics 127A, 127B .................................. 8
Choose one Track from the following two ... 38
Track 1: Preparation for Graduate Study in Mathematics ........... 3
Mathematics 127C ........................................ 4
Mathematics 150A, 150B, 150C ...................... 12
Choose one course from Mathematics 125, 126, 147, 148, 150, 151 ....... 3
Additional upper division units .................. 3
Total Units for the Major ................................ 78-77

B.S. Major Requirements:
Preparatory Subject Matter .................. 30-41
Mathematics 12A (or high school equivalent) ................. 3
Mathematics 21A, 21B, 22A, 22B .................. 22
Computer Science Engineering 30 or Engineering 5 ............. 3
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
Core Requirements ...................................... 65
Mathematics 108 ........................................ 4
Mathematics 127A, 127B .................................. 8
Choose one Track from the following four ... 33
Track 1: Preparation for Graduate Study in Mathematics ........... 3
Mathematics 127C ........................................ 4
Mathematics 150A, 150B, 150C ...................... 12
Choose one course from Mathematics 125, 126, 147, 148, 150, 151 ....... 3
Additional upper division units .................. 3
Total Units for the Major ................................ 78-77

Students may follow one of two program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing a required introductory course in calculus, students plan an upper division program in consultation with a faculty advisor. This individualized program can lead to graduate study in pure or applied mathematics, to secondary level of teaching, or to other professional goals. It also reflects 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:

Preparatory Subject Matter .................. 30-41
Mathematics 12A, 12B .................................. 8
Mathematics 14A, 14B, or 150A, 150B .................. 3
Computer Science Engineering 30 or Engineering 5 ............. 3
Physics 9A ........................................ 4
Additional non-Mathematics courses chosen from natural sciences ........... 3

Core Requirements ...................................... 65
Mathematics 108 ........................................ 4
Mathematics 127A, 127B .................................. 8
Choose one Track from the following two ... 38
Track 1: Preparation for Graduate Study in Mathematics ........... 3
Mathematics 127C ........................................ 4
Mathematics 150A, 150B, 150C ...................... 12
Choose one course from Mathematics 125, 126, 147, 148, 150, 151 ....... 3
Additional upper division units .................. 3
Total Units for the Major ................................ 78-77

B.S. Major Requirements:
Preparatory Subject Matter .................. 30-41
Mathematics 12A (or high school equivalent) ................. 3
Computer Science Engineering 30 or Engineering 5 ............. 3
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
Core Requirements ...................................... 65
Mathematics 108 ........................................ 4
Mathematics 127A, 127B .................................. 8
Choose one Track from the following four ... 33
Track 1: Preparation for Graduate Study in Mathematics ........... 3
Mathematics 127C ........................................ 4
Mathematics 150A, 150B, 150C ...................... 12
Choose one course from Mathematics 125, 126, 147, 148, 150, 151 ....... 3
Additional upper division units .................. 3
Total Units for the Major ................................ 78-77

Course not offered this academic year.
Track 2: Applied Mathematics
Mathematics 150A, 150B.................. 8
Mathematics 167.......................... 3
Elective units in Mathematics 129A, 129B, 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 mathematic department related to area of interest.

Track 3: Mathematics for Secondary Teaching Mathematics 140A.......................... 3
Mathematics 141.......................... 3
Mathematics 149A, 149B; or 150A, 150B.................. 8
Additional upper division units............. 19

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 are not required, to take the same language requirement as required for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Depth Subject Matter Requirements.
Certain mathematics oriented courses given by other departments may be admissible in partial satisfaction of the general education 6- or 45-unit requirement with prior departmental approval. In general, 192, 194, 197 TC, 198, and 199 courses are not appropriate for application towards this requirement; and any exceptions must be approved by the Department's Undergraduate Program Committee.

Qualifying Examination.
Among the prerequisites for taking Mathematics 12, 16, 21A, 21A-H, 36, and 83 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 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. All examinations are given when the examination is offered are posted at the Mathematics Department.

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.

Information for Undecided Students.
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 desiring preparation towards a B.A. degree for secondary teaching or general mathematics, or a B.S. degree for graduate study, biological sciences, physical sciences, secondary teaching, or general mathematics should consult an undergraduate adviser.

Prerequisite Credit.
No student may repeat a course, if that course may be prerequisites 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 12, 197A, 197TC; 198, 199).......................... 20
Three of these units could be from Mathematics 36.
Teaching Credential Subject Representative.
G.T. Salies. 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).
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).
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 $35).

D. Intermediate Algebra (no credit).
The Staff Lecture—3 hours. Basic concepts of algebra, designed to prepare the student for college work in mathematics, such as course 16A or 16. 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, and an introductory trigonometric course that includes the satisfying of the Precalculus Qualifying Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeros of polynomial functions, logarithmic and exponential functions, 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, particularly to maxima and minima problems. Not open for credit to students who have received credit for course 21A.

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.

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.

21A. Calculus (4) I, II, III.
The Staff Lecture—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 trigonometric component. Functions, limits, continuity, derivatives. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extremum 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.

21AH. Honors Calculus (4) I.
The Staff Lecture/discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum score 21A is required. More intensive treatment of material covered in course 21A.

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, extremum 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, surfaces of revolution. Only two units of credit will be allowed students who have received credit for course 21B or 21C.

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 21B can continue with course 21CH or the regular 21C.

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, surfaces 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.

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.

21CL. Emerging Scholars Program Calculus Workshop (2) III.
The Staff Workshop—6 hours. Prerequisite: course 21B or 21BH, concurrent enrollment in course 21B. 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 (6) I. The Staff Lecture/discussion—5 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 components. Accelerated coverage of courses 21A and 21B. Detailed presentation of theory, definitions, and proofs. Condensed treatment of familiar computational aspects of calculus at a 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.

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 decimal number systems. Not open for credit to students who have received credit for course 108. Recommended for non-math majors.

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.

71A-71B. Explorations in Elementary Mathematics (3-3) II-I. 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. Credit will be awarded only to cooperative learning groups. Lectures will provide background and synthesis the results of group exploration. (Deferred grading only, pending completion of sequence.)

90. Elementary Problem Solving Seminar (1) I, II, III. Quaese Seminar—1 hour. Prerequisite: high school mathematics. Students solve and present solutions to challenging problems in elementary mathematics at the board. (P/N grade only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grade only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grade only.)

Upper Division Courses

108. Introduction to Abstract Mathematics (4) I, II, III. The Staff Lecture/discussion—4 hours. Prerequisite: course 21B or completion of an introductory course in abstract mathematics with the emphasis on developing ability to understand and present mathematical arguments.


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, Mobius 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 21C, 22B, 22D. Derivation of partial differential equations; separation of variables; Green’s functions. Fourier Transforms, Green’s Functions for two-dimensional wave equation; solution of non-homogeneous equations.

118B. Partial Differential Equations: Eigenfunction Expansions (3) III. The Staff Lecture—3 hours. Prerequisite: course 118A. Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions; separation of partial differential equations in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions.

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.


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. Basic concepts of sets, 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, III. The Staff Lecture/discussion—4 hours. Prerequisite: courses 21C, 22B, 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 analyses, approximation, interpolation, numerical differentiation and integration.

128B. Numerical Analysis in Solution of Equations (4) II. The Staff Lecture—3 hours; term project. Prerequisite: course 21C and 22A; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems of equations. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems.

128C. Numerical Analysis in Differential Equations (4) III. The Staff Lecture—4 hours. Prerequisite: courses 21C and 22A; 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) I. The Staff Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics, discrete, continuous distributions; random variables; joint, marginal, conditional density functions; 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) II-I. The Staff Lecture—3 hours. Prerequisite: course 131 or Statistics 131A. Markov chains, Poisson process, birth and death processes, renewal theory, queuing 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: course 108, 127A. Basic notions of point-set and combinatorial topology. Offered in alternate years.

149A-149B. Topics in Discrete Mathematics (4) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—4 hours. Prerequisite: course 22A and 108. Coding theory and counting theory and the algebraic concepts needed in their development.

150A-150B. Introduction to Abstract Algebra (3-3) I, II. 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 precision of precise writing, and the ability to deal with abstraction.

160. Mathematical Foundations of Database Theory, Design, and Performance (3). I. Diederich Lecture—4 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. Perfor-
192. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

201. 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

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.

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 (meromorphic functions).

210A. Topics in Geometry (3) I. The Staff
Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced geometry related to curvature 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.
mization and its applications, such as: linear and nonlinear systems theory, stochastic programming, stochastic optimal control, approximation theory for optimization, advanced topics in numerical implementation of algorithms, shape optimization, large scale optimization, semi-infinite and nondifferentiable optimization with applications to engineering design, global optimizations. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 258.)

*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 and nonlinear 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 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.)

*259. Optimal Control, Theory and Algorithms (3) I. The Staff Lecture—3 hours. Prerequisite: graduate standing. Optimal control and calculus of variations; existence of solutions to optimal control problems; necessary conditions of optimality, Pontryagin maximum principle, Euler equation; sufficient conditions of optimality, Hamilton-Jacobi-Bellman equation, linear quadratic regulator problem; algorithms for unconstrained and constrained optimal control problems. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 259.)


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 in different subject area.

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 semi-groups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Course

300. Methods of Teaching Mathematics (3) I, II, III. The Staff Lecture—3 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Practical experience in methods and problems of teaching the 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. (SU 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

Gerald S. Lazarus, M.D., Dean of the School
James J. Castles, M.D., Executive Associate Dean
F. William Blaisdell, M.D., Acting Assistant Dean
Fitz-Roy Curry, Ph.D., Associate Dean
Lindy Kumagai, M.D., Assistant Dean
Ernest L. Lewis, M.D., Associate Dean
Frank J. Logan, M.B.B.A., Associate Dean
Brian O'Neill, M.D., Assistant Dean
Elizabeth Russell, M.S.N., M.B.A., Associate Dean
Margaret S. Steward, Ph.D., Associate Dean
Donald A. Walsh, Ph.D., Associate Dean
Deacon's Office, Medical Sciences 1C (916-752-0331)

Faculty
Deborah S. Ablin, M.D., Associate Professor (Radiology)
Mark A. Zuck, M.D., Assistant Professor (Neurology)
Timothy Albertson, M.D., Ph.D., Professor (Internal Medicine, Pharmacology)
Robbie Allen, M.D., Associate Professor (Internal Medicine)
Eugenie Amparo, M.D., Associate Professor (Radiology)
Ezra A. Amsterdam, M.D., Professor (Internal Medicine)
Thomas Anders, M.D., Professor (Psychiatry)
Mark Anderson, M.D., Assistant Professor (Neurological Surgery)
Russell Andrews, M.D., Assistant Professor (Neurological Surgery)
Joseph Antognini, M.D., Assistant Professor (Anesthesiology)
Thomas Aoki, M.D., Professor (Internal Medicine)
Catherine Babcock, M.D., Assistant Professor (Radiology)
Huong Bach, M.D., Assistant Clinical Professor (Internal Medicine)
Peter Barglow, M.D., Professor (Psychiatry)
Peter Barry, Ph.D., Assistant Adjunct Professor (Pathology)

*Course not offered this academic year.
Michael Gazzaniga, Ph.D., Professor (Neurology)
Eugenia Gerschovitch, M.D., Assistant Professor (Radiology)
Gary Gershony, M.D., Assistant Professor (Internal Medicine)
Eric Gerstman, M.D., Assistant Professor (Neurology)
William Gilbert, M.D., Associate Professor (Gastroenterology and Hepatology)
Boyd W. Goetzman, M.D., Ph.D., Professor (Radiology)
Ellen Gold, Ph.D., Associate Professor (Internal Medicine)
Tizporna Goldkorn, Ph.D., Assistant Adjunct Professor (Internal Medicine)
Mari Golub, Ph.D., Adjunct Professor (Internal Medicine)
Michael Goodman, Ph.D., Adjunct Professor (Internal Medicine)
James E. Goodnight, Jr., M.D. Professor (Surgery)
Frederic A. Gorin, M.D., Associate Professor (Neurology)
Sidney M. Gospe, Jr., M.D., Ph.D., Associate Professor (Neurology, Pediatrics)
John Gould, M.D., Ph.D., Assistant Professor (Urology)
Ira M. Gooley, D.V.M., Professor (Surgery)
Richard Greaves, M.D., Clinical Assistant Professor (Obstetrics and Gynecology)
Sarah D. Gray, Ph.D., Professor (Human Physiology)
Jon Green, M.D., Ph.D., Assistant Professor (Internal Medicine)
Adam Greenspan, M.D., Professor (Radiology, Orthopedics)
M.R. Greenwood, Ph.D., Professor (Internal Medicine)
Gabriel Gregerstos, M.D., Professor (Internal Medicine)
Gerald Gronet, M.D., Professor (Anesthesiology)
Donald Guinan, M.D., Assistant Professor (Pathology)
Phyllis Guinto, M.D., Adjunct Professor (Internal Medicine)
Paul Gurnerling, Ph.D., Assistant Adjunct Professor (Internal Medicine)
Katherine Gundling, M.D., Assistant Clinical Professor (Internal Medicine)
Robert A. Gunther, Ph.D., Adjunct Professor (Psychiatry)
Mary Haan, Ph.D., Assistant Professor (Community and International Health)
Ann Haas, M.D., Clinical Assistant Professor (Otolaryngology)
Barry Halliwell, Ph.D., Associate Adjunct Professor (Internal Medicine)
George Halpern, M.D., Adjunct Professor (Internal Medicine)
Charles H. Halsted, M.D., Professor (Internal Medicine)
James Hanks, M.D., Assistant Professor (Radiology)
Michael Hanley, Ph.D., Professor (Biological Chemistry)
Leland Hanowell, M.D., Associate Professor (Anesthesiology)
Robin L. Hansen, M.D., Associate Professor (Pediatrics)
Rita Hargrave, Assistant Professor (Psychiatry)
Jay Hare, M.D., Professor (Surgery)
Toni Harris, M.D., Associate Clinical Professor (Obstetrics and Gynecology)
Stephen T. Hawley, M.D., Associate Professor (Radiology, Neurological Surgery)
Herman Hedrana, M.D., Assistant Professor (Obstetrics and Gynecology)
Vernon Hendrix, M.D., Assistant Professor (Surgery)
Gary L. Henderson, Ph.D., Professor (Pharmacology)
Andrew G. Hendrickx, Ph.D., Professor (Human Anatomy)
John W. B. Hershey, Ph.D., Professor (Biological Chemistry)
Calvin Hersch, M.D., Assistant Professor (Internal Medicine)
Ela Hervila, M.D., Assistant Professor (Surgery)
Leonard H. Hendriksen, Ph.D., Professor (Ophthalmology)
Hung Ho, M.D., Assistant Professor (Surgery)
James W. Holcroft, M.D., Professor (Surgery)
Michael J. Hojja, Ph.D., Professor (Biological Chemistry)
Mannfred A. Holinger, Ph.D., Professor (Biochemistry)
B. Zane Horowitz, M.D., Assistant Clinical Professor (Internal Medicine)
Jeffrey Hoza, M.D., Assistant Professor (Anesthesiology)
Lydia Howell, M.D., Associate Professor (Pathology)
Ronald Hsu, M.D., Assistant Professor (Internal Medicine)
Arthur C. Huntley, M.D., Associate Professor (Dermatology)
T. William Hutchens, Ph.D., Professor (Pediatrics)
Judith Hwang, M.D., Assistant Professor (Anesthesiology)
Roslyn L. Isseroff, M.D., Associate Professor (Dermatology)
Marija Ivanovic, Ph.D., Assistant Professor (Radiology)
Rory J. Jaffe, M.D., Associate Professor (Anesthesiology)
William J. Jagust, M.D., Associate Professor (Neurology)
Kiran Jain, M.D., Assistant Professor (Radiology)
Hanne M. Jensen, M.D., Associate Professor (Pathology)
Jesse Joad, M.D., Assistant Professor (Pediatrics)
Chris A. Johnson, Ph.D., Professor (Ophthalmology)
Ernest Johnson, M.D., Associate Professor (Physical Medicine and Rehabilitation)
George W. Jordan, Jr., M.D. Professor (Internal Medicine, Pathology)
Robert M. Joy, Ph.D., Professor (Pharmacology)
Thomas Jue, Ph.D., Associate Professor (Biological Chemistry)
Chulani Kappagoda, M.D., Professor (Internal Medicine)
Sidika Karkas, M.D., Associate Professor (Internal Medicine)
Richard Katsberg, M.D., Professor (Radiology)
Marc P. Kaufman, Ph.D., Professor (Internal Medicine, Human Physiology)
Ravi Kaul, Ph.D., Assistant Adjunct Professor (Pediatrics)
George Kayser, M.D., Professor (Internal Medicine)
Paul Kellerman, M.D., Assistant Professor (Internal Medicine)
John L. Keltner, M.D., Professor (Ophthalmology, Neurology, Neurosurgical Surgery)
Katherine Kendall, M.D., Assistant Professor (Anesthesiology)
Nguyen Duc Kien, Ph.D., Associate Adjunct Professor (Anesthesiology)
David Kilmer, M.D., Assistant Professor (Physical Medicine and Rehabilitation)
Barry F. Kings, Ph.D., Professor (Cell Biology and Human Anatomy)
Donna Kirkes, M.D., Assistant Clinical Professor (Internal Medicine)
James Kirk, M.D., M.P.H., Assistant Clinical Professor (Internal Medicine)
Robert T. Knight, M.D., Professor (Neurology, Neurosurgery)
Gerard J. Kost, M.D., Professor (Pathology)
Richard Kralovich, M.D., Assistant Professor (Neurology)
Penelope Kreiser, M.D., Associate Professor (Psychiatry)
Hideo Kubo, M.D., Professor (Surgery)
Ingrid L. Kuwe, M.D., Associate Professor (Neurology)
Carol L. Lake, M.D., Professor (Anesthesiology)
Lawrence Lamden, M.D., Assistant Professor (Anesthesiology)
Bo M. T. Lantz, M.D., Professor (Radiology)
Edward C. Larkin, M.D., Professor (Internal Medicine)
David Larson, M.D., Associate Professor (Surgery)
Lawrence J. Laslett, M.D., Associate Professor (Internal Medicine)
Jerald A. Laslett, M.D., Associate Professor (Internal Medicine, Biological Chemistry)
Derick Lau, M.D., Assistant Professor (Internal Medicine)
Ruth Lawrence, M.D., Associate Professor (Internal Medicine)
Gerald Lazarus, M.D., Professor (Dermatology)
Eun-Kyu Lee, M.D., Assistant Professor (Neurology)
Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also the School of Medicine section in the front portion of this catalog.

Courses in the School of Medicine

The curriculum for the M.D. degree at the University of California, 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 sciences 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/lymphoretic, gastrointestinal, nutrition, musculoskeletal, neuromuscular, respiratory, nephrology). During the second year, students continue training in physical diagnosis and are presented with issues in socio-economic and 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 of family practice, one week each of ophthalmology, otolaryngology, orthopedics, 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, four weeks of emergency care and 22 weeks of clinical electives. 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 clinical clerkship. Students who enroll in programs 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 opportunity for selecting electives during the first two years, in particular during the interterm 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., and M.P.H.). Thesis programs offer a wide range 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. The School of Public Health encourages students interested in pursuing advanced degree programs. The dual-degree program for the M.D./Ph.D. is targeted at training 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 Berkeley School of Public Health offers Ph.D. fellowships each year to students enrolled in the M.D./Ph.D. 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**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Course</th>
<th>Level</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>Fall</td>
<td>Biological Chemistry 410A</td>
<td>Molecular and Cell Biology</td>
<td>4.5</td>
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<tr>
<td></td>
<td>Family Practice 400A</td>
<td>Introduction to Patient Evaluation</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Cell Biology and Human Anatomy 400</td>
<td>Developmental, Gross and Radiologic Anatomy</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Psychiatry 401</td>
<td>Medicine and the Mind</td>
<td>2</td>
</tr>
<tr>
<td>Winter</td>
<td>Biological Chemistry 410B</td>
<td>Cell Biology and Metabolism</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Cell Biology and Human Anatomy 402</td>
<td>Human Microscopic Anatomy</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Human Physiology 400</td>
<td>Human Physiology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Family Practice 400B</td>
<td>Introduction to Patient Evaluation</td>
<td>2</td>
</tr>
<tr>
<td>Spring</td>
<td>Biological Chemistry 410B</td>
<td>Human Physiology</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Cell Biology and Human Anatomy 402</td>
<td>Human Microscopic Anatomy</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Medical Microbiology 480A</td>
<td>Medical Immunology</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Pathology 410A</td>
<td>General System Pathology</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Family Practice 400C</td>
<td>Introduction to Patient Evaluation</td>
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**Second-Year Required Courses**

<table>
<thead>
<tr>
<th>Quarter</th>
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<th>Level</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>IV</td>
<td>Pathology 410B</td>
<td>General Systemic Pathology</td>
<td>7.5</td>
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<tr>
<td></td>
<td>Obstetrics and Gynecology</td>
<td>Human Reproduction</td>
<td>2</td>
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<tr>
<td></td>
<td>Dermatology 420</td>
<td>Integrative System</td>
<td>2</td>
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<tr>
<td></td>
<td>Internal Medicine 400A</td>
<td>Physical Diagnosis</td>
<td>1</td>
</tr>
<tr>
<td>V</td>
<td>Microbiology 480B</td>
<td>Pathogenic Microbiology</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>Internal Medicine 420A</td>
<td>Hematopoietic and Lymphoreticular System</td>
<td>4</td>
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<tr>
<td></td>
<td>Orthopaedic Surgery 420</td>
<td>Musculoskeletal System</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Medical Pharmacology and Toxicology 400A</td>
<td>Principles of Pharmacology</td>
<td>2.5</td>
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<tr>
<td></td>
<td>Community and International Health</td>
<td>Internal Medicine 421</td>
<td>Principles of Epidemiology, Occupational Medicine and Geriatrics</td>
</tr>
<tr>
<td></td>
<td>Internal Medicine 400B</td>
<td>Physical Diagnosis</td>
<td>3</td>
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<tr>
<td>VI</td>
<td>Microbiology 480B</td>
<td>Pathogenic Microbiology</td>
<td>6</td>
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<tr>
<td></td>
<td>Internal Medicine 420C</td>
<td>Respiratory System</td>
<td>4</td>
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<td></td>
<td>Internal Medicine 420D</td>
<td>Cardiovascular System</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Neurology 426</td>
<td>Clinical Neurosciences</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Psychiatry 405</td>
<td>Psychopathology</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Psychiatry 406</td>
<td>Human Sexuality</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Internal Medicine 400C</td>
<td>Physical Diagnosis</td>
<td>3</td>
</tr>
<tr>
<td>VII</td>
<td>Internal Medicine 420F</td>
<td>Metabolic-Rhythmic System</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Internal Medicine 420B</td>
<td>Gastrointestinal System</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Internal Medicine 410B</td>
<td>Biological Chemistry 419</td>
<td>Basic and Clinical Nutrition</td>
</tr>
<tr>
<td></td>
<td>Internal Medicine 420E</td>
<td>Nephrology</td>
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**Third and Fourth Year Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Third Year Clerkships</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Internal Medicine 430</td>
<td>Medicine Clerkship</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Surgery 430</td>
<td>Surgery Clerkship</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Internal Pediatrics 430</td>
<td>Pediatrics Clerkship</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Family Practice 430</td>
<td>Primary Care Clerkship</td>
<td>8 weeks</td>
</tr>
<tr>
<td></td>
<td>Third or Fourth Year Clerkships</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Obstetrics and Gynecology 430</td>
<td>Obstetrics and Gynecology Clerkship</td>
<td>8 weeks</td>
</tr>
<tr>
<td></td>
<td>Psychiatry 430</td>
<td>Psychiatry Clerkship</td>
</tr>
<tr>
<td>Fourth Year Requirements</td>
<td>Physical Medicine and Rehabilitation</td>
<td>4 weeks</td>
</tr>
<tr>
<td>440</td>
<td>Physical Medicine and Rehabilitation Clerkship</td>
<td>2 weeks</td>
</tr>
<tr>
<td>441</td>
<td>Medical Science</td>
<td>2 weeks</td>
</tr>
<tr>
<td>442</td>
<td>Medical Science of Medical Practice</td>
<td>2 weeks</td>
</tr>
<tr>
<td>443</td>
<td>Neurology Clerkship</td>
<td>2 weeks</td>
</tr>
<tr>
<td>444</td>
<td>Emergency Care</td>
<td>4 weeks</td>
</tr>
<tr>
<td>445</td>
<td>Clinical Selectives</td>
<td>22 weeks</td>
</tr>
</tbody>
</table>

The fourth-year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.). These clinical clerkships are currently under development and will be implemented in the summer of 1995.

Clinical electives are chosen by the student in consultation with, and with approval of, the Fourth-Year Oversight Committee. Of the 22 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.

*Course not offered this academic year.

**Medical Sciences (MDS)**

**Professional Courses**

- **Preclinical** (I) I, II, III, IV: Medicine, Surgery, Obstetrics, Pediatrics, Psychiatry, Pathology, Microbiology, Radiology, Histology, Embryology, Anatomy, Physiology, Pharmacology, Clinical Method, Research.
- **Clinical**—full time (8 weeks). Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Obstetrics/neonatal/gynecologic experience in delivery room, nursery wards, operating room, clinics. One third of time spent in gynecology, two thirds of time in perinatology. Obstetrics, neonatology, and continuing care of tetanus/neonatal emphasized in perinatal period. Seminars and conferences throughout period.

**432B. Pediatric Clerkship** (I, II, III, IV: Course Committee Chairperson)

Clinical activity—full time (8 weeks). Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Two 4-week periods, one in inpatient rotation (Children's Hospital or Davis General), one in ambulatory experience (UC Davis Medical Center, UCD Medical Center, UCD Medical Center). Assumption of appropriate patient care responsibilities; participation in conference rounds, and seminars during ambulatory rotation.

**433. Clinical Clerkship in Psychiatry** (I, II, III, IV: Course Committee Chairperson)

Clinical activity—full time (8 weeks). Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Students assigned to various mental health clinical settings following training orientation program. Focus on treatment of psychiatric problems encountered by physicians in practice. Diagnostic, therapeutic, and interpersonal skills emphasized.

**440. Responsibilities of Medical Practice** (I) I. Davidson and staff. Lecture-discussion—60 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address nontreatment components of the physician-patient relationship, non-disease-related interactions, non-misdiagnosis, non-medical ethics, medical jurisprudence, medical economics, alcoholism and drug abuse, etc.) and critically explore social, ethical and cultural issues arising in medical practice. (SU grading only.)

**450. Introduction to UCD Medical Center** (I) I. The Staff. Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (SU grading only.)

**460. Insights in Clinical Research** (I) I. Wash. Lecture—1 hour. Prerequisite: medical students in good standing. Clinical research presented by School of Medicine faculty, overview of pertinent issues, interpreted within medical ethics, human subject protocols, care control methods. (SU grading only.)

**489. Directed Studies** (I, IV) O’Grady. Independent study—40 hours weekly. Prerequisite: individual directed studies in extended preparation for National Board Examination, Part I, and/or as required by General Education Board. Independent studies to review material from Years I and II in the curriculum in preparation for taking National Boards in the fall, and for remediation course work directed by the Promotion Board. Students are expected to spend 6 to 12 hours per day on these studies. Independent consultation and tutoring available on individual basis. (SU grading only.)

**495. Medicine Literature Review** (1-9) I, II, III, IV: Walsh. Dihabitation—5-27 hours. Prerequisite: medical student in good academic standing and permission of the
Departmental Courses:

Anesthesiology (ANE)

Upper Division Course
192. Internship in Anesthesiology (1-6) I, II, III, IV. The Staff (Bennett, Klein) Internship—3 to 16 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesiology and related fields. (P/NP grading only.)

Graduate Courses
209. Prostaglandins/Lipotropins and Related Lipids (2) II. Bzoth (Dermatology) Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B. Oxidative deamination of prostaglandins. Synthesis of prostaglandins from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiologic implications; pharmacological and clinical relevance. Offered fall semesters. (P/NP grading only.)

214. Molecular Medicine (1) II. Hanley 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. (SU grading only) (Same course as 214.)

418. Introduction to Clinical Nutrition (3) III. Phinney (Internal Medicine, Clinical Nutrition and Metabolism), Rucker, and staff Lecture—3 hours. Prerequisites: consent of instructor. Assistant instructor by tutors. (P/NP grading only.)

497. Tutoring in Biology (1-5) I, II, III, IV. The Staff Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assistant instructor by tutors. (P/NP grading only.)

Cell Biology and Human Anatomy (CHA)

Upper Division Courses
101. The Gross and Microscopic Structure of the Human Body (4) I. Lecture—4 hours. Prerequisite: Biological Sciences 1A or 1B; Physiology 2-2L or Biological Sciences 1B recommended. A study of the gross and microscopic structure of the human body with emphasis on function. (SU grading only.)

101L. The Gross and Microscopic Structure of the Human Body (2) I. Laboratory—6 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory will be taught from projections, models, and computer-aided lectures. Participants will have the opportunity to learn structure from direct experience.

192. Internship in Morphology (1-12) I, II, III, IV. The Staff Internship—3 to 36 hours; final report. Prerequisite: upper division standing; approved 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, immuno-
of supervised internship in research laboratories of members of the department. (P/NP grading only.)

197. Tutoring in Cell Biology and Human Anatomy (3-1-5) II. The Staff
Discussion—1 hour; laboratory—2 hours. Required: 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)
Prerequisite: completion of course 101 with a grade of B or better. 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. Erickson
Lecture—3 hours; discussion—1 hour; laboratory—10 hours. Required: consent of instructor and good standing in the department. Consent of instructor required. (S/U grading only.)

201. Human Microscopic Anatomy (5) II. Fitzgerald
Lecture—3 hours; laboratory—6 hours. Required: consent of instructor. Consent of instructor required. (S/U grading only.)

202. Microscopic Anatomy (5) II. Fitzgerald
Lecture—3 hours; laboratory—6 hours. Required: consent of instructor. Consent of instructor required. (S/U grading only.)

203. Neurology (6) III. Vijayan
Lecture—5 hours; laboratory—3 hours. Required: consent of instructor. Consent of instructor required. (S/U grading only.)

204. Clinical Psychology (CPS) Graduate Course
299. Research (1-12) I, II, III, IV. Steward
Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (S/U grading only.)

Community and International Health (CMH)

92. Internship in Community Health (1-12) I, II, III, IV. The Staff
Internship—36 hours. Required: 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) I. Gilmer
Lecture—3 hours. Required: 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.

102. Health Education (1-5) I, II, III, IV. The Staff
Student Health Center)
Lecture—1 hour; laboratory—3-15 hours. Required: 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. Required: 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.

192. Internship in Community Health Practice (1-12) I, II, III, IV. The Staff
Internship—36 hours. Required: 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.)

193. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kumagai and staff
Clinical activity—15 hours; written report. Required: upper division standing. Undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of their organization, administration, and problem solving capabilities of these primary care facilities. (P/NP grading only.)

194. Study in Community and International Health (1-5) I, II, III, IV. The Staff
Required: consent of instructor. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.)

195. Research in Community and International Health (1-5) I, II, III, IV. The Staff
Prerequisite: undergraduate standing; consent of instructor. Students will work with faculty member in areas of research interest, including but not limited to injury control, international health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.)

Graduate Courses

254. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kumagai
Clinical activity—15 hours. Required: open to all first- or second-year medical students, or graduate students with consent of instructor. Students are assigned to clinical settings which demonstrate ethnically, culturally or other related aspects of community practice in health. The students, through active participation in health care delivery, are able to relate conceptual with practical aspects of primary health care. (S/U grading only.)

255. 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 in a graduate student's area of research interest, including but not limited to injury control, international health, health promotion and wellness, women's health, and health demographics. (S/U grading only.)

Professional Courses

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Haas
Lecture—7.5 hours for each 1.5 hours. Required: 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. Geriatics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system. (Same course as Internal Medicine 421.)

455. Multidisciplinary Clinical Preceptorship (4-5) IV, V. The Staff
Clinical activity—full-time (3 weeks). Required: second-year student in good academic standing. Students will be introduced to basic principles 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. (SU 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 (6-12) I, II, III, IV. The Staff Clinical activity—full time (2-6 weeks). Prerequisite: third- or fourth-year medical students. 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. (SU grading only)

480. Senior Partnership (1-3) I. 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 work with elderly from the community for a project on health and aging; field experiences in clinical geriatrics; attendance at SOM lectures concerning geriatrics or the elderly. (SU grading only)

498. Study in Community and International Health (1-9) I, II, III, IV. The Staff Prerequisite: medical students in good academic standing and consent of instructor. Study and experience for medical students in any number of areas in community and international health. (SU 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. (SU grading only)

Family Practice (FAP)

Lower Division Course

92C. Primary Care Clinics (2) I, II, III, IV. Arevalo Lecture—2 hours. 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.

Graduate Courses

240A-240B-240C-240D-240E. Clinical Preceptorship (2) I, II, III, Hess, De Amicis Clinical activity—9-36 hours. Prerequisite: enrollment in the Master’s Track of the FNP Certificate Program, and successful completion of all preceding 240A-F section. Diagnosis and treatment of patients of all ages in an ambulatory setting with the supervision of a preceptor. (FNP grading only)

242A-242B. Clinical Role Seminar (1-1-1) I, II, III. Hess, De Amicis, Leveque Yearly Seminar. 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. (FNP grading only)

252A. Nurse Practitioner Role Development (1) I. Hess 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.


254. Psychosocial Concepts and Issues in Primary Care (1) 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 analysis of nursing interventions in health promotion and maintenance based on nursing and other theoretical frameworks and research data are emphasized.

255A. Family Nursing Theory (2) III. 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.

256A. Family Nursing Interventions (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 analysis of nursing interventions in health promotion and maintenance based on nursing and other theoretical frameworks and research data are emphasized.
Clinical Assistant Program or consent of instructor. Core knowledge in clinical pharmacology and therapeutics. Content deals with facts that are necessary to make rational and optimal therapeutic plans in an ambulatory primary care setting. (Deferral grading only, pending completion of sequence.)

357B. Pharmacology (0.5) I, II, III, Wight, Hasselbach
Lecture/discussion—0.5 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program or consent of instructor. Essentials of drug pharmacodynamics and pharmacokinetics. Course content deals with facts that are necessary to make rational and optimal therapeutic plans in an ambulatory primary care setting.

*360A-360B. Ethics and Trends in Health Care for FNP/PA Students (1-1-1) I-II-III, Merrinck and staff
Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. The student will learn about trends and ethics in health care, and review process and policies for ethical decisionmaking in patient care. These issues, trends and processes will be related to the role of the Nurse Practitioner.

362A-362B. Professional Development of the Physician Assistant (1-1) I, II, Moser, Hasselbach, Hess, Morris
Lecture/discussion—1 hour. Prerequisite: registered student in the Physician Assistant Program. Study of the role of the nurse practitioner and its historical evolution, and of the organizational responsibilities and legal considerations.

365A. Behavioral Science for FNP/PA Students (2) I, Merrinck
Lecture—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program or consent of instructor. Expands upon student's knowledge and skills of effective communication to include sexual history taking. Additionally, introduces the commonly encountered diagnoses of depression, anxiety, substance abuse and stress reaction.

365C. Behavioral Science for FNP/PA Students (2) I, II, Hess, Silveria
Lecture—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program with successful completion of course 365A, consent of instructor. Student gains familiarity with intervention strategies for psychological and psychosocial situations including crisis intervention. Additionally, the student will develop an understanding of patient education as a process of influencing behavior.

365D. Behavioral Science for FNP/PA Students (1) I, II, Silveria
Lecture—1 hour. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program with successful completion of course 365A, consent of instructor. Emphasizes the balance between the science and art of care. Students are encouraged to think like the scientists as well as the mystic as they look at their patients to include self-healing practices.

366A-366B. Community Practice and Community Health for FNP/PA Students (2-2-2-2) I, Trolinger, Stewart
Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Study of family dynamics, growth and development, health promotion for all age groups including special concerns in pediatrics and geriatrics, health promotion and disease prevention, and cultural and community needs and concerns.

Course not offered this academic year.

399. Special Study for Advanced Undergraduates (1-5) I, II, III, IV, Davidson
Prerequisite: consent of instructor. Flexible to develop and pursue research and clinical interests to enhance education in Family Practice. (P/NP grading only)

Professional Courses

400A-400B. Introduction to Patient Evaluation (2-2-2) I, II, Illaham, Morgan, Smilkstein
Clinical activity—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 deal 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. (Deferral grading only, pending completion of sequence.)

401. Preceptorship in Family Practice (1-1-1) I, II, III, IV, Morgan
Preceptorship—part-time (one 4-hour day per week; 10 weeks) or full-time (40-hour per week, 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, Minor
Lecture/discussion—2 hours. Prerequisite: limited to medical students in good standing. Teaches the vocabulary needed to conduct a basic history and physical examination in Spanish. (SU 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. (SU grading only)

408. 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- 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, Orthopedics, 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; seminars—0.2 hours; lectures—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. (SU grading only)

434A-434B-434C-434D-434E-434F-434G-434H. Primary Care and Clinic Tepati (3-3-3-3-3-3-3-3) I-III-IV-II-III-I-IV, Arevalo
Clinical activity—four 8-hour days; group seminar/dis- cussion—ten 1-hour sessions covering 8–12 lectures—four—2-hour sessions. Prerequisites: first- and second-year (full-time) medical students with consent of instructor; pre-application processed. Exposure to epidemic and acute disease; learn physical examination and taking a complete history, including immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only)

440. Ambulatory Medicine Clerkship (5 or 8) I, II, IV, Morgan, Nebra
Clinical activity—full time (4 or 8 weeks). Prerequisite: third-year medicine clerkship. Ambulatory medicine experience in family practice setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians in the outpatient setting.
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 discussions 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. Physiologic and biochemical principles of regulation and membrane permeability characteristics at both the cellular and tissue level. Offered in alternate years.

231. Renal Physiology (3) I. Rabiniwitz
   Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of biologic transport, fluid and electrolyte homeostasis, competitive renal physiology, and pathology of the kidney. 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; 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.

   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as Biophysics 480.)

285. Peripheral Circulation (3) III. Graydon, 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 cell interactions, signal transduction, ion transport, permeability, molecular mechanisms 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. The staff.

Professional Courses

400. Human Physiology (8) II. Curry, Carlsen 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 nervous system. An integrated formal course focused 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. Surgeon and staff
   Lecture—4 hours; discussion—1 hour; student preparation. 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. Principles that regulate hormone secretion, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

480. Pulmonary Function Evaluation (4) I, II, III, Cross
   Lecture—3 hours; laboratory—3 hours.
   Prerequisite: courses 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 280.)

497T. Tutoring in Human Physiology (1-5) I, II, III, IV. Curry
   Lecture—2 to 5 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for the other departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Directed Reading and Group Study (1-4) I, II, III, IV. Curry and staff
   Discussion—2 to 8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (SU 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. (SU grading only.)

Internal Medicine (IMD)

Lower Division Courses

92. Internship (1-4) I, II, III, IV. Last Internship—3 to 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 to 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 Semester—1 to 3 hours. 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 to 36 hours; final report. Prerequisite: upper division standing. Supervised work experience in internal medicine and related fields. (P/NP grading only.)

198. Directed Group Study (1-2) I, II, III, IV. Last Seminar—1 to 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-401D. Physical Diagnosis
   401A. Physical Diagnosis (3) I, II, III. Bonekamp
   401B. Physical Diagnosis (2) I, II, III. Bonekamp
   401C. Physical Diagnosis (2) I, II, III. Bonekamp
   401D. Physical Diagnosis (1) I, II, III. Bonekamp
   Fieldwork—2 hours; lecture—1 hour; laboratory—discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides students with an overall framework for performance of a history and physical exam and with identification of abnormal physical findings. (Deferral grading only, pending completion of sequence.)

419. Introduction to Clinical Nutrition (3) III. Halsted, Pinney, Rucker and staff
   Lecture—5 hours; laboratory—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. Formulas, partly discussion/course study. (Same course as Biological Chemistry 414.)

420A. Hematology (4) I. MacKenzie
Lecture—4 hours (for five weeks); laboratory—6 hours; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic principles of hematopoiesis, hemostatic disorders of blood cells, and interpretation of common laboratory tests and procedures. Staff.

420B. Gastrointestinal System (3.5) III. Laugn
Lecture/discussion—2 hours (over a four-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic pathophysiologic principles of the gastrointestinal system and historical perspective on digestive diseases. Staff.

420C. Respiratory System (4) II, Louie
Lecture—38 hours; discussion—10 hours (for 48 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Respiratory physiology and pathophysiology, introduction to diagnostic procedures, and description of the major respiratory diseases. Staff.

420D. Cardiovascular System (3.5) II. Laslett and staff
Lecture—28 hours; discussion—6 hours (36 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion; or graduate student and approval by Committee on Student Evaluation and Promotion. Basic pathophysiologic principles of the cardiovascular system, including ischemic, valvular, hypertensive, and cardiomyopathic, paracardial, and electrical disorders. Lectures and small group discussions are employed.

420E. Nephrology (2.5) III. Kasen
Lecture—4 hours; laboratory—2 hours (over a six-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to principles of renal physiology, including the anatomy and function of the renal system, renal blood flow, renal tubular function, and renal disease pathogenesis and treatment. Staff.

420F. Metabolic Regulatory System (3.5) III. Seidler
Lecture—4 hours; discussion—2 hours (over a five-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic understanding of the regulation of body fluids, electrolytes, and acid-base balance. Staff.

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. McCurdy
Lecture—7.5 hours; discussion—1.5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals of epidemiology, occupational medicine, and geriatrics. Staff.

430. Medicine Clerkship (12) 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. On-going patient write-ups, rounds, conferences are required.

440. Ambulatory Medicine Clerkship (3-12) I, II, III, IV. Fitzgerald
Clinical activity—full time (2 to 8 weeks). Prerequisites: third-year medical clerkship, two to eight-week ambulatory medicine experience in an internal medicine setting, completion of all skills and knowledge required for the internal medicine clerkship, and consent of instructor. Staff.

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 status of the art of research impacting treatment and prevention of cancer. Emphasis on epigenetics, molecular biology, and pharmacology. (SU grading only)

460. Correctional Health Care Clerkship (1-4) I, II, III, IV. Silva, Shwimer
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 opportunities to unique health care delivery in a prison setting. Students will spend time in clinical settings at three prison facilities.

461. Problems in Internal Medicine (6 or 9) I, II, III, IV. Lauter
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 specialties.

462. Externship in Medicine (1-2) I, II, III, IV. Fitzgerald and staff
Externship—full time (4, 8, or 12 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Full time experience in a specific subspecialty of medicine, with emphasis on clinical experience and diagnosis, and responsibility for patients admitted to the hospital. Staff.

463. Acting Internship in Medicine Intensive Care Unit (MICU) (9) I, II, III, IV. Albertson
Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of instructor. Student functions as acting intern on MICU service under direction of medical residents and staff. Responsibility for patients admitted to MICU. On call in hospital every third night. Limited enrollment.

468. Group Study in Internal Medicine (1-15) 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 UCD Medical Center or off campus by specific arrangement. (SU grading only)

470. Internal Medicine—Cardiology (CAR) Upper Division Courses

192. Internship in Cardiology (1-12) I, II, III, IV. Longhurst and staff
Internship—36 hours; final report. Prerequisite: upper division enrollment in medical school by prior or current to internship. Supervised work experience in cardiology. May be repeated for credit up to 12 units. (P/NP grading only)

198. Cardiology Research (1-6) 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. Emphasis in each of these fields will give current information in their areas. Offered in alternate years. (SU 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)—1-6 hours (clinics). Prerequisite: third- and fourth-year medical students with advanced 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.

406. 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, and consent of instructor. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiological disorders. Two outpatient times 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 (2 or 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 the pathophysiologic mechanism. 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 lectures, general hypertension, arrhythmia, introduction to the diagnosis/treatment of common cardiovascular problems. (SU 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 only. Includes lectures, directed reading, and/or discussion groups. May be repeated for credit. Limited enrollment. (SU grading only)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: approval by Division of Cardiology. (SU grading only)
Internal Medicine—Clinical Nutrition and Metabolism (NCM)

Upper Division Course
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/N grading only.)

Graduate Course
Seminar—1 hour. Weekly seminar presented by a graduate student in research and monitoring the progress of research for the completion of the dissertation. Students are supervised and may elect new topics from the program. (SU grading only.)

Professional Courses
Lecture—2 hours; clinical activity—full time (2 to 12 weeks). Prerequisite: consent of instructor. Students will attend clinical visits at the UCSD Medical Center to study nutrition in patients with a wide variety of illnesses and patients attending the Nutrition Clinic and in patients with undernutrition due to various illnesses.

Clinical activity—3-9 hours. Prerequisite: consent of instructor. Students will attend weekly nutrition conferences and patient visits to learn about nutrition and the various nutrition clinics offered by the UCSD Medical Center.

Prerequisite: medical student in good standing; consent of instructor. Participation in on-going clinical or basic research. (SU grading only.)

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/N grading only.)

Professional Courses
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 Emergency Medicine topics of interest to the student will be performed and discussed. (SU 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: consent of instructor. Exposure to the specialty of Medical Toxicology and observation of a wide array of patients in the Emergency Department. A literature review of Medical Toxicology topics of interest to the student will be performed and discussed. (SU grading only.)

Clinical activity—46 hours; lecture/discussion—8 hours. Prerequisite: satisfactory completion of Medicine Clerkship. Students will be supervised 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. (SU grading only.)

Clinical activity—full time (4 weeks). Prerequisite: third or fourth year medical student; satisfactory completion of Internal Medicine or Surgery clerkship. Consent of instructor. Clinical work at UCSD Medical Center or other affiliated hospitals’ emergency departments will be supplemented by didactic sessions. Students will be assigned appropriate emergency patients and will examine data and treat these patients.

Clinical activity—full time (4 to 12 weeks). Prerequisite: consent of instructor. Students will work in emergency medicine and will be supervised by an attending physician. (SU grading only.)

Prerequisite: consent of instructor. Participation in on-going clinical or basic research. (SU 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/N grading only.)

Graduate Course
Prerequisite: consent of instructor. Participation in on-going clinical or basic research. (SU grading only.)

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. (SU grading only.)

Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. To gain insight in clinical activities of Gastroenterology Division. May be repeated for credit up to 12 units. (P/N grading only.)

Prerequisite: consent of instructor. Participation in on-going clinical or basic research. (SU grading only.)

Internal Medicine—General Medicine (GMD)

Upper Division Course
192. Internship in General Medicine (1-12) I, II, III, IV. 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/N 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. (SU grading only.)

460. General Medicine Consults (18) I, II, III, IV. The Staff (Division Chief in charge).
Clinical activity—40 hours. Prerequisite: fourth-year medical students with consent of instructor. (SU grading only.)

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 Internal Medicine 430. Participation in evaluation and management of HIV-infected patients in both inpatient and outpatient settings. (SU grading only.)
attending General Medicine Clinic and/or Consult Rounds; and make brief presentations to consult service. (SU 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. The 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.

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

296. 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. Specific topics will 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. (SU grading only)

Professional Courses

460. Hematology—Oncology Acting Internship (6-16) 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/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 (6-12) 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, workup, 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 (6) I, II, III, IV. Meyers
Clinical activity—40 hours/week for 4 weeks. Prerequisite: fourth-year medical student and an interview with the Hematology Medical Director. Work with hospice team to gain experience in symptom relief, psychosocial care and bereavement counseling. A written report will be a major component used in grading. This course fulfills the Ambulatory Care requirement.

499. Research (1-12) I, II, III, IV. Meyers and staff
Prerequisite: upper division standing. (SU grading only)

Internal Medicine—Infectious Diseases (IDI)

Upper Division Courses

141. Infectious Diseases of Humans (1) I. Dandeker
Lecture—1 hour. Prerequisite: introductory knowledge in biology and immunology recommended. Course inter-

147. Infectious Diseases of Humans (5-20) I, II, III, IV. Kayser
Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific topic related to biochemical or immunologic changes of viral or bacterial disease and/or urticarial disorders in humans or animals. (SU grading only)

Internal Medicine—Occupational and Environmental Health (OEH)

Upper Division Courses

190C. Research Conference in Occupational and Environmental Health (1-3) I. Gold; II. Beaumont; III. McCurdy
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in occupational and environmental health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only)

192. Internship in Occupational and Environmental Health (1-12) I, II, III, IV. Schenker and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in occupational and environmental health. May be repeated for credit up to 12 units. (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)

Professional Courses

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. Participation 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. (SU grading only)

470. Clinical Selective in Occupational and Environmental Medicine (3) I, II, III, IV. McCurdy
Clinical activity—full time. Prerequisite: fourth-year medical student in good academic standing, with consent of instructor. 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; small research projects. Prerequisite: first- or second-year medical student in good standing; consent of instructor. Students will observe and participate in research 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. (SU grading only)

499. Research (1-12) I, II, III. Schenker and staff
Laboratory—40 hours; clinical activity—4 or 8 hours. Prerequisite: third- or fourth-year medical student or consent of instructor. Student participates in activities of Division of Occupational and Environmental Health. Major activity is involvement in an epidemiologic research project of the Division. Also participates in Ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center.

499. Research in Nephrology (3-18) I, II, III, IV. Kayser
Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific problem related to biochemical or immunologic changes of renal disease and/or urticarial disorders in humans or animals. (SU grading only)
Graduate Courses

281. Clinical Immunology and Immunopathology (4) III. Gershwin, Robbins
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 infection, genetics, transplanta
tion, allergy and autoimmunity. Offered in alternate years.

286. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Laboratory and/or laboratory work as required. (SU 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, Sjogren's syndrome, polymyositis and drug hypersensitivity. (SU grading only)

Professional Courses

460. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Albertson and staff
Clinical activity—full time (2 to 12 weeks). Prerequi
site: Medical Science second year of medical school and/or consent of instructor. Participation at the Sacramento VA clinic with members of the subspecialty service initial clinical evaluation; work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Albertson
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 initial clinical evaluation, work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

490. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU 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 pre
ceptor prior to internship. Supervised work experi
ence 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 and staff
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, Robbins
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 infection, genetics, transplanta
tion, allergy and autoimmunity. Offered in alternate years.

286. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Laboratory and/or laboratory work as required. (SU 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, Sjogren's syndrome, polymyositis and drug hypersensitivity. (SU grading only)

Professional Courses

460. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Albertson and staff
Clinical activity—full time (2 to 12 weeks). Prerequi
site: Medical Science second year of medical school and/or consent of instructor. Participation at the Sacramento VA clinic with members of the subspecialty service initial clinical evaluation; work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Albertson
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 initial clinical evaluation, work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

490. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU 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 pre
ceptor prior to internship. Supervised work experi
ence 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 and staff
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, Robbins
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 infection, genetics, transplanta
tion, allergy and autoimmunity. Offered in alternate years.

286. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin
Laboratory. Prerequisite: consent of instructor. Laboratory and/or laboratory work as required. (SU 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, Sjogren's syndrome, polymyositis and drug hypersensitivity. (SU grading only)

Professional Courses

460. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Albertson and staff
Clinical activity—full time (2 to 12 weeks). Prerequi
site: Medical Science second year of medical school and/or consent of instructor. Participation at the Sacramento VA clinic with members of the subspecialty service initial clinical evaluation; work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Albertson
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 initial clinical evaluation, work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

490. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU 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 pre
ceptor prior to internship. Supervised work experi
ence 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 and staff
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)
409. Current Immunology (2) I, II, III. Discussed—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (Same course as 209.) (SU grading only.)

415. Medical Parasitology (5) I. Thesis Lecture—3 hours; laboratory—4 hours. Prerequisite: medical student with consent of instructor. Approved for graduate degree credit. Epidemiological, pathological, diagnostic methods and laboratory studies of parasites, helminths, and arthropods of medical importance. Offered in alternate years. (SU grading only.) (Same course as 215.)

420. Current Concepts in Bacterial Ultrastructure (2) II. bearman. 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. (SU grading only.)

430. Medical Mycology (2) II. Pappagianis. Lecture—3 hours. Prerequisite: course in basic microbiology, consent of instructor. Various aspects of pathogenic fungi, particularly affecting human disease, will include epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 330.)

480A. Medical Immunology (2.5) III. Schildkraut. Lecture—3 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. Schildkraut. 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. Beamann and staff. Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor in tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beamann in charge). Prerequisite: medical students with consent of instructor. Directed reading and discussion of current literature and laboratory investigation on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Beamann in charge). Prerequisite: medical students with consent of instructor. (SU 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 the Department 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 or the equivalent, 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 in children of school age; pharmacological aspects of drug dependency and related topics. Offered in alternate years.

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.)

200. 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 for graduate medical students. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs.

206. 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 for graduate medical students. The actions, uses and toxicology of major classes of drugs. Continuation of course 200A.

201. Pharmacology of the Nervous System: Transmitter Substances (2) I. Hance and staff. Lecture—2 hours; prerequisite courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in alternate years.

202. Pharmacology of the Nervous System: Hypnotics, Sedatives and Anesthetics (2) II. Stark and staff. Lecture—2 hours; prerequisite courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of centrally acting sedative, hypnotic, and anesthetic agents with emphasis on alterations in brain function. Offered in alternate years. (SU grading only.)

203. Pharmacology of the Nervous System: Stimulants and Anticonvulsants (2) III. Stark and staff. 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 (1-5) II. K.F. Killam. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacological agents, hallucinogens, antidepressants. Offered in alternate years.


206L. Pharmacokinetics Laboratory (2) I. Henderson. Laboratory—6 hours. Prerequisite: course 206C (may be taken concurrently). Laboratory procedures for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject matter sequence of course 206C. Offered in alternate years.

207. Application of Computers to Pharmacology (1) I, II, III. The Staff. Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

297T. Tutoring in Pharmacology (1-3) I, II, III. The Staff (Chairperson in charge). Tutorial—9-3 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or the equivalent; consent of instructor. Under supervision of the instructor, student assists in preparation and tutoring of courses in Pharmacology. (SU 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. (SU 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.

499. Seminar in Pharmacology for Medical Students (1) I, II, III, IV. The Staff (Chairperson in charge). 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. (SU 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. (SU 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. (SU 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 psychophysiology, 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 136. Neurobiology of normal and abnormal behavior of humans, based on specific neuroanatomical, neurophysiological, and cognitive parameters. Evaluation of the role of parameters will be, for example, by application of clinical neurologic, neuropsychologic, and neuromaging tests.

202. Visuomotor Neurobiology (2) II. 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 neu-
logic 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, Tal. Seminar—one hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (SU grading only.)

299. Group Study (1-5) I, II, III, IV. The Staff (Gabor lab charge). Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be arranged. (SU 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. Technical engineering is offered at both Davis and Sacramento Medical Center. (SU 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 diagnosis, development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebro-spinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, neuromuscular, infection, and trauma will be discussed.


454. Electroencephalography and Evoked Potentials (3-18) I, II, III, IV. Gabor, Seyel. 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. 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.

455. Cortical Neurology (3-18) I, II, III, IV. Remler, Knight. Clinical neurological research—full time (12 weeks at Highland General Hospital, Oakland). Prerequisite: course 452 or equivalent. Consent of instructor. Student will pursue a small project in clinical neurological research on higher cortical functions. The focus is on scientific analysis of behavior in disease states. Study may be extended 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-elective number of staff.

458. Introduction to Cognitive and Communication Disorders (3) I. Drnorkers. 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 (SU grading only).

459. Independent Study in Neurogenic Communication Disorders (1-3) I, II, III, IV. Drnorkers. Conference, observation, and data collection—3 to 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 reports. (SU grading only.)


465. 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. (SU grading only.)

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 and consent of instructor. Emphasis on neurology grand rounds and regular rounds following. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Richman in charge). Laboratory—24 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Laboratory investigations on selected topics. (SU grading only for graduate and medical students.)

Neurosciences (NSU)

Upper Division Course

199. Special Study in Neurosciences 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 neurosciences projects or may pursue and design independent projects. (PINP grading only.)

Graduate Course

299. Neurosurgery Research (3-12) I, II, III, IV. The Staff (Chairperson in charge). Prerequisite: graduate standing with consent of instructor. Students may participate in ongoing neurosciences projects or may pursue and design independent projects. (SU grading only.)

Professional Courses

450. Stroke and Cerebrovascular Disease (4) I, II, III, Chehrazi. Lecture-discussion—3 hours; internship—34 hours; clinical activity—3 hours. Prerequisite: basic neurology clerkship or neurosurgery clerkship. Ecology, clinical presentation, diagnostic work-up, surgical and medical treatments, and rehabilitation of stroke and other cerebrovascular diseases. Medical students will rotate on Neurosurgery, Neurology, and PM&R services at UCSDM. (SU grading only.)

451. Neurosurgical Critical Care Clerkship (3) I, II, III, IV. 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 NSCU and in the administration and surgical management of patients admitted through the Emergency Room.

455. Clinical Pediatric Neurology (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 NSU neurosurgery conferences. (SU grading only.)

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- or 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. (SU grading only.)

464. Elective (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, and 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. (SU grading only.)

499. Neurosurgery Research (1-18) I, II, III, IV. The Staff (Chairperson in charge). Prerequisite: medical student with consent of instructor. Students may participate in ongoing neurosurgical projects.
projects or may pursue and design independent projects. (SU grading only.)

Obstetrics and Gynecology (OBG)

Upper Division Courses

190. Seminar in Early Mammalian Development (1) I, II, III, IV. The Staff
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. (SU grading only)

291. Seminar in Early Mammalian Development (1) I, II, III, IV. The Staff
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. (SU grading only)

299. Research (1-12) I, II, III, IV. Overstreet
Prerequisite: graduate standing; consent of instructor. (SU 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 topics of material introduced in the sciences basic to medicine in anatomy, physiology, reproductive physiology and molecular biogenetics.

430. Obstetrics and Gynecology Clerkship (12) I, II, III, IV. Birsdong
Clinical activity—45 hours. Prerequisite: medical student in clerkship by approval on Student Evaluation and Promotion. Obstetric, gynecologic and gynecologic end Monterey experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sister hospitals. Interactive student presentations and seminars ongoing.

450. Elective Clerkship (4-18) I, II, III, IV. Birsdong
Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; course 430 or 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 (6-5) 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 participate in a clinical setting and will experience the following: Obstetrics and Gynecology, 2 weeks each; perform I and J third night; attend scheduled conferences one half-day per week; round in morning.

471. Ambulatory Gynecology and Obstetrics (6-5) 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 will participate in the following clinics each week: General Gynecology, New and Return Obstetrics, Post-Puerperal, High-Risk Obstetrics, Pre-Operative Clinic, other specialties 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 (4-15) I, II, III, IV. The Staff
Prerequisite: medical student with consent of instructor. Prerequisite: student will participate in a research project of his/her choosing and will be closely supervised by the faculty. Integrate with ongoing faculty research projects as recommended. (SU 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 experience in ophthalmology research. Research staff in Ophthalmology 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

290. Basic Research in Visual Science (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU 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 ophthalmology diagnosis and principles; basic ophthalmic instruments; understanding of treatment of eye problems manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

Clinical activity—to be arranged (2 weeks). Prerequisite: medical students who have completed Internal Medicine 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. Manns, Keltrner, J. Brandt
Clinical activity—to be arranged (4 weeks off campus or 9 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, oculoplasty and external ocular disease. Rotation at UCD Medical Center may be arranged in 6-week units of one service alone, or in combination, 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). (SU grading only)

498. Group Study (1-3) I, II, III, IV. The Staff
Clinical activity with consent of instructor. Directed reading and discussion. (SU grading only)

499. Research in Ophthalmology (1-12) I, II, III, IV. The Staff
To be arranged—3-36 hours. Prerequisite: medical student with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. (SU grading only)

Orthopaedic Surgery (OSU)

Lower Division Course

199. Special Studies for Undergraduates (1-15) I, II, III, IV. The Staff (Martin in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: upper division standing and 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 traumatology.

428. Ambulatory Orthopaedics (3-6) I, II, III, IV. Steinberg
Clinical activity—full time (2-4 weeks). Prerequisite: third- and fourth-year medical student in good standing and consent of instructor. Introduction to orthopaedic problems and trauma and their management in an outpatient setting, including the emergency room. Students will conduct orthopedic examinations, present patients to staff, and lead discussion of treatment regimens. Emphasis placed on orthopaedic physical exam and interpretation of x-rays. Limited enrollment.

452. Community Preceptorship (6) I, II, III, IV. Steinberg
Clinical activity—full time (4 weeks). Prerequisite: third- and fourth-year student in good academic standing and consent of instructor. Designed to acquaint student with private practice of orthopaedics in the community setting. Opportunity to observe and assist practitioners in their office, emergency room and outpatient setting. Preceptorships available in Sacramento and surrounding areas. Students must provide own transportation.

454. Acting Internship (6) I, II, III, IV. Steinberg
Clinical activity—full time (4 weeks). Prerequisite: third- and fourth-year student in good academic standing and consent of instructor. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on specific case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern.

460. 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 the aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (SU grading only)

481. History of Medicine for Medical Students (1.5) I. Benson
Lecture/discussion—2.5 hours (for 6 weeks). Prerequisite: third- and fourth-year students in the School of Medicine. Study of 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. (SU grading only)

*Course not offered this academic year.
499. Orthopaedics Research (1-12) I, II, III, IV. The Staff (Rodriguez in charge) Clinical activity—3 hours to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. (SU grading only.)

Otologyngology (OTO)

Otolaryngology Lower Division Courses

192. Internship in Otolaryngology (1-12) I, II, III, IV. Chairperson in charge Internship—3 to 30 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in oto- laryngology and related fields. Final project report. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Otologyngology 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 Otologyngology (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 otology- ngology. (SU grading only.)

291. Principles of Speech, Hearing and Equilibrium (3) I, II. The Staff Lecture/discussion—3 hours. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Orientation to the faculty and guest lecturers on anatomy, physiology, and behavioral interactions in speech production, hearing, and equilibrium. Each student will be expected to make one case presentation. (SU grading only.)

298. Group Study (1-5) I, II, III, IV. The Staff (SU grading only.)

299. Individual Study in Otologyngology for Advanced Graduate Students (1-12) I, II, III, IV. Chairperson in charge Prerequisite: advanced graduate with consent of instructor. (SU grading only.)

Professional Courses

401. Clinical Examinations in Otolaryngology (1) I, II, III, IV. Chole Lecture—1 hour; laboratory—1 hour; practical—1 hour. 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 region, and the art of the examination. Head mirror required.

402. Otologyngology 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) I, II, Donald Lecture—4 hours; sessions; laboratory—one 2-hour session. Prerequisite: third or fourth-year medical student with consent of instructor. Formal lecture and presentation of basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, 2-plas- ties and revision of scars. Laboratory session utilizing animal tissues.

404. Otologyngology 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 otology-
gologic diagnosis and principles, develops facility with basic equipment and techniques, provides understanding of treatment for ear, nose and throat problems manageable by a primary care physician, provides knowledge of what patients should be referred for otologyngologic care.

405. Clinical Otologyngology Elective (3-18) I, II, III, IV. Brodie Clinical activity—full time. Prerequisite: third- or fourth-year medical student with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department.

406. Insights in Otologyngology (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 examinations, ward rounds and attendance at lectures and grand rounds. (SU grading only.)

407. 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 otologyngologic and related literature and recent advances.

408. Individual or Group Study (1-5) I, II, III. The Staff Lecture/discussion—1 hour; laboratory—1 hour; practical—1 hour. Prerequisite: consent of instructor. Introduction to basic research in otologyngology. Lectures, discussion, and laboratory study of sensory and motor systems. (SU grading only.)

409. 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. (SU grading only.)

Pathology (PMD)

Upper Division Courses

192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff Internship—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 undergraduate with consent of instructor. (P/NP grading only.)

Graduate Courses

202. Current Topics in Tumor Biology (2) I, II, III, IV. Cardiff Seminar—2 hours. Prerequisite: consent of instructor. Discussion of current topics in tumor biology by invited speakers and members of the class. A forum for presentation of proposed and completed experiments by persons interested in tumor biology. (SU grading only.)

207. Introduction to Nervous System Pathology (1-4) I, II, III, IV. Ellis Seminar—1 hour. Prerequisite: consent of instructor; open to advanced undergraduate, graduate, veterinary medical, and medical students. Study of nervous system tissue responses to injury, infection, neoplasms, and malformations of the human and experimental animal. Seminars include correlation of clinical, gross and microscopic findings. Discussions provide instruction in microscopic techniques.

210. Introduction to Human Pathology (4.5) III. C. Martin Lecture/discussion—8 hours; laboratory—4 hours (5 weeks). Prerequisite: graduate or upper division stud- ents with background in gross and microscopic anatomy, physiology and biochemistry. Lectures, lab- oratory, and computer-assisted learning. Introduces basic human disease processes. Stresses mastery of pathophysiology and terminology. Examining gross and microscopic tissue sections is taught. Course given over five weeks with five hours of lecture and laboratory per week. First-year medical students enrolled in course 410A. Course not intended for veterinary medical or medical laboratory medicine.

258. 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. (SU grading only.)

Professional Courses

404. Forensic Pathology (2) I, II, III, IV. Ellis Laboratory—3 to 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, baldlissis, and toxicology. (SU grading only.)

405. Brain-Cutting Conference (1-4) I, II, III, IV. Ellis 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, neoplasms and maldevelopment; application of exper- imental models to human disease, and clinical corre- lations. 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 and Anatomic Pathology (1-12) I, II, III, IV. Howell Discussion—1 hour; laboratory—3 to 24 hours. Prerequisite: third- or fourth-year medical student and consent of instructor. Rotation through autopsy, surgical pathology, and cytology services with partici- pation in diagnostic activities under supervision. Ad- ditional correlating discussions of case studies with clinical material, gross, microscopic, and laboratory findings. (SU grading only.)

410A-410B. General/Systemic Pathology (4.5, 7.5) III-IV. Cardiff Lecture—30, 30 hours total; laboratory/discussion—25, 90 hours total; autolaboratory—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. Gander-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 clinicopathologic correla- tions. (SU grading only.)

485. Applied Clinical Laboratory Medicine (6-9) II, III. Kost Clinical activity—full time (4-8 weeks). Prerequisite: consent of instructor. Emphasis upon laboratory tech- niques, procedures, and interpretation of laboratory results. Students will be expected to participate fully in all laboratory operations, clinical techniques, laboratory management and quality control.
469. Trauma Service—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 Surgery 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.

497T. Tutoring in Pathology (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. (SU grading only)

498. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (SU grading only)

499. Research (1-18) I, II, III, IV. The Staff
Prerequisite: medical student with consent of instructor. Research in experimental, molecular, comparative, and applied pathology. Limited enrollment. (SU grading only)

Pediatrics (PED)

Upper Division Course
190. 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(NA) 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. (SU 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 fourth-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.

Clinical activity—full time (2 to 12 weeks). Prerequisite: third-year 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 for 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. Rodriguez, S., 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 UCSF Medical Center. Student functions as “Acting Intern” with appropriate supervision by resident 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) 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 subspecialties. 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. Chairperson in charge
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.

488. Elective in Pediatric Nephropathy (3-18) I, II, III, IV. Barsky
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 second year or the equivalent; 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. Gospa
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 subspecialties which serve children with neurological disorders. This course does not satisfy requirements for fourth-year neurology requirement. Limited enrollment.

471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV. Marlowe
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.

475. 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.

498. 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, oncology, 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. (SU 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(NA) grading only)

199. Special Study for Advanced Undergraduates (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P(NA) grading only)

Graduate Course
299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU 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 neuromusculoskeletal disorders. Physiological effects, indications and contraindications of the therapeutic modalities and their application to common neuromusculoskeletal disorders.

461. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Klimer
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. Klimer
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
322 Medicine, School of

Medicine and Rehabilitation at off-campus facility must be approved by Chairperson.

498. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Study and experience for medical students in a number of areas in physical medicine and rehabilitation. (SU 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. (SU grading only.)

Plastic Surgery (PSU)

Professional Courses

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. Microsurgical operation included. Student rotation.

461. Dentistry for Future Physicians and Surgeons (6-6) I, II, III, IV. Thaller
Discussion/sessions—3 hours; laboratory—2 hours; clinical activity—6 hours. 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. (SU 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. (PFP grading only.)

199. Special Study for Advanced Undergraduate Students (1-5) I, II, III, IV. The Staff (Servis in charge)
Prerequisite: advanced standing and consent of instructor. (PFP grading only.)

Graduate Courses

**220. Psychiatric Implications of Legal Interventions** (2) I, II, III, IV.
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. Most 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. (SU grading only)

299. Special Study For Graduate Students (1-12) I, II, III, IV. The Staff (Servis in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only)

Professional Courses

401. Medicine and the Mind: An Introduction to Psychotherapy (2) I. Keasey
Laboratory/discussion—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to concepts and clinical applications of psychotherapy 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: consent of instructor. Focus will be on understanding normal human sexual function in health and illness. (SU grading only)

403. Psychosexology (3.5) VI. Feinberg and Morrison
Lecture—6 hours; discussion—2 hours (5 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to basic aspects in female/male dysfunction. Focus on understanding the development and symptomatology of major forms of psychiatric dysfunction.

412. Psychiatry Grand Rounds (1) I, II, III, IV. Maddock and staff
Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UC Davis Medical Center. In selected clinical cases, presentation of lecture and research reports.

413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of instructor. Students will be members of the team in evaluation, management, and psychologic liaison with other specialties. Intensive supervision from senior staff and psychiatric residents.

415. Substance Abuse: Diagnosis and Treatment (3) I, II, III, IV. Berglow
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 psycho-stimulants. Sites: Travis Air Force Base and regional Methadone and Alcohol Treatment Programs. Pharmacological, psychosocial, “12-step” and behavioral treatments will be demonstrated. (SU grading only.)

416. Child Psychiatry Clerkship (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of instructor. Duty-blocked clinical rotation, outpatient, and consultation-liason experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken. Literature review and case conferences presented on a regular basis.

417. Jail Psychiatry Clerkship (6 or 12) I, II, III, IV. Maddock 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 (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of course coordinator. Clinical activity appropriate for diagnostic and long-term patient management.

422. Readings in Psychiatry (1-3) I, II, III, IV. Maddock and staff
Reading/discussion—3 to 9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (SU grading only.)

430. Psychiatry Clinical Clerkship (12) I, II, III, IV. Maddock
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 pharmacology, crisis assessment and intervention.

480. Insights in Psychiatry (1-3) I, II, III, IV. Maddock
Clinical activity—3 to 9 hours. Prerequisite: first- or second-year medical student in good academic standing with consent of instructor. Students will be provided with an opportunity to gain insight into various clinical activities in the practice of psychiatry. (SU grading only.)

489. 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. (SU 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. (SU grading only for graduate or medical students.)

Radiation Oncology (RON)

Graduate Course

296. 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 advisor and sponsor. (SU grading only.)

Professional Courses

463. Radiation Oncology Clerkship (3-9) I, II, III, IV. Caero, 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.

488. Group Study in Therapeutic Radiology (1-2) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU 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. (SU grading only for medical students)

Radiology/Diagnostic (RDI)

Professional Courses

413. Radiological Diagnosis II (Physics of Diagnostic Radiology) (5) I. Seibert, Boone
Lecture—48 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.
raphy; computerized and geometrical tomography; magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (SU grading only.)

414. Medical Radiation Biology (3) II. Bushberg. Lecture—27 hours total. Prerequisite: consent of instructor. Medical radiation biology; molecular and cellular and organ system response to acute and chronic irradiation; mechanisms of action in the cell 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. (SU grading only.)

415. Radiopharmacy (3) III. Vera. Lecture—3 hours. Prerequisite: consent of instructor. Fundamentals of radiopharmaceutical science including radiopharmacy, radiopharmaceutical production; theory, applications; mechanisms of localization, radionuclide and radiopharmaceutical drug applications and related regulatory aspects. Offered in alternate years. (SU grading only.)

461. Clinical Clerkship in Diagnostic Radiology (1-18) I, II, III, IV. Greenspan. Clinical activity—full time (3 days per week). Prerequisite: completion of third year of Medical School; consent of instructor. Student works with radiologists at UC Davis Medical Center in film reading sessions and radiological procedures; includes fluorescence, vascular radiology and special investigations. Includes daily individual teaching sessions with faculty radiologists, radiology learning laboratory, and all-radiology conferences and seminars. (SU grading only.)

463. Group Study in Diagnostic Radiology (1-12) I, II, III, IV. The Staff. Prerequisite: consent of instructor. (SU grading only)

499. Research in Diagnostic Radiology (1-12) I, II, III, IV. The Staff. Prerequisite: consent of instructor. Approved for graduate degree credit. (SU 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 pharmacodynamics and radiomimicker. (Same course as 101.)

411. Radiological Physics I (Physics of Nuclear Medicine) (3) I. Bushberg, Vera. Lecture—43 hours total; laboratory—12 hours total. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radiobiology, and photon interactions in tissue: Excitation and ionization; dosimetry; 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. (SU grading only.)

463. Clinical Clerkship in Nuclear Medicine (9 or 18) I, II, III, IV. Shelton. Clinical activity—full time (3 days per week). Prerequisite: satisfactory completion of second year of Medical School; consent of instructor. Clinical Clerkship correlates radiotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques utilized. Limited enrollment with preference to students entering for 16 units.

498. Group Study in Nuclear Medicine (1-12) I, II, III, IV. The Staff. Prerequisite: consent of instructor. Approved for graduate degree credit. (SU 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. (SU grading only for medical students.)

Surgery (SUR)

Upper Division Courses

192. Internship in General Surgery (1-12) I, II, III, IV. The Staff. Internship—38 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (PINF grading only.)

196. Special Study in General Surgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff. Prerequisite: advanced undergraduate student with consent of instructor. (PINF grading only.)

Graduate Courses

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. (SU 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 radiomimicker. (Same course as 101.)

Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussions.

461. Surgical 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 intern in the eight-week, learning principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

462. Surgical Trauma Service Clerkship (6 or 9) I, II, III, IV. Blasdel and staff. Clinical activity—full time (4 or 5 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 clinically supervised. Provides exposure and 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 430. Student participates in general surgery services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical general surgical problems and participate in their care.

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.


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 Surgery 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. Opportunity to learn 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
Medicine and Epidemiology

(School of Veterinary Medicine)

Anthony A. Stannard, D.V.M., Ph.D., Chairperson of the Department
Department Office, 2102 Medical Science 1A
(916) 752-1363

Faculty

Alexander A. Arndt, D.V.M., M.S., Professor
(Medicine and Epidemiology: Pathology, Microbiology, Immunology)

Dale L. Brooks, D.V.M., Ph.D., Lecturer
Gary P. Carlan, D.V.M., Ph.D., Professor
Tim Carpenter, Ph.D., Professor
Jim Cave, D.V.M., Ph.D., Associate Professor
Larry D. Dowgill, D.V.M., Ph.D., Associate Professor
Nancy E. East, M.S., D.V.M., M.P.V.M., Associate Professor
Pamela H. Eisele, D.V.M., Assistant 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
Lise 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. Irve, V.M.D., Ph.D., Professor
Mark D. Krissel, D.V.M., M.S., Ph.D., Professor
Gerald V. Ling, D.V.M., Professor
John P. Maas, D.V.M., M.S., Assistant Professor
Clinical Diagnostic Medicine/VetEn
John Madigan, M.S., D.V.M., Professor
Richard W. Nelson, D.V.M., Professor
Ben Norman, D.V.M., M.S., Ph.D., Lecturer
Niel C. Pedersen, D.V.M., Ph.D., Professor
Lyndsey G. Phillips, D.V.M., Ph.D., Professor
Jeffrey A. Roberts, D.V.M., Assistant Clinical Professor
Bradford P. Smith, D.V.M., Professor
Elan Soergar, D.V.M., Ph.D., Assistant Adjunct Professor
Sharon J. Spier, D.V.M., Ph.D., Associate Professor
Anthony A. Stannard, D.V.M., Ph.D., Professor
(Medicine, Pathology)
William P. Thomas, D.V.M., Professor
Mark Thurmond, D.V.M., M.P.V.M., Ph.D., Professor
Michael Torten, D.V.M., Ph.D., Research Virologist
James W. Wilson, D.V.M., J.D., Lecturer
W. David Wilson, D.V.M., Ph.D., M.R.C.V.S., Professor
Ermerit Facuity
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. Rhodes, D.V.M., Professor Emeritus
Donald R. Strombek, D.V.M., Ph.D., Professor Emeritus

Courses in Medicine and Epidemiology (VME)

Upper Division Course

198. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge) (PAP grading only)

Graduate Courses

217. Evaluation of Diagnostic Tests (2) III
Gardner Lecture/discussion—1 hour; laboratory—1 hour. Prerequisite: consent of instructor. Topics include sensivity, specificity, predictive values, Bayes' Theorem, ROC curves, measurement of discrepancy between test 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: productivity and cost functions, firm decision-making, and the market place as they relate to animal health and well-being. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

290. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Chairperson in charge)

291. Seminars in Epidemiology (1) III Seminar—1 hour. Participants will present and discuss ongoing or published research projects in epidemiology. Emphasis will be on study design and data analysis. (SU grading only)

298. Group Study (1-15) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Professional Courses

401. Small Animal Clinic (1 1/2 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 diagnoses, medical and surgical treatment of animals in the ward and outpatient clinic, including history taking, physical examination, laboratory tests, special diagnostic and therapeutic procedures, consultations, and postoperative care. May be repeated for credit. (SU grading only)

402. Large Animal Medicine (1 1/2 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 medical care of patients in the VM Teaching Hospital and outpatient clinic under the direction of the senior staff. May be repeated for credit. (SU grading only)

403. Small Animal Medicine (1 1/2 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. (SU grading only)

410. Management of Captive Wild Animals (2) I, 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 with exotic, aquaria, exotics, 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 other related laboratory rodents will be presented and 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...
of food animals performed by groups of students. Limited (6.0) II. Madigan. (S.U. grading only.)

430A-430B-433C. Ripaor Medicine (1.1-1.1) I-II-III. Brooks
Lecture—1 hour. Prerequisite: upper division standing (Avian Science 115 recommended) or second-year standing in the School of Veterinary Medicine. Three part course sequence offered sequentially with laboratory course 431A-431B-431C, providing birds of prey medical and rehabilitation techniques and skills. Fall—normal raptor; winter—abnormal raptor; spring—rehabilitation.

431A-431B-431C. Raptor Medicine Laboratory (1.1-1.1) I-II-III. Brooks
Laboratory—3 hours. Prerequisite: upper division standing (Avian Science 115 recommended) or second-year standing in the School of Veterinary Medicine; and course 430A-430B-433C concurrently. Three-part course sequence offered sequentially with lecture course 430A-430B-433C, providing birds of prey medical and rehabilitation techniques and skills. Fall—normal raptor; winter—abnormal raptor; spring—rehabilitation.

432A-432B-432C. Reptil Clarian (1-1-1) I-II-III. Brooks
Laboratory—3 hours. Prerequisite: student in the School of Veterinary Medicine or consent of instructor. Serves as student treatment crew for the Reptil Center, providing care and treatment for reptile patients, restraint and treatment for wild animals. (S.U. grading only.)

448, Small Animal Reproduction (1) III. Feldman
Lecture—7 hours; discussion—1 hour; laboratory—2-3 hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides a complete description of the history, physical examination, laboratory abnormalities, etc. of the common abnormalities associated with the genetic tract of male and female dogs and cats.

448A, Small Animal Medicine—Level 1 (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 the dog and cat. Course is a core option for the professional veterinary curriculum and preparatory for advanced courses in small animal medical diagnosis and therapeutics.

448B, Small Animal Medicine—Level 2 (5, 5, 4) II. Ihrie
Lecture—37 hours; laboratory—13 hours; discussion—4 hours. Small Animal Medicine 447 and course 448A. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of the dog and cat. Course is a core option for the professional veterinary curriculum and preparatory for small animal medical diagnosis and therapeutics.

449A, Large Animal Medicine—Level 1 (6) 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, treatment, prevention, and control of important infectious and noninfectious 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, sport medicine, equine practice, obstetrical complications, perinatology and neonatology, and the epidemiology, etiology, and medical control of various infectious and noninfectious conditions of the equine.

Course not offered this academic year.
### Medieval Studies

**College of Letters and Science**

Winfried Schütze, Program Director
Program Office, 922 Sproul Hall (916-752-1219)

#### Committee in Charge

Samuel G. Armstong, Ph.D. (Spanish)
Dennis Dutschke, Ph.D. (Italian)
Ingeborg Henderson, Ph.D. (German)
Winder McConnell, Ph.D. (German)
Marianne Osborn, Ph.D. (English)
Larry Peterman, Ph.D. (Political Science)
Kevin Roddy, Ph.D. (Medieval Studies)
Peter Schaeffer, Ph.D. (German)
Kathleen Stuart, Ph.D. (History)
Raymond Waddington, Ph.D. (English)

#### The Major Program

The major in medieval studies is designed to introduce 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 is designed to give students a broad view of the period and to allow for the flexibility necessary to accommodate their individual interests. The department 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 coursework in specific areas of history (the fall of Rome to the Renaissance), literature (Old and Middle English, Chaucer), romantic literature, including French, German, Italian, Russian, Latin), philosophy and religion, arts and language, and political thought. In addition, each student must 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:

**Preparatory Subject Matter**


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.

### 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. General Education credit: Civilization and Culture.

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. General Education credit: Civilization and Culture.

20C. Medieval Transformations (4) III. Roddy
Lecture—2 hours; discussion—1 hour. Paper or formal presentation. Course deals with 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. General Education credit: Civilization and Culture.

#### Upper Division Courses

120A-F. The Medieval World (4) I, II, III. The Staff (Chairperson in charge)
Lecture—2 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.

General Education credit for course 120A or 120B or 120C; Civilization and Culture.

190. Senior Thesis (4) I, II, III. The Staff (Chairperson in charge)
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 (4-8) I, 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 utilized 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 Chicano/Chicano Studies

### Microbiology

See Biological Sciences: Section of Microbiology; Medical Microbiology (Medicine, School of); Microbiology (Graduate Group); and Pathology, Microbiology and Immunology (Veterinary Medicine)
Military Science

(Reserve Officers' Training Corps (ROTC), Army)

Ronald R. Porter, LLC, Chairperson of the Department
Department Office, 125 Hickey Gymnasium
(916-752-0541)

Faculty
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, judgment, 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 includes two-year scholarship. Regardless of the track, students pursuing the academic track do not wear a uniform or otherwise participate in extracurricular activities designed as part of the precommissioning process. Activities for all students include the Ranger Club (a club designed for adventure activities such as rappelling, white-water rafting, paint gun wars, and paratrooping) and Intramural sports teams.

Students who wish to commission in the U.S. Army participate in both the academic portion of the program and in the leadership laboratories and extracurricular activities designed to enhance their leadership and technical skills. They wear uniforms to leadership laboratories 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. Extracurricular activities for cadets include an intercollegiate sports team (Ranger Challenge), the university color guard, a military honor society, a rifle 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 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 upper division courses, textbooks, 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 three-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. Upon in-tidation in three different levels of annual payment. $12,000 (Tier I), $8,000 (Tier II), and $5,000 (Tier III). All applicants will be considered for each level. Also included in all scholarships are a stipend 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 Cycle scholarship by submitting their application complete and postmarked by 15 July between their junior and senior years. Applicants will receive notification of their final status by 1 November. As high school seniors, students compete for the Regular Cycle scholarship by submitting their application complete and postmarked by 1 December. Those applications in the Early Cycle that are considered in the Regular Cycle competition. Students will receive notification of their final status by 1 March of their senior year in high school.interest or any other 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.
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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). Lecture—1 hour. Prerequisite: lower division status. Constitutional and legal basis of the Army, organization and strategic roles of the Army in peace and war, 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). Lecture—2 hours. Prerequisite: lower division standing, and consent of instructor. Introduction to leadership theories used in military organizations. Course surveys the duties and responsibilities of junior Army officers, the general environment in which they work, and leadership skills performed. Introduces military map reading skills.

13. Introduction to Basic Military Operations (1). Lecture—1 hour. Prerequisite: lower division status. 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). Laboratory—2 hours. Prerequisite: lower division status and consent of instructor; completion of all previous laboratories. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervised leadership experiences conducted in military environment. Basic military skills required for promotion to non-commissioned officer are covered. (PMP grading only).

14B. Introduction to Military Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: lower division status 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 role in the squadron, the basic organizational element of the Army. No units gain capabilities, supervisory controls are reduced. (PMP grading only).

14C. Introduction to Military Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: lower division status 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 troop to individual leadership is emphasized. Interrelationships of squad and platoon organizations is explored. (PMP grading only).

21. Advanced Military Theory (1). Lecture—2 hours. Prerequisite: lower division status; course 11 or consent of instructor. Survey of military history from 1940 to present, focusing on World War I, World War II, Korean War, and the Vietnam War.

22A. Intermediate Military Leadership and Operations (1). Lecture—2 hours. Prerequisite: lower division status; course 12 or consent of instructor. Develops and exerts 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 officer.

22B. Intermediate Military Leadership and Operations (2). Lecture—2 hours. Prerequisite: lower division status; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits identified in course 22A are explored in more depth enabling each student to improve his/ her weaknesses. Instruction is presented in intermediate defensive tactics at the squadron level.

24A. Individual Military Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: lower division status; 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 officer. (PMP grading only).

24B. Individual Military Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Personal supervisory and leadership styles are developed in a supervised laboratory environment. Trains and supervises squad level supervisory positions, given responsibility commensurate with positions. (PMP grading only).

24C. Individual Military Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: lower division status; 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. (PMP grading only).

Upper Division Courses

131. Advanced Military Leadership and Management (2). Lecture—2 hours. Prerequisite: upper division status; 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 provides experiences in which a commissioned officer could serve.

132A. Advanced Military Operations (2). Lecture—2 hours. Prerequisite: upper division status; course 322A 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 includes in-depth analysis of the principles of war related to offensive and defensive operations.

134A. Military Organizational Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. Students develop interpersonal and management skills by practical application of leadership military organizations in a supervised leadership laboratory. Advanced-level military leadership skills presented. Students fulfill the roles of senior non-commissioned officers. (PMP grading only).

14B. Military Organizational Leadership Skills (1). Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. As more complex material is presented in classroom, the laboratory assignments are more challenging. Students serve as senior non-commissioned officers in squad, platoon and company levels, with appropriate authority and responsibility. (PMP grading only).

134C. Military Organizational Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. Students prepare for advanced summer training experience by extension training, organize and conduct military operations in field environments. Individual leadership potential is closely assessed in the laboratory environment. (PMP grading only).

141. U.S. Army Management Systems (2). Lecture—2 hours. Prerequisite: upper division status and course 131. Army decision making, personnel and equipment management. Includes command and control functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

142. Military Law (2). Lecture—2 hours. Prerequisite: upper division status and course 142. Profession of arms, its characteristics, law of armed forces, legal responsibility. 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). Laboratory—2 hours. Prerequisite: upper division status; 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 training. Students perform as cadre officers. (PMP grading only).

144B. Military Training Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, and 141. Requirements for training of all other levels of the cadre 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 cadre staff officers. (PMP grading only).

144C. Military Training Leadership Skills (0.5). Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, 141. Final laboratory in military science sequence; students are prepared for final testing and commissioning as officers. Students will demonstrate all leadership skills necessary to commissioned officers. Students perform leadership tasks at platoon, company, and battalion level. (PMP grading only).

191. Special Studies in Military Science (2). Tucker Independent study—6 hours. Prerequisite: consent of department chair, and courses 131, 132A, 132B, 132C, 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 responsibility. May be repeated twice for credit when different topic is studied. (PMP grading only).

Aerospace Studies (Air Force)

Air Force ROTC is available to UC Davis students through a program offered by California State University, Sacramento (CSUS). UC Davis' participation is large, with about 30 percent of the corps commuting to CSUS from UC Davis. The CSUS Department of Aerospace Studies (Aerospace Engineering Program) offers one-, two-, or four-year programs leading to a commission in the United States Air Force. All coursework (12 or 16 semester units) is completed at the CSUS campus. Dates and times of coursework are normally offered on Thursdays. Field Training is conducted during part of
the summer at an active Air Force base between the student's sophomore and junior years. Upon completion of the program (integrated with UCD's quarter system) and all requirements for the Bachelor's degree, cadets are commissioned second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and selected may enter pilot or navigator training after graduation, or serve in a specialty consistent with their academic major, individual goals, and existing Air Force needs. Graduates may request a delay of entry on active duty to continue their education or may apply for Air Force personnel graduate study to begin immediately upon entry on active duty. Due to firm scheduling requirements for the AFROTC program, students are encouraged to work closely with their academic advisors in planning this academic program. Application to the AFROTC program should normally be no later than the middle of a student's sophomore year. Upperclassmen and graduate students may also apply under special conditions. Contact representatives in the Aerospace Studies Department at CSUS, telephone (916) 278-7315, for information on the program or processing of entry. (An AFROTC program is also available within the UC system at Berkeley campus, Department of Aerospace Studies, (909) 855-7472.) AFROTC offers 3-year and 2-year scholarships to qualified students. Applications are accepted in a variety of academic disciplines; however, particular emphasis will be given to applicants in the fields of engineering, meteorology, and nursing.

Molecular Biosciences
(School of Veterinary Medicine)
Shri N. Gill, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 1311 Haring Hall (916-752-1059)
Faculty
Mohammed A. Al-Bayati, Ph.D., B.V.M.S., Assistant Adjunct Professor
Aar N. Buckpitt, Ph.D., Professor
Francis T. Bailey, D.V.M., Ph.D., Associate Professor
Molecular Biosciences, California Veterinary Diagnostic Laboratory
Shri N. Gill, B.V.Sc., Ph.D., Professor
Robert N. Buckpitt, Ph.D., Professor
Arthur D. Jones, Ph.D., Assistant Adjunct Professor
Robert M. Joy, Ph.D., Professor
Michael E. Mount, D.V.M., Ph.D., Associate Professor
Isaac H. Perry, Ph.D., Associate Professor
Quentin R. Rogers, Ph.D., Professor
Henry J. Segal, Ph.D., Professor
Philip R. Villet, D.V.M., Ph.D., Associate Professor
Hansel S. Bunker, M.D., Professor (Medicine, Internal Medicine)
Emeriti Faculty
Arthur L. Bunker, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Victor W. Burns, Ph.D., Professor Emeritus
Gaylord J. Conzemius, Jr., Ph.D., Professor Emeritus
Charles E. Conzemius, D.V.M., 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—36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/N grading only)
Upper Division Courses
192. Internship (1-12) I, II, III. The Staff Internship—36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/N grading only)
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only)
Graduate Courses
205A. Intermetabolism of Metabolism of Animals (4) I. The Staff Lecture—4 hours, Prerequisite: a course in biochemistry or physiology of metabolism or consent of instructor; a course in physical chemistry; or chemical sciences 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 intermetabolism including pools and turnover rates. Offered in alternate years.
205B. Intermetabolism of Metabolism of Animals (3) II. Rogers, K. Hansen, Hershey (Biological Chemistry, Physiology) Lecture—3 hours, Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, proteins, nucleic acids and vitamins; includes hormonal, nutritional, and genetic effects. Offered in alternate years.
223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine (2) J. VanCott 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 Toxicology and Metabolism (2) II. The Staff Lecture—2 hours, Prerequisite: Biological Sciences 103, 104, 105, 106. Neurobiology, Physiology and Behavior 106, or Biochemistry and metabolism of inorganic compounds with emphasis on heavy metals. Examines the relationships between chemical properties and biologic activity of various metals. Includes discussions on metal toxicity, interactions, genetic disorders in metabolism, chelation therapy, and inorganic carcinogenesis. Offered in alternate years.
247. Natural Toxins (2) III. Segal Lecture—2 hours, Prerequisite: organic chemistry, Biological Sciences 103, 104, 105, 106, or Biochemistry and metabolism of natural toxins and their effects. Toxicology and metabolism of natural toxins and their effects in the body. 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 of chemical pathways of toxicants and drugs, enzymes and molecular aspects of P450 and its role in drug metabolism. Offered in alternate years.
258. Receptor-Mediated Mechanisms (2) II. Pessah Lecture—2 hours, Prerequisite: Pharmacology and Toxicology 201 or the equivalent. Survey of modern methods for studying physiological receptors including rat 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 toxicity and action. Offered in alternate years.
258L. Laboratory in Receptor Mechanisms (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 15 students. Offered in alternate years.
260. Toxicologic Pathology (3) II. Witschi, Wilson Lecture—3 hours, Prerequisite: Pharmacology and Toxicology 201, 202, and 203. Introduction to the organ system pathology; provide understanding of pathogenesis and significance of chemotherapy 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. Introduction to 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) Tutoring in veterinary pharmacology and toxicology to students in 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) Group study in selected areas of Pharmacology and Toxicology. (S/U grading only)
Professional Course
297T. Tutoring in Molecular Biosciences (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring in molecular biosciences to students in the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. (S/U grading only)
Professional Courses
405. Veterinary Clinical Pharmacology (2) II. Villet Lecture—2 hours, Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Pharmacological basis of therapeautic use of drugs in domestic animals. Emphasis on selection of most appropriate drug, 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.

*Course not offered this academic year.
Music
(College of Letters and Science)
Christopher Reynolds, Ph.D., Chairperson of the Department
Department Office, 112 Music Building
(916) 752-5537; FAX: 752-0983

Faculty
Ross Bauer, Ph.D., Associate Professor
Robert S. Bloch, M.A., Professor
Anna Marie Busse Berger, Ph.D., Associate Professor
Jonathan Elikis, M.A., Lecturer
Andrew J. Frank, M.A., Professor
Paul Hillier, A.G.S.M., Associate Professor
D. Kern Holman, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Zoia Mendoza-Walker, Ph.D., Assistant Professor
Maria Niederberger, Ph.D., Lecturer
David A. Nutter, Ph.D., Professor
Pablo Ortiz, D.M.A., Assistant Professor
Christopher A. Reynolds, Ph.D., Professor
Wayne Swanson, Ph.D., Professor
Emeriti Faculty
Sydney R. Charles, Ph.D., Professor Emeritus
Albert J. McNeil, M.S., Professor Emeritus
Jerome E. Risien, M.A., Professor Emeritus
Richard G. Selig, M.A., Professor Emeritus
Academic Senate Distinguished Teaching Award
Faculty Affiliates in Applied Music
Dale Lee Brandon, M.M., Lecturer (organ)
Lois Brandwine, M.A., Lecturer (piano)
Todd Brody, B.A., Lecturer (flute)
Phebe Craig, M.M., Lecturer (tuba)
Thomas Dentrich, B.M., Lecturer (string bass)
Joel Elias, M.M., Lecturer (trumpet)
Elizabeth Field, M.M.A., Lecturer (violin)
Stephanie Friedman, M.A., Lecturer (voice)
David Granger, M.M., Lecturer (tuba)
Edward Higgins, M.M., Lecturer (trumpet)
Susan Lamb Cook, M.A., Lecturer (cello)
Stanley Luratta, M.A., Lecturer (percussion)
Tom Nowlin, B.M., Lecturer (flute)
Deborah Pitman, M.A., Lecturer (clarinet)
Deborah Shidler, B.M.E., Lecturer (bass)
The UC Davis Contemporary Music Players
Rose Bauer, Director
Todd Brody, flute
Deborah Shidler, cello
Diane Maltese, clarinet
Peter Jaskeff, clarinet
Carla Wilson, bassoon
Peter Nowlin, French horn
Daniel Kennedy, percussion
Allan Biggs, percussion
Betty Woo, piano
Terrie Baume, violin
Ruby Kremer, violin
Ulli Wetzlaufer, viola
Sarah Freiberg, cello
Thomas Dentrich, basson
The UC Davis Woodwind Quintet
Deborah Shidler, cello
David Granger, basson
Deborah Pitman, clarinet
Todd Brody, flute
Peter Nowlin, French horn

The Major Program
The Bachelor of Arts degree in music provides both a broad liberal arts education and the skills needed 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 is followed by a more specialized study of composition, history, criticism, or performance during the last two years of undergraduate work.

Student Performing Activities. The UCD Department of Music presents over 100 concerts each year, offering performing opportunities for both majors and non-majors in the UCD Symphony Orchestra, University Choir, Concert Band, Early Music Ensemble, Baroque Chamber Orchestra, Chamber Singers, and numerous small ensembles. Also affiliated with the department are the UC Davis Gospel Choir, 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 non-majors.

Faculty and Facilities. The faculty is noted for its achievement in its area of specialization. The musicologists are active in research, writing, and performance; the musicians are composers and teachers, and the performers and teachers are of high quality. The music program is supported by the Davis Wind Quintet, the UC Davis Contemporary Players, and the Theater of Voices.

The department's facilities include a large collection of Renaissance, Baroque, and modern instruments, an electronic and computer music studio, practice rooms, and a cutting-edge recording studio. The music department also has its own lab space, with some 20,000 recordings, CDs, laser discs, and videos. In addition, the library houses the Jan Popper collection of scores, books, and memorabilia.

Career Alternatives. Many students who graduate with a degree in music continue on to careers in music education, law, and medicine. Others choose to pursue graduate work in the field of musicology, ethnomusicology, or music history.的学生 who graduate with a degree in music can find work in music industry, or work with music teachers or music students informally. Professors of music at UC Davis include the UC Davis Wind Quintet, the UC Davis Contemporary Players, and the Theater of Voices.

The department's faculty includes distinguished professors in the fields of musicology, composition, performance, and music education. The department has a strong tradition of excellence in both teaching and research.

A.B. Major Requirements:

Music

At least 8 units in performance courses are required.

Select from Music 130 or 131, 141, 142, 143, 144, 145, 146.

Total Units for the Major

B.S. B.A.

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 Prelude 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 in a jury of faculty members prior to advancement to the intermediate division. Students transferring from other colleges should take the Placement Examination and consult with departmental advisors before enrolling in any music course.

Foreign Language Requirement. Attention is called to the requirement in foreign languages for higher degrees in music.

Major Advisers. P. Hillier, D.A. Nutter.

Minor Program Requirements:

A minimum of six units of upper division Music courses are required.

Courses in Music (MUS)

Lower Division Courses

1. Basic Musicianship (3) Block I

Lecture—3 hours. Fundamentals of music, singing, ear-training and conducting for beginners in music. 6 units, required for all majors.

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 exam (not open for credit to students who have passed the exam). Designed to train students to meet and approach the requirements of the major. All music majors will be expected to perform scales, modulations, and to appreciate appreciation.

3A. Introduction to Music Theory (4). Block II, III

Lecture—3 hours; laboratory—1 hour. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis toward the development of listening and writing techniques. Required for the general student. General Education credit for two-course sequence of 9-15 units (Music 105, 107) which will satisfy requirement for one course: Civilization and Culture.

3B. Introduction to Music Theory (4) Block IV

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 3A. Continuation of course 3A. Intended for the general student. General Education credit for two-
course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture.

4.4B-4C. Elementary Theory (4.4-4.4) I-II. III. Niederberg
Lecture-discussion—3 hours; practice—2 hours. Required knowledge: keyboard competency. 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 (4.4-4.4) I. Critz; II. III. Frank
Lecture-discussion—3 hours; practice—2 hours. Prerequisite: course 4C. Study of imitative tonal counterpoint and of keyboard harmony; analysis of repertoire.

10. Introduction to Musical Literature (4) I. Holoman; II. Frank; III. Nutter
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. General Education credit: Civilization and Culture.

24A. Introduction to the History of Music, I (4) I. Busse Burger
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4B or 4C (concurrently). Intended primarily for majors in music. History of music from the late Baroque to the Classical Period.

24B. Introduction to the History of Music, II (4) II. Busse Burger
Lecture—3 hours; listening section—1 hour. Prerequisite: course 24A; course 4B or 4B (concurrently). Intended primarily for majors in music. History of music from the Classical Period to the nineteenth century.

24C. Introduction to the History of Music, III (4) III. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4B or 4B; course 4C (concurrently). Intended primarily for majors in music. History of music from the nineteenth century to the present.

28. Introduction to Afro-American Music (4) II. The Staff
Lecture—3 hours; 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-Cuban musical traditions.

30A-U. Applied Study of Music: Intermediate (1-2) I. 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) Cello; (G) Double Bass; (H) Flute; (I) Oboe; (J) Clarinet; (K) Bassoon; (L) French Horn; (M) Trumpet; (O) Trombone; (P) Tube; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit. General Education credit: Civilization and Culture.

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) Cello; (G) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tube; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Violin 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 course and whose 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. Hillier
Rehearsal—3 hours, plus sections—at least 1 hour. Prerequisite: admittance subject to audition before first class meeting. Rehearsal and performance of works for small chorus or chamber group. May be repeated for credit. (P/NP grading only.)

43. University Concert Band (2) I, II, III. Elkus
Rehearsal—3 hours—per semester—at least 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. Rehearsal and performance of music for band. May be repeated for credit. (P/NP grading only.)

44. University Chorus (2) I, II, III. Hillier
Rehearsal—3 hours—per semester—at least 1 hour. 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. Open to any student in the University. 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 (Chairperson 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 ensemble 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.)

99. Special Study for Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

103. Workshop in Composition (3) I. Bauer; II, III. Ortiz
Workshop—3 hours. Prerequisite: course 4C. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies. Course work will allow students to explore 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. Ortiz
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, discussions, guided listening sessions, and selected readings. Designed for non-music majors. General Education credit: Civilization and Culture.

107A. Computer and Electronic Music (3) I. Sloan
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.

107E. The Music of a Major Composer: Bach (4) I. Frank
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 sessions, and selected readings. For non-majors. General Education credit: Civilization and Culture.

110C. The Music of a Major Composer: Haydn (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 4A-4B-4C. The work of Haydn will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sessions, and selected readings. For non-majors. General Education credit: Civilization and Culture.

115. The Music of a Major Composer: Mozart (4) I. Busse Burger
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 sessions, and selected readings. For non-majors. General Education credit: Civilization and Culture.

116E. The Music of a Major Composer: Haydn (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Haydn will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sessions, and selected readings. For non-majors. Offered in alternate years. General Education credit: Civilization and Culture.

119. Choral Conducting (2) I. Hillier
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting choral ensembles.

122. Topics in Analysis and Theory (4) III. 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.
124A. History of Western Music: Middle Ages to 1820 (4) II. Nutter
Lecture—3 hours; reading—1 hour. Prerequisite: course 24C and 4C. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 18th century.

124B. History of Western Music: 1600 to 1750 (4) II. Busse Berger
Lecture—3 hours; reading—1 hour. Prerequisite: course 124A. Historical survey of composers and musical styles from the late 1600s to the mid-18th century.

*125. American Music (4) Hillier
Lecture—3 hours; reading—1 hour. Prerequisite: course 10 or 3A-B or consent of instructor. Introduction to American musical traditions, including Native American music, Hispanic polyphony, New England psalmody, and selected 20th-century composers and styles. Offered in alternate years.

129. World Music (4) II. Mendoza-Walker
Lecture—3 hours; listening—1 hour, selected readings. Prerequisite: course 3A-B or 10 recommended. Intended for non-majors. Studies in selected areas of non-Western music, including appropriate instrumental arrangements, analysis of tonal systems, melody, rhythm and musical structures. Emphasis placed on cultural context of the music. General Education credit: Civilization and Culture.

130A-U. Applied Study of Music: Advanced (1) I, II. 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. Individual instruction in: Vocal (pre-requisite of course 1 or the equivalent); Piano; Organ; Harpsichord; Oboe; Violin; Flute; Cello; Bassoon; French Horn; Trumpet; Trombone; Tuba; Percussion; Classical Guitar; Lute; Viola da gamba; Recorder. May be repeated for credit. Offered as demand indicates.

131A-U. Applied Study of Music: Advanced (Individual) (2) I, II. 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: Voice (pre-requisite of course 1 or the equivalent); Piano; Harpsichord; Organ; Violin; Cello; Double Bass; Flute; Oboe; Clarinet; Bassoon; French Horn; Trumpet; Trombone; Tuba; Percussion; Classical Guitar; Lute; Viola da gamba; Recorder. May be repeated for credit. Offered as demand indicates.

141. University Symphony (3) II, III. Holoman Rehearsal—4 hours. Prerequisite: audition 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 preparation of music from the orchestral literature. May be repeated for credit. (P/NP grading only.)

142. University Chamber Singers (2) I, II, III. Hillier Rehearsal—3 hours, plus sections—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. Hillier 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. 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 (Chairperson in charge)
Rehearsal—2 hours; student practice—1 hour. Prerequisite: audition 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.)

*190. Senior Seminar in Music (2) I. The Staff (Chairperson in charge)
Lecture—4 hours. Prerequisite: courses 5C and 25C, and consent of instructor; course 10AC 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) III. Busse Berger 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) III. Busse Berger Seminar—3 hours; term paper. Study of musical notation, investigation of techniques for editing Medieval and Renaissance music.

203A-203B. Composition (4-4-4) I, II, III. Holoman Seminar—3 hours. Technical projects and free composition.

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. Holoman 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. Holoman Seminar—3 hours; term paper. Voice-leading analysis of tonal music; Schoenberg and atonal-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.

211. Perspectives in Music (Musicology and Criticism) (4) I. Holoman 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-Walker 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 metaromantic analysis (see Edgar) to analysis of individual genres to sociological study.

221. Topics in Music History (4) I. Reynolds; II. Busse Berger Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.

222. Techniques of Analysis (4) II. 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.

299. Individual Study (1-12) I, II, III. The Staff (Holoman in charge) (5SU grading only)

Teaching Methods Courses

300. The Teaching of Music (3) II. The Staff Lecture—3 hours. Prerequisite: course 1 or the equivalent. Methods of teaching music in grades K-6.

301. The Teaching of Music (3) II. The Staff 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 repertoire and program planning for secondary schools.

321A-321B. Stringed Instruments (1-1-1) I-II. The Staff Discussion—2 hours. Prerequisite: course 4C.

322. Brass Instruments (1-1) I. The Staff Laboratory—2 hours. Prerequisite: course 4C. Offered in alternate years.

323A-323B. Woodwind Instruments (1-1) I-II. The Staff Discussion—2 hours. Prerequisite: course 4C.

324. Percussion Instruments (1) I. Lunetta 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)

Jack D. Forbes, Ph.D., Chairperson of the Department
Department Office, 2401 Hart Hall (916-752-3237)

Faculty

Steven J. Grum, Ph.D., Associate Professor
Ines Hernandez, Ph.D., Assistant Professor
George C. Longfish, M.F.A., Professor
Martha J. Maci, Ph.D., Associate Professor
Stefano Verese, Ph.D., Professor

Emeritus Faculty

Jack D. Forbes, Ph.D., Professor Emeritus
Carl N. Gorman, M.F.A., Lecturer Emeritus
Sarah Hutchison, M.A., Lecturer Emeritus
David Rising, M.A., Senior Lecturer Emeritus

*Course not offered this academic year.
The Major Program

Native American studies focuses upon the indigenous peoples of both North and South America. The program is a multidisciplinary approach to the historical, artistic, and cultural development of the American Indian and offers a comprehensive and comparative perspective.

The Program. Students electing a major in Native American studies may construct a 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 coursework integrated in Meso-America with North America and South America. Plan III focuses upon South America, with some coursework integrating that region with areas to the north.

Career Alternatives. Native American studies is excellent preparation for a professional career such as teaching, law, human services, health, tribal administration, social work, and inter-ethnic relations. Graduates and alumni 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:

Preparatory Subject Matter

UNITS

Native American Studies 1, 10...........8
One or two courses from Native American Studies 32, 33, 46, 55.............4-6
One or two courses from African American and African Studies 12, 52, Anthropology 2, 3, Asian American Studies 1, Chicano Studies 10, History 17A.............4-6

Depth Subject Matter

UNITS

Native American Studies 130A, 157, 180, 191.............8
One course from Native American Studies 107, 115, 130B, 130C, 133, 156.............4
Note: If a course is counted for either Plan I, II, or III (below), it cannot also be counted as part of the 16 units of Depth Subject Matter.

Areas of Specialization

UNITS

(Complete one of the following plans)

Plan I—North American Emphasis

UNITS

Two courses from Native American Studies 107, 115, 116, 117, 118, 122, 130C, 133.............8
Two courses from Native American Studies 101, 181A, 181B, 181C.............8
One other upper division Native American Studies course, selected in consultation with adviser.............4

Plan II—Meso-Central America Emphasis

UNITS

Native American Studies 107, 133.............8
Three courses from History 161A, 168A, 169B, Geography 122A, Anthropology 134, 145, 146, 174, 175, Chicano/a Studies 130, Native American Studies 122.............12
Two courses from Spanish 156, 172, Art History 151, Native American Studies 101, 156, 181A, 181B, 181C, or, if student’s work is specifically focused upon a Meso-America language or region from Native American Studies 188, 191.............8

Plan III—South American Emphasis

UNITS

Native American Studies 107, 120.............8
Two courses from History 161A, 168B, 169A, 169B, 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

84

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 up to 12 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 indigenous population. Students must have upper division standing to petition and for Plan II, courses 107 and 133 should have been completed; for Plan III, courses 107 and 133 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 coursework dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

UNITS

Native American Studies

UNITS

Native American Studies 1 or 10.............4
Five upper division courses, at least one of which is chosen from each of the following groups

- Ethno-History and Latin 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. The Staff, II, III, Crus
   Lecture/discussion—4 hours. Introduction to Native American studies with emphasis upon basic concepts relating to Native American history and political development.

2. Introduction to Native American Literature (4)
   I, II, III, The Staff
   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. General Education credit: Civilization and Culture.

3. Native American Experience (4)
   I, II, III, The Staff
   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. General Education credit: Contemporary Societies.

4. Native American Music and Dance (4)
   I, II, 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.

5. Native American Cinema in the U.S. (4)
   I, II, Longish
   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.

6. Native American Art Workshop (4)
   I, II, Longish
   Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 32 recommended. Students create Navajo art, design, and crafts. (FNP grading only.)

7. Orientation to Research in Native American Studies (4)
   I, II, The Staff
   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. Emphasizes upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Limited enrollment.

8. Americanisms: Native American Contributions to World Civilization (4)
   I, II, The Staff
   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 indigenous peoples in the development of Western dominance and resulting appropriation of cultural creations. Response and initiatives of indigenous peoples will be analyzed. General Education credit: Cultural Perspectives.

9. Special Study for Undergraduates (1-3)
   I, II, III, The Staff
   Prerequisite: consent of instructor. (FNP grading only)

Upper Division Courses

101. Contemporary Indian Art (4)
   I, II, Longish
   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.

102. Special Topic in Native American Languages (4)
   I, II, Macri
   Lecture/discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historic Native American language studies. May be repeated for credit when a different topic is studied.

112. History and Culture of the “Five Civilized Tribes” (4)
   I, II, The Staff
   Lecture—4 hours. Prerequisite: upper division standing; course 1, History and Culture of the Native American People, or course 8, “Introduction to Native American Studies,” or, if a student’s level is specifically focused upon a Meso-American language or region from Native American Studies 188, 191.

115. Native Americans in the Contemporary World (4)
   I, II, 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 Native American affairs and problems as well as to the background for present day conditions. Not open for credit to students who have completed Anthropology 141B. General Education credit: Cultural Perspectives.

116. Native American Traditional Governments (4)
   I, II, The Staff
   Lecture—4 hours. Prerequisite: course 1; Anthropology 2; Study of selected Native American Tribal Governments, confederations, leagues, and alliances systems. Offered in alternate years.

117. Native American Governmental Decision Making (4)
   I, 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.

118. Native American Politics (4)
   I, II, 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 actions and policies, both national and local communities, along with relevant theory relating to underdevel-

120. **Ethnopolitics of South American Indians (4)**. Varese
Lecture/discussion—4 hours. Prerequisite: course 1, or 55. Social, political, cultural movements of indige-

122. **Native American Community Development (4)** III. Varese
Lecture—4 hours. Prerequisite: course 1, Applied Behavioral Sciences 151. Application of community develop-

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-

130B. **Native American Ethno-Historical Development (4)** I. Crum
Lecture—4 hours. Prerequisite: course 1; History 17A-178 recommended. Study of Native American ethn-

130C. **Native American Ethno-Historical Development (4)** III. Crum
Lecture—4 hours. Prerequisite: course 1; History 17A-178 recommended. Study of Native American ethno-

133. **Ethnohistory of Native People of Mexico and Central America (4)** I. Varise
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.

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, Chicano Studies 110, African American and Afro-American Studies 110. The socio-cultural development of bicultural and multi-ethnic peoples. Focus on the themes of race and sex in the context of contemporary sociocultural and political issues.

135. **Native American Religion and Philosophy (4)** II. Handler
Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philo-

180. **Native American Women (4)** III. Hernandez
Lecture/discussion—4 hours. Prerequisite: course 1 or 10 or Women's Studies 50. Social and cultural foun-

181A-181B-181C. **Native American Literature (4-4-4)** I-III. Herendeen
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 alter-

188. **Special Topics in Native American Literary Studies (4)** II, III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisites: 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.

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 Cultural Studies (4)** II, III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American cultural history, development, culture, and thought. May be repeated for credit when a different topic is studied.

194A-194BH. **Special Studies for Honors Students (4-4)** I-II. The Staff (Forbes in charge)
Independent study—12 hours. Prerequisite: senior standing. Directed reading and research in selected topics in Native American cultural history, development, culture, and thought. May be repeated for credit when a different topic is studied.

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 advisor 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)** II, III. The Staff
Discussion—1 hour; independent study—3 hours. Prerequisite: upper division standing and major in Native American Studies, course 195 (may be taken concur-

197TC. **Community Tutoring in Native American Studies (1-5)** I, II, III. The Staff
Tutoring—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 (Forbes 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 (Forbes in charge)
Prerequisite: consent of instructor. (P/NP grading only)

200. **Basic Concepts in Native American Studies (4)** II. Crum
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Analysis of the characteristics of the discipline of Native American Studies. Concentra-

202. **Advanced Topics in Native American Studies (4)** II. Miler
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 topics offered.

212. **Community Development for Sovereignty and Autonomy (4)** III. Varise
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examination 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-manage-

220. **Colonialism/Racism and Self-Determination (4)** III. Varese/Maci
Seminar—3 hours. Term paper. Prerequisite: graduate standing. Study of imperial/colonial systems and their psychosocial impacts upon oppressors and oppressed, as well as their impact on indigenous peoples, but other groups will also be considered. Offered in alternate years.

280. **Ethnohistorical Theory and Method (4)** II. Forbes
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 application of ethnohistory in the solution of contemporary social problems. Offered in alternate years.

282. **Group Study for Graduate Students (1-5)** I, II, III. The Staff (Forbes in Charge)
Prerequisite: graduate standing, consent of instructor. (SU grading only.)

285. **Special Study for Graduate Students (1-12)** I, II, III. The Staff (Forbes in Charge)
Prerequisite: graduate standing, consent of instructor. (SU grading only.)

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**Nature and Culture**

(College of Letters and Science)

Leorona Timm, Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-1219)

**Committee in Charge**

Francisco X. Alarcón (Spanish and Classics)
Michael Barbou, Ph.D. (Environmental Horticulture)
Richard Cowen, Ph.D. (Geology)
Paula Finden, Ph.D. (History)
Scott McLean, Ph.D. (Comparative Literature)
Ben Orlove, Ph.D. (Environmental Studies)
Andrea Orlove, Ph.D. (Evolution & Ecology)
Gary Snyder, Hon. Ph.D. (English)
Lenora Timm, Ph.D. (Linguistics)
Robert Torrance, Ph.D. (Comparative Literature)
Mark Wheelis, Ph.D. (Microbiology)

**Faculty**

Michael Barbou, Ph.D., Professor (Environmental Horticulture)
Scott McLean, Ph.D., Lecturer (Comparative Literature)
Benjamin Orlove, Ph.D., Professor (Environmental Studies)
Lenora Timm, Ph.D., Professor (Linguistics)
Mark Wheelis, Ph.D., Senior Lecturer (Microbiology)

**The Program.** The Nature and Culture major is designed as a coherent interdisciplinary set of courses that offers the complex relationships 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.
existing between human cultures and the natural world. This program is the first of its kind in the country, provides a framework that integrates courses in the natural sciences, the humanities, and the social sciences, supplemented by elective coursework in 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 during the course of their studies. 

Career Alternatives. Because the program is designed to educate students broadly in the liberal arts and science, it provides excellent preparation for students planning to go on to professional schools, many of which are looking for students with interdisciplinary training, or those planning to major in the Bachelor's degree (e.g., law). The major program also provides an excellent academic foundation for entry into such career areas as international development, agricultural economics, environmental policy analysis, landscape design, park and reserve management, land trust administration, fish and wildlife services, environmental studies, land-use planning, resource planning and management, range science, and forestry. 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 in the mass media.

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Nature and Culture</td>
<td>44-45</td>
</tr>
<tr>
<td>Chemistry 2A-2B</td>
<td>10</td>
</tr>
<tr>
<td>Biological Sciences 1A-1B-1C</td>
<td>15</td>
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<tr>
<td>Environmental Studies 30 or Anthropology 2</td>
<td>3-4</td>
</tr>
<tr>
<td>Comparative Literature 1, 2, or 3, or English</td>
<td>4</td>
</tr>
<tr>
<td>Comparative Literature 20</td>
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<tr>
<td>American Studies 1E, History 85, or Native</td>
<td>4</td>
</tr>
<tr>
<td>American Studies 70...</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13, 32, 102, or 103</td>
<td>8</td>
</tr>
<tr>
<td>Anthropology/Environmental Studies 101...</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology/Environmental Studies 133...</td>
<td>4</td>
</tr>
<tr>
<td>English 164 or Native American Studies 181A,</td>
<td>4</td>
</tr>
<tr>
<td>181B, or 181C, or Comparative Literature 120</td>
<td>4</td>
</tr>
<tr>
<td>Electives, a minimum of 16 units; list of</td>
<td></td>
</tr>
<tr>
<td>choices available from the program office</td>
<td>8-65</td>
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<tr>
<td>Total units for the major</td>
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Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Nature and Culture</td>
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<tr>
<td>Environment and Evolution and Ecology 100</td>
<td>1</td>
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<td>Anthropology/Environmental Studies 101...</td>
<td>4</td>
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<tr>
<td>Anthropology/Environmental Studies 133...</td>
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<tr>
<td>English 164 or Native American Studies 181A,</td>
<td>4</td>
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<tr>
<td>181B, or 181C, or Comparative Literature 120</td>
<td>4</td>
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<tr>
<td>Total units for the minor</td>
<td>24</td>
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</table>

Courses in Nature and Culture (NAC)

Lower Division Courses

1. Intersections of Nature and Culture (4) III. McLellan, White
   Lecture/discussion—3 hours; term paper. 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 integration of the relation between nature and culture, including forms of observation and methods of analysis.

Upper Division Courses

100 The Culture of Nature: Theoretical Frameworks and Case Studies (4) II. Orlove, Timm
   Lecture/discussion—3 hours; term paper. Prerequisite: course 1, Biological Sciences 1C, and Comparative Literature 20, and Comparative Literature 1, 2, or 3, or English 3. In-depth study of one or two 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 for credit.

180. Fieldwork in Nature and Culture (4) I. Barbour, McLean
   Discussion—1 hour; fieldwork—70 hours/quarter; term paper. Prerequisite: course 100. 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.

197T. Tutoring in Nature and Culture (1-5) I, II, III. The Staff
   Tutoring—5-15 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. Kays, Ph.D., Chairperson of the Department Department Office, 354 Hutchison Hall (916-752-7567 or 916-752-6090)

Faculty

Edward P. Casswell-Chen, Ph.D., Associate Professor Howard Ferris, Ph.D., Professor Bruce A. Jaffee, Ph.D., Associate Professor Harry K. Kays, Ph.D., Professor Emeritus Becky B. Westerfield, Ph.D., Lecturer Valerie M. Wilkinson, Ph.D., Associate Professor

Emeriti Faculty

Benjamin F. Lowsnberry, Ph.D., Professor Emeritus Armand R. Maggini, Ph.D., Professor Emeritus Dewey H. Raski, Ph.D., Professor Emeritus

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nematology</td>
<td>18-20</td>
</tr>
<tr>
<td>Nematology 100, 110, and Soil Science 100</td>
<td></td>
</tr>
<tr>
<td>Two or three courses from the following areas</td>
<td></td>
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<tr>
<td>(a) Plant Science: Microbiology 102, Entomology 100, Entomology 135, Entomology 153, Entomology 156, Evolution and Ecology 112, Pathology, Microbiology and Immunology 132, Plant Biology 120, 121, Soil Science 111.</td>
<td></td>
</tr>
<tr>
<td>(b) Entomology: upper division Entomology course, Evolution and Ecology 112, Microbiology 102, Plant Biology 120, 121, Pathology, Microbiology and Immunology 132, Soil Science 102, 111.</td>
<td></td>
</tr>
</tbody>
</table>

*NOS course not offered this academic year.

Minor Adviser: C.Y.S. Peng.

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 1B. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

110. Introduction to Nematology (2) I. 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.

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 Study

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, 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 Sciences 100 or 111. Consideration of how soilborne nematodes (parasites of plants and insects and microorganisms) 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 mor-
Neuroscience (A Graduate Group)

Lynn Robertson, Ph.D., Chairperson of the Group
Group Office, 188 Briggs Hall (916-752-9002)

Faculty: The group includes 29 faculty members from fourteen 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 biology of cells 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: A. Lahde (Neurobiology, Physiology and Behavior), R. P. R. Staff (Center for Neuroscience).

Courses in Neuroscience (NSC)

Graduate Courses

200A. Laboratory Methods in Neurobiology (3) 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 will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.

200B. 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 will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.

210. Contemporary Research in Neurobiology (3) I. The Staff (Chairperson in charge) Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in Neuroscience or consent of instructor. Series of lectures by faculty members presenting the intellectual and technical basis for their own research. May be repeated for credit once with consent of instructor.

243. Topics in Cellular and Behavioral Neurobiology (2) I, III. Wilson Lecture discussion—1 hour. Prerequisite: consent of instructor. Advanced examination of several current problems in neurobiology. Topics will vary in different years; may be repeated for credit. (SU grading only)

260. Biology of Neurons (3) III. Menon Lecture—1 hour. Prerequisite: consent of instructor. Properties and functions of neurons in the mammalian central nervous system with relation to neuronal development, physiology and injury response. Offered in alternate years. (Same course as Cell Biology and Human Anatomy C99.) (SU grading only)

283. Neurobiological Literature (1) I, II, III. Mulloney and Wilson Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. (SU grading only)

290C. Research Conference in Neurobiology (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: standing in Neuroscience or consent of instructor; course 259 (concurrently). Presentation and discussion of faculty and student research in neurobiology. May be repeated for credit. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU 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)

Curt L. Keen, Ph.D., Chairperson of the Department
Department Office, 3135 Meyer Hall (916-752-8000)

Faculty

Lindsay H. Allen, Ph.D., Professor
Elizabeth A. Appleget, Ph.D., Lecturer
Kenneth B. Brown, M.D., Professor
Andrew J. Clifford, Ph.D., Professor
Kathryn S. DeWey, Ph.D., Professor

M.A. Greenwood, Ph.D., Professor
Louis E. Gravert, Ph.D., Professor (Nutrition, Geography)
Patricia Johnson, Adjunct Professor
Curt L. Keen, Ph.D., Professor (Nutrition, Internal Medicine)
Bo L. Lohland, Ph.D., Professor (Nutrition, Internal Medicine)
Roger McDonald, Ph.D., Assistant Professor
Jo Ann Pochtel, M.S., Lecturer
Robert B. Rucker, Ph.D., Professor (Nutrition, Biological Chemistry)
Michael A. Satri, Ph.D., Assistant Professor
Barbara G. Schranner, Ph.D., Professor (Nutrition, Food Science and Technology, Internal Medicine)
Judith S. Stern, Sc.D., Professor (Nutrition, Internal Medicine)
Janet Lin-Ye, Assistant Research Nutritionist
Shari Zdenberg-Cherry, Ph.D., Nutrition Science Specialist

Emeriti Faculty

Fredric Wi, Ph.D., Professor Emeritus
William C. Weir, Ph.D., Professor Emeritus
Frances J. Zerman, Ph.D., Professor Emeritus

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.

Community Nutrition..............................24 UNITS
Nutrition 101 or 110, plus 111....................9
Nutrition 118, 192 (2)..............................6
Nutrition 120........................................4
Nutrition, Physiology and Behavior 101.......5
Nutrition 114, 116A-116B, 116AL-116BL....5

Food Service Management..........................24-25 UNITS
Nutrition and Food Science..........................24 UNITS

Nutrition Science.................................20 UNITS

Nutrition Science, School of
Courses in Nutrition (NUT)

Lower Division Courses


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. General Education credit: Nature and Environment. To receive GE credit, course 11 must be taken in a concurrent or subsequent quarter.


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. General Education credit: Nature and Environment. To receive GE credit, course 10 must be taken in a concurrent or previous quarter.

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 habits research; minority food habits; origins and development of dietary practices. General Education credit: Nature and Environment.

30. Public Issues in Nutrition and Food Science (1) I. Schniewern

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) (Same course as Food Science and Technology 93)

99. Individual Study for Undergraduates (1-5) I, II, III. 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 68B; 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 (Nutrition)

Lecture—5 hours. Prerequisite: Biological Sciences 103, a course in physiology or zoology. Fundamental principles of the roles of man and other animals. Physiological basis of nutrient requirements for growth, maintenance and production. Physiological basis of nutritional disorders.

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.

120. Nutritional Assessment; Dietary, Anthropometric, and Clinical Measures (2) III. Broering

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 101 or 111 (may be taken concurrently). Methods of nutritional assessment in humans to evaluate digestion (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 hemotologic, urine, and hair analyses of clinical importance will be demonstrated and emphasized. Emphasis on precision, accuracy, reliability, and interpretation of the values.

114. Developmental Nutrition (4) II. Keen, Satre

Lecture—4 hours; prerequisite: course 110 or 111; course 111. Role of nutritional factors in embryonic and postnatal development.

115. Animal Feeds and Nutrition (4) II. DePeters (Animal Science)


116A-116B. Diet Therapy (3-3) I-III. 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: courses 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 (I) I. 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

Animal Science (Nutrition)

Lecture—4 hours; laboratory—4 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, with an emphasis on 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) 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.

122. Ruminant Nutrition and Digestive Physiology (3) I. Foo (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 (3) II. Macy (Animal Science)

Laboratory—8 hours. Prerequisite: course 122 (concurrently). Study of digestion and fermentation in ruminants. Laboratory will deal with topics developed in lectures.

123. Companion and Captive Animal Nutrition (4) III. Klausing

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 animal.

201. Vitamin Metabolism (2) II. Rucker

Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Review of studies and relationships involving the biochemical action of vitamins. Comparative nutritional aspects and the metabolism and chemistry of vitamins and vitamin-like compounds emphasized.
Nutrition

(A Graduate Group)

Q.R. Rogers, Ph.D., Chairperson of the Group
Group Office, 3135 Meyer Hall (916-752-4653)

Faculty: Faculty are drawn from the Colleges of Agricultural and Environmental Sciences, and of Letters and Science, and the Schools of Medicine and 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 strong background in genetics and in nutritional analyses; human and animal diets; 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 coursework 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..................0-6
See College requirement.
Preparatory Subject Matter.........................55-58
Biological sciences (Biological Sciences 1A, 1B, 1C)..........................15

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 metabolism in food utilization. Energy distribution at cellular, tissue, and animal levels as affected by diet and physiologic state. Current and future feeding systems.

203. Advanced Protein and Amino Acid Nutrition (2) Ill. The Staff (Rogers, Molecular Biology, 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 effects of deficiency of dietary protein on digestion, absorption, metabolism, resistance to disease, and fat intake. Study of dietary requirements and interrelationships among amino acids.

204. Mineral Metabolism (2) Ill. 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) Ill. The Staff
Lecture—4 hours. Prerequisite: course 116A or 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 and diet.

218. Advanced Field Work in Community Nutrition (2-12) I., II, III, extra session summer.
The Staff
Discussion—1 hour; field work. 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, Polit (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, Polit (Pediatrics)
Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Nutrition in developing countries. Offered in alternate years.

225. Nutrition and Development (3) II. Keen, Satter
Lecture—3 hours. Prerequisite: courses 201, 202, 203, 204. Relationship of nutrition to prenatal and postnatal development. Offered in alternate years.

253. Control of Food Intake (3) Ill. Stern
(Nutrition). Gietz (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, emotional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstrations 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 206A-206B 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 equivalent. Courses 201 and 204, Physiological Sciences 206A recommended. Examinations naturally occurring toxicants in human food and animal feeds. Toxic nutrients, anti-nutrients, secondary plant compounds and mycotoxin metabolism will be 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 206A-206B. Significance and interpretation of enzyme, metabolite, in vivo and in vivo isotopic 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. Klaising (Avian Sciences), Calvert (Animal Science)
Lecture—2 hours. Prerequisite: courses 201 through 204, Physiological Sciences 206A-206B 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, Polit (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.

280. 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
(Koen 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 presented and evaluated. Format will combine seminar and discussion style. (SU grading only.)

291. Advanced Nutrition Seminar (1) II., III, III. The Staff (Koen in charge)
Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (SU grading only.)

297T. Supervised Teaching in Nutrition (1-3) I., II, III. The Staff (Koen in charge)
Teaching under faculty supervision—3-9 hours. Prerequisite: graduate status 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. (SU grading only.)

299. Group Study (1-5) I., II, III. The Staff (Koen in charge)

299. Research (1-12) I., II, III. The Staff (Koen in charge)
(SU grading only.)

Professional Course

298. Supervised Teaching in Dietsetics (2-12) I., II, III, extra-session summer. The Staff
Laboratory—3 hours. Prerequisite: graduate status in M.S. program in Nutrition with emphasis in dietics; consent of instructor. Directed teaching in approved dietetic internships or coordinated program in dietics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

*Course not offered this academic year.
Orientation

(College of Agricultural and Environmental Sciences)

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 of exploration of the philosophy, purpose, significance, expectations and mechanisms of university education. (PIN grading only)

Orthopaedic Surgery

See Medicine, School of

Otolaryngology

See Medicine, School of

Pathology

See Pathology (Medicine, School of); and Pathology, Microbiology and Immunology (Veterinary Medicine), below

Pathology, Microbiology, and Immunology

(School of Veterinary Medicine)

N. James MacLachlan, B.V.S.C., Ph.D., Chairperson of the Department

Faculty

Mark L. Anderson, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Alex A. Ardavan, D.V.M., M.S., Professor (Medicine and Epidemiology)

Bridget D. Ball, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Arthur A. Block, M.D., Ph.D., Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Patricia C. Blanchard, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Walter M. Boyce, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Pat A. Conrad, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Microbiology (California Veterinary Diagnostic Laboratory)

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 of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

David A. Ferrick, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Robert J. Higgins, B.V.S.C., M.S., Ph.D., Associate Professor

Dwight C. Hirsh, D.V.M., Ph.D., Professor

Bill Johnson, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Kathleen M. Larr, D.V.M., Ph.D., Professor

Rance B. LeFebvre, D.V.M., Ph.D., Associate Professor

Linda J. Lowenstein, D.V.M., Ph.D., Professor

N. James MacLachlan, B.V.S.C., Ph.D., Professor

Christopher J. Miller, D.V.M., Ph.D., Assistant Adjunct Professor (Pathology, California Primate Research Center)

F. Charles Mohr, D.V.M., Ph.D., Associate Professor

Peter F. Moore, B.V.S.C., Ph.D., Professor

Frederick A. Murphy, D.V.M., Ph.D., Dean

Bennett I. Osburn, D.V.M., Ph.D., Professor

Roy P. Poole, Jr., D.V.M., Professor

Deryck H. Read, B.V.S.C., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

H.L. Shivasaprasad, M.S., B.V.S.C., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Jeffrey L. Stoll, Ph.D., Associate 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., Associate Professor

Talibah Yima, D.V.M., Ph.D., Professor

Yuan Chun Zee, D.V.M., Ph.D., Professor

Joseph G. Zinkl, D.V.M., Ph.D., Professor

Part-Time Clinical Faculty

Robert M. DuFort, D.V.M., Assistant Clinical Professor

Sonjia M. Shelly, D.V.M., Assistant Clinical Professor

John W. Switzer, D.V.M., Associate Clinical Professor

Emeriti Faculty

Norman B. Baker, D.V.M., Ph.D., Professor Emeritus

Emil L. Bibarzein, D.V.M., Ph.D., Professor Emeritus

Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus

Donald L. Dungworth, B.V.S.C., Ph.D., Professor Emeritus

Bernard F. Feldman, D.V.M., Ph.D., Professor Emeritus

Nem C. Jain, M.V.S.C., 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. (veterinary medicine)

Peter C. Kennedy, D.V.M., Ph.D., Professor Emeritus

Jack E. Moulton, D.V.M., Ph.D., Professor Emeritus

Harvey J. Olsander, D.V.M., Ph.D., Professor Emeritus

John W. Osbould, D.V.M., Ph.D., Professor Emeritus

Roy R. Poole, Jr., D.V.M., Professor Emeritus

Ming Ming Wong, Ph.D., Professor Emeritus

Courses in Pathology, Microbiology, and Immunology (PMI)

Upper Division Courses

101. Comparative Hematology (2 credits) III. Kaneko, Jain, Zinkl Lecture—2 hours. Prerequisite: Biological Sciences 1A, Physiology 110, Biochemistry 101A-101B or Physiology 101A-101B or consent of instructor. Principles, interpretation of and applications of clinical hematology; comparative blood cellular morphology and function.

101L. Comparative Hematology Laboratory (2 credits) III. Kaneko, Zinkl, Jain Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Intro-
duction to laboratory methods and procedures of clinical hematology. Limited enrollment.


126. Fundamentals of Immunology (3). Ferrick, Garshwin, Stott. Lecture—3 hours alternate weeks with lecture—2 hours lab. 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.

128L. Immunology Laboratory (2). Ferrick. Laboratory—4 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. Lahm. Lecture—3 hours; laboratory—6 hours. Prerequisite: general microbiology (Microbiology 20 or 102); basic immunology (Pathology, Microbiology and Immunology and Biology 107). An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecological aspects of infectious disease. Limited enrollment.


198. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor (PNP grading only).

199. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Gershwin in charge). (PAP grading only)

Graduate Courses

204. Histology of Normal Bone Marrow and Cytology (1). Zinn. Lecture-laboratory—2 hours. Prerequisite: Veterinary Medicine 435 or course 101. Normal maturation of the bone marrow as observed by a study of the histology of blood and bone marrow in selected diseases of domestic animals including infections, anemias, myeloproliferative disorders and leukemias.

205. Physiology and Pathology of Leukocytes (2). II, III, IV. L. W. Stott. Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B, or consent of instructor. Metabolism, ultrastructure, kinetics, homeostasis, cytochemistry, and function of different leukocytes; physiological, functional, histochemical, and morphological changes in leukocytes in diseases; their role in inflammatory and immunologic processes. Offered in alternate years.

206. Immunohematology (2). II, III. Jain, MacKenzie (Medicine). Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 126, or consent of instructor. Immunohematology and immunochemistry; blood cell antigens and antibodies; autoimmune hemolytic diseases; reactions to blood transfusions; transplantation mechanisms. Offered in alternate years.

216. Immunodiagnostic Techniques (3). II, Lam, Curtin. Lecture—3 hours. Prerequisite: enrollment in MPVM program or consent of instructor. Consideration of immunodiagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple, and inexpensive procedures for mass screening.

216L. Immunodiagnostic Techniques Laboratory (by arrangement). Lecture—2 hours. Prerequisite: course 216 (may be taken concurrently) or consent of instructor. Application and interpretation of serologic techniques for diagnosis of animal diseases. (SU grading only) Limited enrollment.

219. Mycoplasma as Agents of Disease (2). II, III. Lam. Lecture—2 hours. Prerequisite: Veterinary Microbiology and Immunology 127 or the equivalent or consent of instructor. Offered in alternate years.

276. Advanced Immunology (3). III. Stott. Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 452 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement. Biology of lymphocytes, cell-mediated immune reactions, Immunogenetics, hypersensitivity. Pathogenetic mechanisms in immunologic diseases, immunologic unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunohemology and immunobiology. Offered in alternate years.

281. Foreign Animal Diseases (3). III. Olander. Lecture—3 hours. Prerequisite: course 210, and Veterinary Medicine 452, and 451 or 459. For students interested in research and teaching in tropical veterinary medicine. The diseases studied are the most important ones currently floating around the world, particularly Africa and Latin America. Offered in alternate years.

282. Tumor Pathology (3). II. The Staff. Lecture—3 hours. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. The histogenesis, incidence, geographical distribution, pathology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in alternate years.

283. Comparative Avian Anatomy and Pathology (1-3). I. Lowensteine. 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 in students interested in avian diseases. Offered in alternate years.

284. Pathogenesis of Infectious Disease (2). II, III. Corder. Lecture—2 hours. Prerequisite: upper division or graduate standing in biology or the medical sciences and introductory courses in microbiology, immunology, hematology, or consent of instructor. Features of pathogenicity and host defense mechanisms common to infection with bacteria, viruses, fungi, and protozoa, emphasizing, as appropriate, the important species differences. Perinatal immune responses and de novo offspring are covered. Offered in alternate years.


286A-286B-286C. Selected Topics in Advanced Special Pathology (2-11). II, III, IV. The Staff. Lecture—variable. Prerequisite: graduate standing, DVM degree, or final-year veterinary student. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

287. Comparative Pathology of Laboratory Animals (3). III. Lowensteine. 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, lago- mine and non-human primates. Emphasis will be placed on lesions and understanding of pathogenesis. Offered in alternate years.

289. Seminar in Veterinary Pathology (1). I, II, III. The Staff. Seminar—1 hour. (SU grading only)

290A. Current Topics in Avian Medicine (1). I, II, III. Lam, Weakenell. Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation.

291A. Seminar in Immunology (1). I, II, III. Garshwin. Seminar—1 hour. A discussion of the current topics in immunology. (SU grading only)

291B. Histopathology Conference (1). I, II, III. The Staff (Wilson in charge). Discussion—1 hour. Prerequisite: graduate standing or third-year veterinary student; consent of instructor. Discussion of selected cases based on records and slides. Defense of diagnoses. (SU grading only)

292A. Seminar in Animal Virology (1). I, II, III. Yilmaz, Zee. Seminar—1 hour. A discussion of the current topics in animal virology. (SU grading only) (Same course as Microbiology 296)

292B. Surgical Pathology Conference (1). I, II, III. The Staff (Poul 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. (SU grading only)

293A. Seminar in Infectious Diseases (1). I, II, III. Hirsh. Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (SU grading only)

293B. Necropsy and Surgical Pathology (1-4). I, II, III. The Staff (Olander in charge). Discussion—1 hour; laboratory—32 hours. Prerequisite: graduate standing; consent of instructor. Diagnostic case study and case reporting. (SU grading only)

294A. Comparative Pathology Conference (1). I, II, III. Lowensteine. 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. (Su grading only)

294B. Conservation Biology and Veterinary Medicine (1). I, II, III. Boyce. Seminar—1 hour. Discussion of current topics in conservation biology as they relate to veterinary medicine; emphasis is on wildlife. (SU grading only)

295. Microbiological Diagnosis (2-5). I, II, III. Garshwin, Hirsh. Discussion—1 hour; laboratory—5-14 hours. Prerequisite: laboratory course in veterinary medicine or 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. (SU grading only)

298. Group Study (1-5). I, II, III. The Staff. Group Study of advanced topics in pathology. (SU grading only)

299. Research (1-12) I, II, III. The Staff (SU grading only)
Graduate Advisers. C.G. Plopper (Anatomy, Physiology and Cell Biology); A.R. Buckpitt (Molecular Biosciences); J.A. Last (Pulmonary Medicine); B.W. Wilson (Environmental Toxicology).

Courses in Pharmacology and Toxicology (PTX)

Graduate Courses

201. Principles of Pharmacology and Toxicology I (5) I. Miller (Environmental Toxicology)
Lecture—4 hours. Prerequisite: Biological Sciences 103, Physiology 110. Basic concepts underlying metabolic fate of xenobiotics, receptor and cell biology, and chemotherapy for cancer and infectious disease. Selected drugs, drug processes, disposition kinetics, dose-response relationships, cellular toxicity and oncogenes.

202. Principles of Pharmacology and Toxicology II (5) II. Ruckpik (Molecular Biosciences)
Lecture—5 hours. Prerequisite: satisfactory completion of course 201. Mechanisms of action, pharmacologic and toxic effects, and pathologic changes produced by drugs and other chemical substances on various body systems and their associated organs.

203. Principles of Pharmacology and Toxicology III (5) III. Joyce (Molecular Biosciences)
Lecture—5 hours, discussion—1 hour; tutorial—1–3 hours. Prerequisite: courses 201 and 202. Mechanisms of action, pharmacology, toxic effects, and pathologic changes produced by drugs and other chemical substances on various body systems and their associated organs. Ecotoxicology, risk assessment and epidemiology.

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. (SU grading only.)

*Course not offered this academic year.

Philosophy

(Philosophy of Letters and Science)

David I. Coop, Ph.D., Chairperson of the Department Department Office, 728 Social Sciences and Humanities Building (916-752-0670)

Faculty

Phil M. Clark, III, Ph.D., Assistant Professor
David I. Coop, Ph.D., Professor
James R. Griesemer, Ph.D., Associate Professor
Michael J. King, Ph.D., Professor
Jeffrey King, Ph.D., Associate Professor
George J. Mclain, Jr., Ph.D., Lecturer
Paul Perez, Ph.D., Professor
Michael V. Wedin, Ph.D., Professor
Richard A. Wolheim, M.A., Visiting Professor

Emeriti Faculty

Ronald A. Arbin, Ph.D., Emeritus Emeritus
William H. Bassett, Ph.D., Emeritus Emeritus
Joel J. Friedman, Ph.D., Emeritus Emeritus
Neal V. Gilbert, Ph.D., Emeritus Emeritus
Marjorie Groene, Ph.D., Emeritus Emeritus
John F. Malcolm, Ph.D., Emeritus 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 and mathematics, of 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 we 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. It also offers a strong program in the philosophy of science, including the philosophy of biology, psychology, and the natural sciences. Students enrolled in the philosophy major may also pursue a second major in a discipline in the humanities or social sciences, and most of them graduate with a minor in a discipline in the social sciences.

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, developing analytical skills that are assets in any career. Many of our majors have pursued graduate study in philosophy and become philosophers in their own right. In addition, a few 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, ministry, and social work. Most of them graduate with a minor in a discipline in the social sciences.

A.B. Major Requirements:

Preparatory Subject Matter .......................................................................................................................... 16
Philosophy 12, 21, 22, 23 ......................................................................................................................... 16
Depth Subject Matter ................................................................................................................................. 38
Upper division units in Philosophy selected with approval from the major adviser ................................................................................................................................. 38
Total Units for the Major ............................................................................................................................. 52

Minor Adviser. G.J. Mathey.

Minor Program Requirements:

Students wishing to minor in Philosophy may choose a minor in one of several areas, including logic, history of philosophy, political philosophy, or the philosophy of science. Students may also pursue a minor in art and philosophy, history and philosophy, literature and philosophy, or music and philosophy.

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 13, 104 ............................................................................................................................ 12
Philosophy 112 ............................................................................................................................................ 4
Select units from Philosophy 113, 131, 132, 133, 134, 135 ...................................................................... 12
Courses for Non-Majors. The department offers both lower and upper division courses of interest and benefit to non-majors. Philosophy 1 is the General Education course for non-majors. Philosophy 5 teaches critical thinking. Students majoring in most disciplines in the university will find courses relevant to their education or career goals. The following courses are recommended:

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 a faculty and graduate student colloquia. Undergraduate students are strongly encouraged and, by their 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 Ecology, Justice, and Society, the department also offers the Ph.D. in Philosophy with designated emphases in Philosophy, 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 (PHI 4). I, II, II.:

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. General Education credit: Civilization and Culture.

5. Critical Reasoning (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Topics 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 5. Offered in alternate years.

11. Philosophy East and West (PHI 4). I, II, II.

Lecture—3 hours; discussion—1 hour. Comparative treatment of select theories in Eastern and Western philosophy, e.g., Confucianism, Buddhism, Taoism, and Modern Orientalism. Open to students who have completed course 5. Offered in alternate years.

12. Introduction to Symbolic Logic (PHI 4).


13. The Paradox (PHI 4). I, II.:

Lecture—3 hours; discussion—1 hour. Examination of the concept of the person, that is, of our intuitions about what persons are, i.e., that persons are agents, that they have a distinct psychology, that they are rational, that they are language-users, that they are mortal. General Education credit: Civilization and Culture.

14. Ethical and Social Problems in Contemporary Society (PHI 4). I, II.

Lecture—3 hours; term paper. Social and political issues and problems involved in contemporary moral and social problems. Among possible topics are: civil disobedience and revolution, racial and sex discrimination, consumerism in population control, genetic engineering, technology and human values, sexual morality, freedom in society. General Education credit: Civilization and Culture.


Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Presocratics, Plato, and Aristotle. General Education credit: Civilization and Culture.


Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz and seventeenth century scientific thinkers. General Education credit: Civilization and Culture.


Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. General Education credit: Civilization and Culture.

24. Introduction to Ethics and Politics (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting current problems in political and ethical 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? General Education credit: Civilization and Culture.

*31. Appraising Scientific Reasoning (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Introduction to scientific hypotheses and the kinds of reasoning used to justify such hypotheses. Emphasis on adequacy of justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Concrete historical and contemporary cases. General Education credit: Civilization and Culture or Nature and Environment.

32. Understanding Scientific Change (PHI 4). I, II, II.

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 change. Kuhn's revolutionary model. Examples from various sciences. General Education credit: Civilization and Culture.

*90X. Lower Division Seminar In Philosophy (PHI 1-2). I, II, II.

Seminar—3 hours; credit 1-2. 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, discussions, and written assignments. Emphasis upon student participation. Limited enrollment. (Former course 10E.) General Education credit: Civilization and Culture.

98. Directed Group Study (PHI 1-5). I, II, II.

The Staff (Chairperson in charge). Prerequisite: consent of instructor. (P/NP grading only)


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 (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of the concept of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and methods of metaphysics. Anti-metaphysical arguments. General Education credit: Civilization and Culture.

102. Theory of Knowledge (PHI 4). I, II.


103. Philosophy of Mind (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Analysis of the nature of the mind and the explanation of mental acts. Discussion of such concepts as action, intention, and causation.

104. Introduction to Philosophy of Science (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Analysis of the nature of science. The relationship between logic and proof and scientific methodology. Basic concepts of the nature of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms. Analysis of theories, operationalism and behaviorism, realism, reduction. General Education credit: Civilization and Culture.

105. Philosophy of Religion (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. General Education credit: Civilization and Culture.

*106. Science and Metaphysics (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. 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.

107. Philosophy of the Physical Sciences (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. General Education credit: Civilization and Culture or Nature and Environment.

108. Philosophy of the Biological Sciences (PHI 4). I, II.


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 and differences from natural and life sciences. Predicting and explaining human behavior. Behaviorism, reductionism, and individualism. Related moral issues. The social sciences in modern society. General Education credit: Civilization and Culture.

*110. An Historical Introduction to the Philosophy of Science (PHI 4). I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Several general topics in the philosophy of science introduced and discussed in the context of actual episodes in the develop
111. Philosophy of Space and Time (4) (III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: one upper division philosophy course. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of geometry, conventionalism, absolutist versus relativist views of space and time, philosophical implications of relativity theory.

112. Intermediate Symbolic Logic (4) (II. M. Matty Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or consent of instructor. Predicate logic syntax and semantics. Transition between predicate logic and English. Proof techniques. Identity, functions, and definite descriptions. Introduction to concepts of metafetaphysics.

113. Advanced Logic (4) (II. R. Heim Lecture—4 hours. Prerequisite: course 112, or Mathematics 108 or the equivalent. Topics will vary between metalevel of First-Order logic through the Completeness and Löwenheim-Skolem theorems, and the Gödel-Fraenkel theorem typically axiomatized as a First-Order theory. May be repeated once when subject area differs.

114. History of Ethics (4) (III. C. Clark Lecture—3 hours; term paper. Prerequisite: one philosophy course. The history of philosophical writing on central problems of ethics, the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.

115. Problems in Normative Ethics (4) (I. The Staff 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, feta rights, euthanasia, justice and health care, war, nuclear deterrence, world hunger, environmental protection.

116. Ethical Theories (4) (II. C. Clark Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Ethical theories that may be discussed are utilitarianism, virtue theory, theories of natural rights, Kantian ethical theory, and contractualism.

117. Foundations of Ethics (4) (II. C. Clark Lecture/discussion—3 hours; term paper. Prerequisite: one of courses 114, 116, 118, 131, 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, concepts of moral obligation, moral justification, moral skepticism, normative language and normative belief.

118. Political Philosophy (4) (I. The Staff 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. Offered in alternate years. (3 hours lecture in rotation credit: Contemporary Societies. Former course 117.) Not open for credit to students who have completed former course 117.

119. Philosophy of Law (4) (III. C. Opp 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, personal rights and liberties, fairness, responsibility, and punishment. (Former course 116.) General Education credit: Contemporary Societies.

120. Topics in Metaphysics (4) (II. J. Rubin Lecture/discussion—4 hours. Prerequisite: course 101. Examination of up to three topics in metaphysics, e.g., being, identity; ontology; categories; minds, bodies, and persons; space and time; freedom and determinism.

122. Topics in Theory of Knowledge (4) (II. M. Matty 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) (III. W. Wolowiec 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; relation of art to its environment.

127. Philosophy and Economics (4) (I. 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.

131. Philosophy of Logic and Mathematics (4) (I. J. Rubin Lecture—3 hours; term paper. Prerequisite: course 12 or one course for credit in mathematics. Nature of formal systems and mathematical theories. Selected topics include logic and semantical paradoxes, foundations of mathematics; set theory, type theory, and intuitionistic logic; philosophy of geometry; philosophical implications of Godel's incompleteness results.

132. History of Logic (4) (II. I. Arion 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) (I. I. Arion Lecture/discussion—3 hours. Prerequisite: course 113 or Mathematics 125 or consent of instructor. Topics to be taken typically from the following: metamathematics and model theory, axiomatic set theory and independence results, recursive function theory; computability and recursion theory.

134. Modal Logic (4) (III. R. Heim Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or Mathematics 108 or the equivalent. Survey of the modern 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) (II. I. Arion Lecture/discussion—3 hours; term paper. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionistic logics, relevance logics, and non-monotonic logics.

137. Philosophy of Language (4) (I. R. Heim 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 (1979-present) philosophical views on language.

143. Heilagist Therapy (4) (I. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Focus on Greek and Roman philosophy after Aristotle, including Epicureanism, Stoicism, Skepticism, and neo-Platonism.

145. Medieval Philosophy (4) (II. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Study of major philosophers in the medieval period.

151. Philosophy of the Nineteenth Century (4) (II. The Staff 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. General Education credit: Civilization and Culture.

155. American Philosophy (4) (I. 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 Analytical Philosophy (4) (I. R. Heim 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 work by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen.

159. Phenomenology and Existentialism in France (4) (II. The Staff Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century German thinkers such as Husserl, Heidegger, Jaspers.

160. Pre-Socratic (4) (II. 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, Heraclitans, Parmenides, Empedocles, Democritus, and theatomists.

161. Plato (III. 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 mid and later writings. Offered in alternate years.

162. Aristotle (4) (III. W. Wolowiec 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.


169. Spinoza (4) (I. I. Arion Lecture/discussion—4 hours. Prerequisite: course 22.

170. Leibniz (4) (I. I. Arion 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. I. Arion 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) (I. I. Arion 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) (I. I. Arion Lecture/discussion—4 hours. Prerequisite: course 23. Intensive examination of the Critique of Pure Reason. Topics include the external world, the nature of human cognition, space and time, substance and causality, freedom and determinism, and the existence of God. Offered in alternate years.
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
Wendel H. Potter, Ph.D., Vice Chairperson of the Department
Department Office, 225 Physics/Geology Building (016-752-1500)

Faculty
Robert H. Becker, Ph.D., Professor
Frank P. Brady, Ph.D., Professor
Steven Carlip, Ph.D., Associate Professor
Daniel A. Cetra, Ph.D., Assistant Professor
Ling-La Chay, Ph.D., Professor
Shirley Chiang, Ph.D., Professor
Lawrence B. Coleman, Ph.D., Professor, Academic
Senate Distinguished Teaching Award
Linton R. Cornucini, Ph.D., Professor
Charles C. Fadley, Ph.D., Professor
Ching-Yao Feng, Ph.D., Professor
John F. Gunion, Ph.D., Professor

Applied Physics

B.S. Major Requirements:

Preparatory Subject Matter

Chemistry 3A-2B-2C or 2A-2B-2CH, 45

Any recommended courses for a particular concentration.

Depth Subject Matter (Common Core)


*Course not offered this academic year.
Minor Program Requirements:

Three distinct minors are offered, all requiring prerequisites equivalent to Mathematics 21A-21B-21C-21D and 22A-22B-22C and Physics 1A-1B-9C-9D. Students considering the possibility of earning a Physics minor should consult with a Physics major advisor before beginning work in one of these minor programs.

UNITs

Physics 18-24

Classical Physics emphasis


(fall if quarter courses, 104A, 105A, 110A, 112A, are taken in different years, 104A and 110A should be taken the first year, course 105C does not require 105B.)

Quantum Physics emphasis

Physics 104A, 105A-105B, 112A

(Physics 104A-104B and 105A-105B must precede 115A-115B. Physics 110A recommended.)

General Physics emphasis

Physics 104A, 104B, 105A-105B, 105C, 110A, 112A

(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 in physics. In general, the same programs are offered which are authorized for the Ph.D. degree with an emphasis within the field of physics.

Note: Faculty listed for each course are well acquainted with the course, but may not teach this year.

Lower Division Courses

1A. Principles of Physics (3) I, II. McClain

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 practical situations. Students who have completed course 5A or 9A. 1B. Principles of Physics (3) II. McClain

Lecture—3 hours. Prerequisite: course 1A or 9A, and consent of instructor. Dynamics and statics. Introduction to general principles and analytical methods used in physics with an emphasis on applications in practical situations. Students who have completed course 5C or 9C, or 9D. 5A. General Physics (4) I, II. The Staff

Lecture—3 hours, laboratory—2.5 hours. Prerequisite: Mathematics 16B (may be taken concurrently.) Mechanics and fluids. Introduction to general principles and analytical methods used in physics. Primarily for biological science majors. Students who have had course 9A may not receive credit for 5A. Students who have had course 1A may receive only 2 units of credit.

5B. General Physics (4) II, III. The Staff

Lecture—3 hours, laboratory—2.5 hours. Prerequisite: course 5A or 9A with consent of instructor and Mathematics 16B, or Physics 5 or 9A. Kinetic theory and thermodynamics, wave phenomena, optics. Students who have had course 9B may not receive credit for course 5B. Those who have had course 1B may receive only 2 units of credit.

5C. General Physics (4) I, II. The Staff

Lecture—3 hours, laboratory—2.5 hours. Prerequisite: course 9B. Continuation of course 5B. Electricity and magnetism, modern physics. Students who have had course 9C may not receive credit for course 5B. Those who have had course 1B may receive only 3 units of credit.

7A. General Physics (4) I, II. Coleman, Potter

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 5A, 5B, or 1A.

7B. General Physics (4) II, III. Coleman, 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 5B, 5C, or 1B.

7C. General Physics (4) III. 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 5C or 5E.

9A. Classical Physics (4) I. 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 sci-
ence and engineering majors. Only two units of credit allowed for students who have completed course 1A.

9B. Classical Physics (4) (I). The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9A or 5A with consent of instructor. 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 10SA. Only 1 unit of credit allowed to students who have completed course 5B.

9C. Classical Physics (4) (II). The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9B; Mathematics 21C; Mathematics 21D (may be taken concurrently). Continuation of course 9B. Electricity and magnetism including circuits and Maxwell’s equations. Only one unit allowed to students who have completed course 5C.

9D. Modern Physics (4) (III). The Staff
Lecture—3 hours; discussion—1.5 hours. Prerequisite: courses 9C and Mathematics 22A; Mathematics 22B recommended (may be taken concurrently). Introduction to the basic concepts developed in the late 19th and early 20th centuries. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics. Only two units of credit allowed to students who have completed course 5C.

9HA. Honors Classical Physics (4) (I). The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: high school physics, Mathematics 21A-21B with at least a B average (or by recommendation of academic adviser). Same material as in course 9A, but in greater depth. Only 2 units of credit allowed for students who have completed course 1A or 5A.

9HB. Honors Classical Physics (4) (II). The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9HA (or course 9A with recommendation of course 9A instructor or academic adviser); Mathematics 21C; Mathematics 21D (may be taken concurrently). Continuation of course 9HA. Same material as in course 9B, but in greater depth. Only 2 units of credit allowed for students who have completed course 5B.

9HC. Honors Classical Physics (4) (II). The Staff
Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9HB (or course 9B with recommendation of course 9B instructor or academic adviser); Mathematics 21D; Mathematics 22A (may be taken concurrently). Continuation of course 9HB. Same material as in course 9C, but in greater depth. Only 2 units of credit allowed for students who have completed course 5C.

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 3 units of credit allowed for students who have completed course 5C.

10. Basic Concepts of Physics (4) (I, II). The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of basic principles: motion, gravitation, electricity and magnetism, light, relativity, atoms, quanta, nuclei, elementary particles. Includes lecture, laboratories, and elementary problem solving. Check with the department office for the emphasis (history/philosophy, energy/environment, natural phenomena, etc.) each quarter. Students who have had any other physics course (except 137, 140) will not receive credit for course 10. General Education credit: Nature and Environment.

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 Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May not be repeated for credit. Limited to 1 unit per quarter.

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) II. Chau
Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C- or better; consent of department; course 104A passed with a grade C- or better or consent of department required for 104B. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

105A-105B. Analytical Mechanics (3-3-3) III. 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 passed with a grade C- or better or consent of department required for 105B. Principles and applications of analytical mechanics; introduction to Lagrange’s and Hamilton’s equations.

105AL. Computational Laboratory in Mechanics (1) I. Rousse
Laboratory—3 hours. Prerequisite: Engineering 5 or the equivalent. Continuation of course 105A; an 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. Rousse
Laboratory—3 hours. Prerequisite: course 105A; course 105B concurrently. Computer application of numerical and graphical methods in mechanics. (P/NP grading only.)

106C. 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. Continuum mechanics.

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, elementary particle physics, and atmospheric science. Study of modern optical instruments. 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. Electricity and Magnetism (3-3-3) I-II. 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.

112A-112B. Thermodynamics and Statistical Mechanics (3-3-3) I-II. Webb
Lecture—3 hours. Prerequisite: course 105B or 115A or equivalent. Introduction to statistical mechanics and thermodynamics.

115A-115B. Introduction to Quantum Mechanics (3-3-3) III-I. Feng, Carlip
Lecture—3 hours. Prerequisite: for 115A—courses 104B and 105B passed with grade C- or better, or consent of department; for 115B—115A passed with a grade of C- or better, or consent of department. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4) I. 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. Foundations of Atomic and Molecular Physics (4) III. McColm
Lecture—3 hours; outside work—9 hours. Prerequisite: course 9D; Mathematics 21C. The phenomena of atomic physics and molecular physics. Nuclear structure and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state.

122A. Advanced Physics Laboratory: Atomic/Solid-State (3) I. I. Chiang
Laboratory—8 hours. Prerequisite: course 9D. Experimental techniques and measurements in atomic and solid-state physics; e.g., spectroscopy, optical pumping, magnetic resonance, superconductivity, semiconductors, ferromagnetism. The student performs three to six experiments depending on difficulty. Individual work is stressed.

122B. Advanced Physics Laboratory: Nuclear/High Energy (3) II. Pellett
Laboratory—8 hours. Prerequisite: course 9D. Similar to course 122A with experiments in gamma-ray coincidence, Møssbauer Effect, Rutherford scattering, muon lifetime, others. Student performs three to six experiments; some of these may be chosen from course 122A.

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) I. Brady
Lecture—3 hours. Prerequisite: course 115A. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics.

129B. Nuclear Physics (4) II. Brady
Lecture—3 hours; outside work—9 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A.

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.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungerman, Craig (Applied Science)
Lecture—3 hours. Prerequisite: upper division standing in one course from: 100C, SC; 137. 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, CBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. General Education credit: Contemporary Societies or Nature and Environment. (Same course as Applied Science Engineering 137.)

140A. Introduction to Solid-State Physics (3) II. Klein
Lecture—3 hours. Prerequisite: course 115A or 9D, and consent of instructor. Survey of basic concepts and classification of solid-state phenomena in solids. Crystal structure, phonons, simple metals.

*Course not offered this academic year.
nuclear physics. May be repeated for credit. (SU grading only)

*202. 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. (SU grading only)

*203. 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. (SU grading only)

*285. 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. (SU grading only)

*297. Research on the Teaching and Learning of Physics (3) III. Potter Seminar—9 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.

*296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only)

*298. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU 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. (SU grading only)

Physiology

See Biological Sciences: Section of Neurobiology, Physiology and Behavior; Human Physiology (Medicine, School of); and Plant Biology

Physiology

(A Graduate Group)

James H. Jones, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (916-752-9022)

Faculty. Consists of more than 70 faculty members drawn from 20 departments in the College of Agriculture and Environmental Sciences, the College of Letters and Science, 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, gastrointestinal, metabolic, neuro-., systemic, and domestic animal physiology. For information regarding these programs, address the Program Staff at the above location.

Graduate Advisers. J.M. Horowitz (Neurobiology, Physiology and Behavior); J. Roser (Animal Sciences); and W.J. Weidner (Neurobiology, Physiology and Behavior).

Graduate Admissions Officer. T. Adams (Animal Sciences).

Courses in Physiology (PGG)

Graduate Courses

200L. Animal Cell Culture Laboratory (4) II. B. Wilson Discussion—2 hours; laboratory—6 hours. Prerequisite: course in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Techniques of cell culture, with emphasis 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. Advanced Physiology (6-6) III-III. Jones Lecture—5 hours; discussion—1 hour. Prerequisite: graduate student in the Physiology Graduate Group Ph.D. program, or consent of instructor. Advanced course on general physiology. Review of neuroendocrine, homeostasis, cellular, neurophysiology, cardiovascular, respiratory, renal, endocrine, gastrointestinal, metabolic, reproductive, exercise, comparative, environmental and integrative physiology.

*212. Principles of Electrons for Biologists (2) III. Horowitz, Scober Lecture—1 hour; laboratory—3 hours. Prerequisite: Physics 5A, 5B, 5C, and Mathematics 16A, 16B, 16C or the equivalent. Principles of electrophysiology applied to biological measurements. Focuses on the interconnection of laboratory instruments including filters and computers. Topics covered include: Recorder networks; operational amplifiers; digital gates; computer interfacing; and programming.

214. Neuropathology (4) III. Carstens Lecture—4 hours. Prerequisite: Neurobiology, Physiology and Behavior 111B, 112, consent of instructor. Electrical activity of neurons and neuroreceptor functions; physiology of the nervous system as studied by its electrical activity.

*216. Neurophysiology Laboratory (3) III. Horowitz, Scober Discussion—2 hours; laboratory—8 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 neurophyysiology research.

216. Neurophysiology Literature (3) I. Rappone 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 origins. Required of all physiology graduate students.

217. The Vertebrate Eye (2) II. Stillman Seminar—1 hour; lecture/discussion—1 hour. Prerequisite: graduate standing in biology and 129F 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) III. Weidner Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Selected topics 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 for credit. (SU grading only)

219. Muscle Growth and Development (3) II. R. Carlsen (Human Physiology) Lecture—2 hours; seminar—1 hour. Prerequisite: Biological Sciences 104 or the equivalent. Theory of muscular growth and development. Integration of growth and development of skeletal and smooth muscle. Research in biochemistry, cell biology, and neural control mechanisms, circulatory and nutritional factors, prenatal and maternal factors, and extrauterine factors. Experimental and hereditary myopathies. Offered in alternate years.

220. General and Comparative Physiology of Reproduction (3) I. Anderson (Animal Science); Laskey (Reproduction) Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110, 110L, Biological Sciences 101, 102. Basic phenomena of sexual and asexual reproduction and comparison of prokaryotes in a wide variety of animal groups; general control mechanisms; fertilization; neuroendocrine mechanisms in mammalian and invertebrate 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 physiological aspects of events in the mammalian gametogenesis and fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding of reproduction 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 endocrine research. Critical review of recent literature and discussion of future research strategies in the area. May be repeated for credit when topic differs.

231. Neuroendocrinology (3) II. Woycke Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or equivalent and consent of instructor. General aspects of neuroendocrine mechanisms and the role of hormones and growth factors in sexual differentiation and brain development. The role of hormones and growth factors in sexual differentiation of the brain.

234. Neurophysiological Basis of Neurotoxicology (3) I. Woycke Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent. Basic understanding of neurophysiological mechanisms of action at the cellular and systemic level of a number of different neurotransmitters and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Environmental Toxicology 234.)

234. 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 treatment and rehabilitation; and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual rhythms; shift-work, jet lag and sleep disorders. Offered in alternate years.

275. Neurohumoral Regulatory Mechanisms of Thermogenesis (3) II. Horowitz, Horowitz Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 or the equivalent and consent of instructor. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeothermic (primarily mammals) with respect to regulation (hypothalamic and central nervous control) and effector mechanisms (basal heat generation at the target cell).

*Course not offered this academic year.
Plant Biology

See Agricultural Systems and Environment; Biological Sciences: Section of Plant Biology; Plant Biology (below); and Plant Biology (A Graduate Group)

Plant Biology

Thomas L. Rost, Ph.D., Acting Chairperson of the Section
Section Office, 143 Robbins Hall (916-752-0817)

Committee in Charge
John J. Harada, Ph.D. (Plant Biology), Chairperson
Judith Jernefelt, Ph.D. (Agriculture and Range Science)
Catalyn Napoli, Ph.D. (Environmental Horticulture)
Robert M. Thorn, Ph.D. (Plant Biology)
Alan Stenler, Ph.D. (Plant Biology)
John Yoder, Ph.D. (Vegetable Crops)

Faculty
Faculty includes members of the Departments of Agricultural 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.

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, and ecology.

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) applied plant biology; (2) plant ecology and evolution; (3) general plant biology; and (4) 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.

Core Alternatives
A Plant Biology degree is an excellent credential for a variety 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 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, and 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:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B-1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 2A-2B, 8A-8B</td>
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Total Units for the Major: 35-42

B.S. Major Requirements:

Preparatory Subject Matter

<table>
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<th>Course</th>
<th>Units</th>
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<td>Biological Sciences 1A-1B-1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 2A-2B</td>
<td>15</td>
</tr>
<tr>
<td>Mathematics 1A-1B-1C</td>
<td>9</td>
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<tr>
<td>Physics 5A-5B-5C</td>
<td>12</td>
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<tr>
<td>Agricultural Sciences and Environment 103 or Statistics 33, 122, 100, or 102</td>
<td>3-4</td>
</tr>
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</table>

Total Units for the Major: 60-61

Plant Biology option

Evolution and Ecology 100, Plant Biology 112, Plant Science 107, or Plant Science 117 | 3 |

Plant Science 101 or 103 | 3-4 |

Plant Science 140, 145 | 3 |

Molecular and Cellular Biology 120L, Plant Biology 111L, Plant Science 107L, 112L, or Vegetable Crops 191L | 3-6 |

Total Units for the Major: 12-13

Evolution and Ecology option

Evolution and Ecology 100 | 4 |

Plant Biology 117 or Plant Science 107 | 4 |

Plant Science 101 or 103 | 3-4 |

Total Units for the Major: 12-13
Plant Physiology, Development and Molecular Biology

Course Lists

Applied Plant Biology

Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 116, 120, 170A, 170B, 178, 185; Atmospheric Science 133; Entomology 100, 100L, 110, 119, 119L, 125; Environmental Horticulture 102, 105, 107, 120, 125, 135, 133; Environmental Toxicology 101; Hydrologic Science 124; International Agricultural Development 101; Meteorology 100, 110; Plant Biology 100, 120, 121, 122, 125; Plant Pathology 120, 125; Plant Science 101, 103, 104, 105, 107, 109, 110, 112, 113, 114, 115, 116, 122, 126, 135, 140, 145, 191, 191L, 196; Forestry 103; Range Science 100, 103, 133; Range Science 103; 105, 103; Viticulture and Enology 101A, 101B, 101C, 110, 116, 118.

Ecology

Agricultural Systems and Environment 112; Environmental Studies 100, 121, 123, 124, 126, 126L, 150C, 151, 151L, 155, 155L, Evolution and Ecology 121, 138; Hydrologic Science 122, 122L, 124; Plant Biology 117, 121; Plant Science 101; Range Science 133, 134.

Evolution and Diversity

Evolution and Ecology 100, 102, 140, 144, 149; Plant Biology 102, 106, 116, 118, 119; Plant Science 103, 103, 114.

Plant Physiology, Development, and Molecular Biology

Environmental Horticulture 133; Molecular and Cellular Biology 126; Plant Biology 125, 135; Plant Pathology 130; Plant Science 102, 105, 107, 122, 126, 140.

Total Units for the Major: 105-106

Master Adviser: Contact A. Stener, Plant Biology Section Office, 143 Robbins Hall

Minor Program Requirements:

To satisfy the requirements for a Plant Biology minor, a student must complete Biological Sciences 1C (or equivalent introductory plant biology course).............5

Upper division units including at least one course from each of the four groups below..............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, Plant Science 103.


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 section and the appropriate College section for Dean’s Honors List information.

Teaching Credential Subject Representative: R. M. Thornton (Section of Plant Biology), 218 Robbins Hall. See also the Teacher Education Program.

Graduate Study: Consult the Plant Biology Graduate Group listing.

Courses in Plant Biology (PLB)

Lower Division Courses

10. Plants, People and the Biosphere (3) I. Canington

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 botanical knowledge. All students are strongly encouraged to enroll. General Education credit: Nature and Environment. Not open for credit to students who have completed Botany 10. (Former course Botany 103.)

92. Internship (0-12) I, II. 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 faculty. Not open for credit to students who have completed 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.)

Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisites: consent of instructor. (Former course Botany 99.) (P/NP grading only.)

Upper Division Courses

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, ecological, 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. Host

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 processes. Not open for credit to students who have completed Botany 105. (Former course Botany 105.)

108. Systematic Botany of Flowering Plants (5) III. The Staff

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Laboratory and field studies of the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of specific species by means of keys. Not open for credit to students who have completed Botany 108. (Former course Botany 108.)

111. Plant Physiology (3) I, II

Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B (may be taken concurrently; Physics 5A, 5B, 5C recommended. Fundamental activities of plants; the plant cell as a functioning unit. Processes of absorption, movement, and distribution of water and solutes; reproduction, photosynthesis, respiration. Not open for credit to students who have completed Botany 111. (Former course Botany 111.)

111D. Problems in Plant Physiology (1) I. O’Neill

Discussion—1 hour. Prerequisite: course 111 concurrently. Discussion of problems and applications related 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. Stemmer

Lecture-discussion—1 hour; laboratory—9 hours; extensive writing. Prerequisite: course 111 (may be taken concurrently). Prerequisite: consent of instructor (both recommended). Introduction to basic experimental techniques such as 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) III. Thornton

Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B and 111L and Biological Sciences 102 recommended. Processes, dynamics, and control of growth and development. Modeling. Not open for credit to students who have completed Botany 112. (Former course Botany 112.)

112D. Problems in Plant Growth and Development (1) I. Thornton

Discussion—1 hour. Prerequisite: course 111D concurrently. Discussion of problems and applications related 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.)

116. Plant Development and Evolution (4) II. Geratelli

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory plant biology (i.e., Biological Sciences 1C). Introduction to form, development and evolution of vascular plants. Emphasis is given to the development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Structure-function relationships are also considered with respect to changing environments. Not open for credit to students who have completed Botany 116. (Former course Botany 116.)

117. Plant Ecology (4) I. Pearcy

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, vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for course 101. (Same course as Evolution and Ecology 117.) Not open for credit to students who have completed Botany 117. (Former course Botany 117.)

118. Introduction to Phylogeny (4) II. The Staff

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Comparative morphology, physiology, developmental biology of the major algal groups, including cyanobacteria. Focus is on phylogeny through serial endosymbioses. Laboratories study living organisms and have identification exercises. Ecological factors and commercial uses are considered. Not open for credit to students who have completed Botany 118. (Former course Botany 118.)

119. Introductory Mycology (5) I. MacDonald

(Lect) 3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to structure, taxonomy, and morphology of selected classes of the major divisions of the fungi. Not open for credit to students who have completed Botany 119. (Former course Botany 119.)
Plant Biology
(A Graduate Group)

Vito S. Polito, Ph.D., Chairperson of the Group
Office, 152 Robbins Hall (916-756-7034/FAX 916-752-6040)
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 is designed to prepare students for 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 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, molecular biology, population biology, systematics, and weed science.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic achievement 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.

120. Introduction to Weed Science (3) BI
Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 9A, 9B.
Principles of weed science including mechanical, biological, and chemical control methods. Weeds in control in crop, pasture, range, brush, forrest, aquatic, and non-agricultural habitats. Application of herbicides. Sight identification of common weeds and demonstrations to illustrate the principles. Not open for credit to students who have completed Botany 120. (Former course Botany 120.)

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, herbicides and permethrin digestion, application of herbicides. Sight identification of common weeds and demonstrations to illustrate the principles. Not open for credit to students who have completed Botany 120. (Former course Botany 121.)

122. Action of Herbicides (3) III, Rejmanek
Lecture—2 hours; laboratory—3 hours. Prerequisite: course Botany 120. Soil Science 100, courses 111, 110 recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants and soils, herbicides on plant population. Physical and molecular fate of herbicides in soils. Not open for credit to students who have completed Botany 122. (Former course Botany 122.)

125. Molecular Biology of Plant Development (3) Harada
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.)

135. Mineral Nutrition of Plants (4) II, J. Richards (Land, Air and Water Resources) and 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. (Same course as Plant Science 135.) Not open for credit to students who have completed Botany 155. (Former course Botany 135.)

150. 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 Water Science 122 recommended. Brief survey of common freshwater macrophytes, their reproductive modes, anatomy, growth (photosynthesis, nutrient utilization), development (morphological interactions), ecology and management. Offered in alternate years. Not open for credit to students who have completed Botany 150. (Former course Botany 150.)

185. Experiments in Plant Biology: Design, Analysis, and Execution (3) I, II, III
The Staff
Lecture/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, or the equivalent course in physics/chemistry, 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 185.) (P/NP grading only.)

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.)

*Course not offered this academic year.

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, 302; 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, Sachs (Environmental Horticulture), Labavitch (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 relationships, affecting crop production and quality. Offered in alternate years. (P/NP grading only.)

205A. Advanced Plant Physiology (3) III, Lucas
Lecture—3 hours. Prerequisite: Plant Biology 112; Chemistry 107A or consent of instructor. Cellular physiology, water relations, translocation, and membrane transport.

205B. Advanced Plant Physiology Laboratory (3) II, Stermer (Thelig)
Laboratory—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 Laboratory (3)
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.

206A. Advanced Plant Physiology Laboratory (3) III, Lucas
Laboratory—6 hours; term paper; prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

206C. Advanced Plant Physiology Laboratory (3)
The Staff
Lecture—4 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

208B. 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, Peary
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, Peary
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) II, Bayer
Lecture—3 hours. Prerequisite: Plant Biology 112, 122. Study of the fundamental processes involved in
352 Plant Pathology

the physiological action of herbicides. Detailed consid-
eration of the fate of herbicides in plants.

214. Higher Plant Cell Walls (3) I. Labavitch

(Potato Virus Y: Mechanistic Aspects of Cellular
Structure). Lecture—2 hours; discussion—1 hour. Prerequisite:
Plant Biology 112, a course in biochemistry. Lectures focus
on the structure, analysis, synthesis, and develop-
ment-related aspects of cell walls. Discussions center
on analysis of scientific papers related to lec-
ture topics. Offered in alternate years.

215. Light and Plant Growth (3) II. Bornner

Lecture—3 hours; discussion—1 hour. Prerequisite:
205A, 205B, 205C. Mechanisms and phenome-
on involved in the control of plant growth by light.
Phototropism, photomorphogenesis, phototropism,
and certain aspects of photosynthesis. Course offered
in alternate years.

216. Advanced Topics in Animal Nutrition (4)

II. L. L. L. L. (Land, Air and Water Resources)

Lecture—3 hours; discussion—1 hour. Prerequisite:
Plant Biology 135 or consent of instructor. Cellular
compartmentation of mineral elements, raw and
results; selected topics in absorption, transloca-
tion, 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) II.

Bennett, L. (Vegetable Crops)

Lecture—2 hours; discussion—1 hour. Prerequisite:
Plant Biology 112 and Biological Sciences 103, or
consent of instructor. Structure, biogenesis, and
function of plant membranes. Emphasis will be placed
on the molecular basis of plant membrane functions
and on the role of membranes in selected physiologi-
cal processes. Offered in alternate years.

218. Advanced Concepts in Plant Cell Biology:

Cell Biogenesis (3) III. Bennett, T. (Vegetable Crops)

Lecture—3 hours; discussion—1 hour. Prerequisite:
Biological Sciences 102, 103. Survey of membrane
and cell wall components and mechanisms of cell
biosynthesis, as well as selected membrane phenomena.
Topics include signal transduction, membrane biogenesis,
and sequencing. Offered in alternate years.

219. Advanced Concepts in Plant Cell Biology:

Signal Transduction and Intercellular

Communication (3) III. Lucas, L. (Vegetable Crops)

Lecture—3 hours; discussion—1 hour. Prerequisite:
Biological Sciences 103 or consent of instructor. Intracellular
signal transduction pathways in the plant cells as well as
other long-term, adaptive responses which involve sig-
nals transmitted between plant cells. Weekly lectures
and present/absent discussions on current literature.
Offered in alternate years.

220. Plant Developmental Biology (4) III.

Rost, J. (Vegetable Crops)

Lecture—3 hours; discussion—1 hour; term paper:
Prerequisite: plant anatomy, physiology, and bio-
chemistry. A survey of the concepts of plant develop-
ment and organization. Examines plant cells, tissues,
and organs with special emphasis on experimental
evidence for mechanisms regulating developmental
processes.

221. Special Topics in Plant Physiology (2)

II. The Staff

Discussion—1 hour; seminar—1 hour. Analysis in
depth of recent advances in plant physiology. Lectures
and discussions by research specialists. Term paper
integrating and analyzing lectures required. May be repeated for credit. (SU graded only)

222. Special Topics in Plant Morphology,

Systematics, Evolution (2) II. The Staff

Seminar—2 hours. Analysis of recent advances in
plant structure and evolution. Lectures and discus-
sions by research specialists. Term paper integrating
and analyzing lectures required. May be repeated for
credit. (SU graded only). Offered in alternate years.

223. Special Topics in Scientific Method (2)

II. Bradford

Discussion—2 hours. Examine the historical and
philosophical background of the scientific method.

224. Analyze the rational perceptual, causal, creative and
social aspects of scientific knowledge. Clarify
the roles of quantitative and qualitative in scientific
research. (SU graded only)

225. Plant Molecular Biology (4) IV. Harada, B.

Biology/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 regulation, mechanisms of gene
regulation, gene transfer, and special topics related
to development and response to biological and environ-
mental stimuli.

227. Plant Molecular Biology Laboratory (5)

II. Harada, B. (Vegetable Crops)

Lecture—2 hours; laboratory—10 hours. Prerequisite:
Molecular and Cellular Biology 120L; a course in mol-
ecular genetics and consent of instructors. Research
methods in molecular plant 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 Vegetable Crops 228)

228. Molecular Biology of Plant Reproduction

(3) IV. O'Neill

Lecture—3 hours. Molecular genetic basis of plant
reproduction. Emphasis on understanding develop-
mentally 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 microscopy, electron specimen interactions,
and vacuum systems.

231L. Biological Electron Microscopy

Laboratory (1) I. Falk

Laboratory—9 hours. Prerequisite: consent of instruc-
tor; course may be taken concurrently. Introduction
to biological electron microscopy. Areas covered are:
specimen preparation and microscope operation.
Limited enrollment.

233. Biological Nitrogen Fixation (3) III.

Phillips, P. (Vegetable Crops)

Lecture—2 hours; laboratory—6 hours. Prerequisites:
Plant Biology 108, Evolution and Ecology 100 recom-
manded. Principles of plant taxonomy, phylogenetic
vs. phenetic classification; examples of the way in
which various disciplines—taxonomy, embryology, bio-
chemistry, 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 106. Plant Biology 117 and Evolution
and Ecology 100 recommended. Application of ex-
perimental 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 taxon-
mology; the application of population sample analysis,
cytogenetics, transplant studies, etc., to the solution
of taxonomic problems and the clarification of rela-
tionships. 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. (SU graded only)

290B. Seminar (1) I, II, III. The Staff

Seminars presented by visiting scientists on research topics of current interest. (SU graded only)

290C. Research Conference in Botany (1) I, II,

III. The Staff

Discussion—1 hour. Prerequisite: graduate standing
and consent of instructor. Presentation and discus-
sion by faculty and graduate students of research
projects in botany. May be repeated for credit. (SU graded only)

291. Graduate Student Seminar in Plant

Biology (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: graduate student
standing. Student-presented seminars on topics in
plant biology, with critiques by instructor and peers.
How to give seminars, including preparation of visual and
other teaching aids. Topics determined by instructor.
May be repeated for credit. (SU graded only)

292. Seminars in Plant Biology (1) I, II, III.

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. (SU graded only)

295. Seminar in Mycology (1) I. Butler (Plant
Pathology)

Seminar—1 hour. Review and evaluation of current
literature and research in mycology. (SU graded only)
(Same course as Plant Pathology 295)

297T. Tutoring in Plant Biology (1-5) I, II, III.

The Staff

Tutoring—3-15 hours. Offers graduate students, par-
ticularly those not serving as teaching assistants, the
opportunity to gain teaching experience. (SU graded only)

299B. Group Study (1-5) I, II, III. The Staff

Prerequisite: graduate standing

299A. Research (1-12) I, II, III. The Staff

Prerequisite: graduate standing. (SU graded only)

Professional Course

300. The Teaching of Plant Biology (2) I, II, III.

The Staff

Discussion—2 hours. Prerequisite: graduate stand-
ing, concurrent appointment as a teaching assistant
in Plant Biology. Consideration of the problems
of teaching botany, especially of preparing for and con-
ducting discussions, guiding student laboratory work,
and the formulation of questions and tests for exam-
inations. (SU graded only)

Professional Course

401. Functioning as a Professional Beyond

UCD (2) I. Phillips

Lecture/discussion—1 hour; seminar—1 hour. Prereq-
quisite: graduate standing as M.S. or Ph.D. candidate.
Students will develop a letter of application, a curricu-
num vitae, a statement of teaching and/or research interest, and a job interview seminar for a position
advertised in their area of professional specialization.
Group discussions will provide constructive sugges-
tions for strengthening individual presentations.
Offered in alternate years. (SU graded only). Former
course Agronomy 401

Plant Pathology

(College of Agricultural and Environmental Sciences)

James J. Marois, 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
C. Civerolo, Ph.D., Lecturer
Michael R. Davi, Ph.D., Lecturer

*Course not offered this academic year.*
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 (4-5) I, II. Extra-session summer. van Bruggen
Lecture—2 hours; laboratory—3 hours; fieldwork—6 hours; research paper term. Prerequisite: course 120; Plant Biology 119 or course 121. 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 pest management. Field trips and laboratory exercises related to disease diagnosis. (Deferred grading only, pending completion of sequence.)

205A-205B. Diseases of Fruit, Nut, and Vine Crops (3-4) I, II. Extra-session summer. Kirkpatrick
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Plant Biology 119. Clinical study of fruit, nut, and vine crops with emphasis on ecology, epidemiology, disease diagnosis, and control. (Deferred grading only, pending completion of sequence.) Course 205B may be taken concurrently. Offered in alternate years.

208. Ecology of Plant Pathogens and Epidemiology of Plant Diseases (4) III. Dunway
Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or equivalent. Analysis of the ecology of 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 agricultural and soil environment. Offered in alternate years.

209. Principles of Plant Disease Control (3) II. Webster
Lecture—3 hours. Prerequisite: course 120 or 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—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 disease 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 pathogenesis, 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) III. Holland, Tyler
Lecture—3 hours. Prerequisite: graduate standing in a biological science. Biological Sciences 101, 103, Molecular and Cellular Biology 161, Plant Biology 119, or course 121. Advanced study of the molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; plant pathogenesis; reproduction; endophyte transformation; and gene manipulation. Offered in alternate years. (Same course as Biological Chemistry 217.)

224. Pathogenic Fungi (5) III. The Staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: Plant Biology 119. Morphology and taxonomy of plant pathogenic fungi. Offered in alternate years.

225. Plant Virology (5) II. Bruening, Falk
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Viruses as causative 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—3 hours. Prerequisite: course 120, Plant Biology 119, 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 (1-1) 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 (1-1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussion of research activities in the area of advanced plant pathology. Primarily designed for graduate students. (S/U grading only.)

291. Seminar in Host-Parasite Physiology (1-1) I, II. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: course 120. Review and evaluation of current literature and research in host-parasite physiology. (S/U grading only.)

292. Seminar in Plant Virology (1-1) I, II. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: course 205. Review and evaluation of current literature and research in virology. (S/U grading only.)

293. Seminar on Soil Microbiology and Root Disease (1-1) I, II. Van Bruggen, Dunway
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 the seminar leads the discussion on this topic. (S/U grading only.)

294. Seminar on Plant Epidemiology (1-1) I. van Bruggen, Marrick
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 the seminar leads the discussion on this topic. (S/U grading only.)

295. Seminar in Mycology (1-1) I, II. The Staff (Chairperson in charge)
Seminar—1 hour. Review and evaluation of current literature and research in mycology. (S/U grading only.) (Same course as Plant Biology 236.)

296. Special Group Study (1-15) I, II, III. The Staff (Chairperson in charge)

299. Research (1-15) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

Courses in Plant Pathology (PLP)

Upper Division Courses

125. Introduction to Plant Pathology (4) I. Gilchrist, Falk; III. The Staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C, Microbiology 2 recommended. The nature, cause, and control of plant diseases.

125. Diagnosis and Control of Plant Diseases (4) III. MacDonald
Lecture—3 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of vegetable crops. Students may specialize in fungicides, fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Offered in alternate years.

130. Physiology of Fungi (3) I. Gilchrist, Bostock
Lecture—3 hours. Prerequisite: Biological Sciences 1C, Biological Sciences 103 and Plant Biology 119 recommended. Discussion of the nature and interrelationships of fungal cell structure, growth, spore germination, nutrition, and metabolism with emphasis on responses of fungi to environmental changes. Selected examples of beneficial and destructive roles of fungi will also be considered. Offered in alternate years.

140. Agricultural Biotechnology, Ethics and Public Policy (4) III. Marois, Jolly (AgroEcology Economics)

192. Internship (I-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: course 120 and consent of instructor. Lectures and supervised field experience off 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.)

Plant Physiology

See Biological Sciences: Section of Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)
Plant Protection and Pest Management
(A Graduate Group)
Lester E. Ehler, Ph.D., 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 ongoing 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 may 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
261. Concepts and Systems of Plant Protection and Pest Management (4) II. Marots (Plant Pathology) Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisites: Agricultural Systems and Environment 120; Entomology 110; Plant Pathology 129; 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.

262A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents (4-4) I. Norris (Weed Science); II. Rosenheim (Entomology) Discussion—1 hour; fieldwork—9 hours. Prerequisites: 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.

280. Seminar (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only).

286. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only).

299. Research (1-12) I, II, III, summer. The Staff (Chairperson in charge) (SU grading only).

Plant Science
(College of Agricultural and Environmental Sciences)
Faculty, in the Departments of Agronomy and Range Science, Environmental Horticulture, Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology contribute to teaching courses in the plant science area.
Related Major Programs. Plant Science courses fulfill requirements in several majors, including Agricultural Systems and Environment, Biological Sciences, Environmental and Resource Sciences, International Agricultural Development, and Plant Biology.
Related Courses. See under Agronomy, Environmental Horticulture, Plant Biology, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

Admission into the Plant Science major is temporarily closed for the academic year 1986-87. Students should refer to the major programs listed above.

The Major Program
The plant science major trains students in the biological and natural sciences as they apply to the protection, production, and maintenance of crop plants, and their quality following harvest.

The Program. Students majoring in plant science 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. General background is provided by course offerings in the social sciences and humanities area (English, rhetoric, and economics) and by courses in areas supportive of plant science, such as entomology (the study of insects), weed science, genetics, water science, plant pathology, and plant physiology (plant processes and functions). At the upper division level, students may choose to specialize in one of the seven departmentally associated options or may choose general education by selecting the general Plant Science option.

Internships and Career Alternatives. Internships are available with local seed companies in farm production, and in extension work with farm advisers. For graduates, job opportunities exist in nursery and greenhouse management, farming, technical, and sales positions in agricultural businesses and associated enterprises, such as banking and equipment and supply companies, as well as in private, state, and federal service in consulting and research.

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. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Course Sequence</th>
<th>Units</th>
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<tbody>
<tr>
<td>English Composition Requirement</td>
<td>3-11</td>
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<tr>
<td>French or Spanish</td>
<td>0-4</td>
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<tr>
<td>Additional English (English 102 in plant science or related area, or English 104)</td>
<td>1-3</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>59-61</td>
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<tr>
<td>Computer science (Agricultural Science and Management 21)</td>
<td>3</td>
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<tr>
<td>Economics (Economics 1A or 1B)</td>
<td>5</td>
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<tr>
<td>Physics (Physics 1A-1B)</td>
<td>8</td>
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<tr>
<td>General Biology (Biology 1A-1B)</td>
<td>10</td>
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<tr>
<td>Organic chemistry (Chemistry 8A-8B)</td>
<td>8</td>
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<tr>
<td>Biological sciences (Biology 1A, 1B, 1C)</td>
<td>15</td>
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<tr>
<td>Plant science (Plant Science 2)</td>
<td>6</td>
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<tr>
<td>Mathematics (Mathematics 16A-16B)</td>
<td>6</td>
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<tr>
<td>Depth Subject Matter</td>
<td>36-37</td>
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<tr>
<td>Statistics (Agricultural Science and Management 150)</td>
<td>10</td>
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<tr>
<td>Soil science (Soil Science 105)</td>
<td>3</td>
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<tr>
<td>Weed science (Botany 120)</td>
<td>3</td>
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<tr>
<td>Entomology (Entomology 110 or 115)</td>
<td>4</td>
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<tr>
<td>Plant physiology (Plant Physiology 120)</td>
<td>4</td>
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<tr>
<td>Genetics (Genetics 100)</td>
<td>4</td>
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<tr>
<td>Water science (Water Science 104 or 105)</td>
<td>3-4</td>
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<tr>
<td>Plant nutrition (Botany/Plant Science 135 or Soil Science 109)</td>
<td>4</td>
</tr>
<tr>
<td>Select one of the following options</td>
<td>38-49</td>
</tr>
</tbody>
</table>

Agronomy Option
Specific course requirements | 20-21 |
Agronomy 100, 101L | 5 |

Additional courses to be selected with consent of the advisor from the following:

- Agricultural Economics 130, 130, 140, 150
- Agricultural Engineering 133, 133, 133, 133, 133
- Agricultural Science 140, 140, 140
- Agricultural Science 110, 110, 110, 110, 110
- Science 120, 120, 120, 120, 120
- Science 130, 130, 130, 130, 130
- Science 140, 140, 140, 140, 140
- Science 150, 150, 150, 150, 150

Courses offered in other production departments (e.g., Vegetable Crops, Pomology, Viticulture, and Enology, etc.) or in Range Science may be selected in consultation with advisor to satisfy specific individual goals.

Natural sciences electives, not to exceed 8 units, may also be included.

Floriculture/Nursery Management Option
Specific course requirements | 27 |
Environmental Horticulture 6, 105, 120, 125, 133 | 19 |
Plant Science 102, 108 | 8 |

Additional courses to be selected with consent of the advisor from the following:

- Agricultural Economics 18, 112, 113
- Agricultural Engineering Technology 114
- Agronomy 100, Botany 105, 111L
- Economics 11A, 11B
- Environmental Horticulture 107, 130
- Geology 3
- Landscape Architecture 40, 131, 155
- Microbiology 3
- Plant Pathology 125
- Plant Science 101, 112, 112L, 113
- Pomology 102
- Psychology 144
- Soil Science 105
- Vegetable Crops 101
- Viticulture and Enology 101B, 110, 110

Courses offered in the natural sciences may be selected in consultation with advisor.

Landscape Horticulture Option
Specific course requirements | 30 |
Environmental Horticulture 6, 105, 120, 130, 133 | 17 |
Landscape Architecture 40, 131, 135, 9
- Environmental Horticulture 107, 125

Additional courses to be selected with consent of the advisor from the following:

- Agricultural Economics 18, 112, Agronomy 100, Botany 105, Economics 11A, 11B, Environmental Horticulture 107, 125
- Geography 3
- Landscape Architecture 111
- Plant Pathology 125
- Plant Science 101, 105, 113, 115
- Pomology 101, Soil Science 105
- Vegetable Crops 101, 105, 113
- Wildlife

Courses offered in the natural sciences may be selected in consultation with advisor.

Plant Pathology Option
Specific course requirements | 38 |
Biological Sciences 102, 103, 106, 108, 110 | 7 |
Plant Biology 105, 119 | 10 |
Chemistry 2C | 5 |
Microbiology 102, 102L | 6 |
Nematology 100 | 4 |
Plant Pathology 125, 130 | 7 |

Plant Science Option
Specific course requirements | 46-49 |
Plant science (Plant Science 101, 102, 109, 113, 113L) | 11 |
Agricultural economics (Agricultural Economics 18, 113, 120, 130, 140, 140) | 3-5 |

*Course not offered this academic year.
Courses in Plant Science (PLS)

Questions pertaining to the following courses should be directed for instruction and additional courses related to Plant Science, see Plant Biology.

Lower Division Courses

1. Plants for Garden, Orchard and Landscape (2) I, III. Marrush (Vegetable Crops) Lecture—1 hour; laboratory—3 hours. For non-majors. Hands-on experience with plants cultivated for food, environmental benefit 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.

10. Plants and People (3) I. Bradford; II. Bennett, Michelmore; III. Nevin (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 the contribution of plants affect their utility. General Education: creative, cultural and environmental. 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.

92. Plant Science Internship (1-6) I, II, III, summer. The Staff. Internship—3-18 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to plant science. Internships supervised by a member of the faculty. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Rains (Agronomy and Range Science) in charge). Prerequisite: lower division standing. (P/N grading only.)

Upper Division Courses

101. Ecology of Crop Systems (4) II. Denison (Agronomy and Range Science) Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 and Soil Science 100, 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.

103. Evolution of Crop Plants (3) III. Gepts (Agronomy and Range Science) Lecture—3 hours. Prerequisite: course 10, Biological Sciences 101. Diversity of domestication of eukaryotic plants; principles of plant evolution; centers of origin, genetic diversity and germ plasm collections; implications in new agricultural developments; bioethical issues and relation to genetic resources.

104. Conservation of Plant Genetic Resources (3) I. Bliss (Pomology) Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 10 or Biological Sciences 10. Biological, social and ethical issues involved in plant genetic resources will be studied after becoming familiar with the human importance of heat-tolerant and covering germplasm utilization, property rights and strategies for conservation. General Education credit: Natural and Environmental Science.

105. 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 analysis and assessment of segregating populations.

107. Plant Cell, Tissue, and Organ Culture (4) II. Burger (Environmental Horticulture), Sutter (Pomology) Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Plant Biology 111, 112 (may be taken concurrently); consent of instructor. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryogenesis, anther culture, protoplast culture and transformation. Offered in alternate years.

109. Plant Propagation (4) II. 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 from cuttings, tissue culture and rooting. Emphasis on propagation methods covering anatomical, physiological, and practical aspects.

110. Rhizosphere Ecology (2) II. Phillips (Agronomy and Range Science) Lecture—2 hours; prereq: Agronomic Systems and Environment 2 or Biological Sciences 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.

112. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology), Reid (Environmental Horticulture), Sutter (Vegetable Crops) Lecture—3 hours; prerequisite: general plant science background recommended (e.g., Agricultural Systems and Environment 2, coursework in Food Science and Technology 2); concurrent enrollment in course 112L recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamental plants, fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres.

112L. Postharvest Physiology and Handling Laboratory (2) I. Kader (Pomology), Reid (Environmental Horticulture), Sutter (Vegetable Crops) Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112.

113. Plant Breeding (4) I. St. Clair (Vegetable Crops) Lecture—3 hours; demonstration-discussion—2-3 hours. Prerequisite: Biological Sciences 101 (may be taken concurrently). The principles of plant breeding applied to economic crops.

114. Biology, Evolution and Systematics in Agriculture (3) I. Rubatzky (Vegetable Crops) Lecture—2 hours; laboratory—3 hours. One or more field trips; written and oral reports. Prerequisite: upper division standing, Agricultural Systems and Environment 2. Taxonomic and ecological classification of the major crop and vegetable plants and wild relatives. Evolutionary relationships and trends in development of new cultivars. Not open for credit to students who have completed Vegetable Crops 105.

115. Biological Applications in Pomology (2) II. De Jong (Pomology) Lecture—1 hour, laboratory—3 hours. Prerequisite: Biological Sciences 1C or concurrent course in laboratory. Application of concepts in the study of commercially important temperate zone fruit and vegetable species. Not open for credit to students who have completed Pomology 101.

116. Principles of Fruit Production (4) II. Shaik (Pomology) Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C; course 115 recommended. Principles underlying cultural practices associated with fruit and nut production, including morphology and physiology of the developing buds, flowering, and fruit. Emphasis on commercially important temperate zone species. Not open for credit to students who have completed Pomology 102.
121. Plant Chromosome Variation, Behavior, and Engineering (4) II. Quirios (Vegetable Crops) Lecture—3 hours; laboratory—3 hours. Prerequisite: course 105 or consent of instructor. Chromosome composition, structure and morphology; methods of transmission, recombination, meiosis, evolution, and recombination; karyotype variants and analysis: structural changes, aneuploidy, polyploidy; genome analysis, manipulation and engineering. Techniques for chromosomal observation and identification. Marker assignment to chromosomes.

122. Physiological Genetics of Crop Plants (3) I. Jones (Vegetable Crops) Lecture—3 hours. Prerequisite: Biological Sciences 101; Plant Biology 111, 112, or consent of instructor. Principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels; genetic control, biochemical regulation and the impact of the environment on development of plants. Offered in alternate years.

126. Physiology of Environmental Stresses in Plants (3) II. Silk, Richards, L"uchth (Land, Air and Water Resources) Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Emphasis is on general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses.

135. Mineral Nutrition of Plants (4) III. Richards (Land, Air, and Water Resources), Brown (Pomology) Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Biology 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. (Same course as Plant Biology 135.)

140. 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.

141A. Plant Genetics and Biotechnology Laboratory (4) I. Wilkins, Quirios, Dandekar Lecture—4 hours; laboratory—4 hours. Prerequisites: course 105 and 140. Techniques of genetic analysis at the molecular and organismal levels, including segregation and linkage analysis, cytotypogenesis and recombinant.

141B. Plant Genetics and Biotechnology Laboratory (4) II. Wilkins, Quirios, Dandekar Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105 and 140. Advanced techniques of genetic analysis at the molecular and organismal levels, including transformation, gene expression, analysis of transgenic plants and QTL analysis.

145. Applied Plant Biology (4) II. Brown (Pomology), Napoli (Environmental Horticulture), Richards (Agricultural Range Science) Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 111, and Biological Sciences 101 or course 105. 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.

191. Undergraduate Research: Proposal (3) III. The Staff Lecture—1 hour; discussion—1 hour; independent study—3 hours. Prerequisite: upper division standing and consent of instructor. A faculty sponsor will individually assist each student to define a problem of such a nature as to be amenable to objective investigation. Student work may include experiments, evaluations, surveys, and related activities. Independent study may be repeated for credit.

191L. Undergraduate Research: Experiment (1-5) I, II, III. The Staff Laboratory—3-15 hours. Prerequisite: course 191 (may be taken concurrently) and consent of instructor. Experimental testing of the hypothesis developed in course 191. May be repeated for credit. Not open for credit to students who have completed Vegetable Crops 191L. (P/NP grading only)

192. Internship (1-12) I, II, III. Summer. The Staff (Rains (Agricultural Range Science) 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 Plant Science. Internships supervised by a member of the faculty. (P/NP grading only).

194H. Senior Honors Thesis (1) I, II, III. The Staff Independent study—3 hours. Prerequisite: course 191L and consent of thesis adviser. Preparation and submission of honors thesis and presentation of the results in a seminar. Not open for credit to students who have completed Vegetable Crops 194H. (P/NP grading only)

196. Postharvest Technology of Horticultural Crops (3) III. Kader (Pomology) Lecture/discussion/demonstration—6 days; field trip—5 days. Prerequisite: upper division or graduate student standing. Intensive study of current procedures for (a) 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. (P/NP grading only).

197T. Tutoring in Plant Science (1-4) I, II, III. The Staff (Rains (Agricultural Range Science) in charge). Prerequisite: upper division standing; completion of course being tutored or the equivalent. Leading discussion sections, conducting laboratory exercises or proctoring in personalized-system-of-instruction-format classes under faculty guidance. May be repeated once for credit if different course is tutored. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Rains (Agricultural Range Science) in charge). Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

216. Ecology and Agriculture (3) III. Jackson Lecture—3 hours; laboratory—2 hours. Prerequisite: Ecology 200A and 200B or Plant Pathology 210 or consent of instructor. Ecological principles and relationships as applied to agriculture. Integration of ecological approaches into agriculture to develop environmentally sound management practices. Topics include crop ecology, biotic interactions among crops and pests, and crop systems ecology. (Same course as Ecology 216; Vegetable Crops 216.)

221A/221B. Applied Crop Physiology (4-4) I, II. The Staff Lecture—1 hour; seminar—1 hour; laboratory—6 hours. Prerequisite: course 101 or Plant Biology 111, 112 or consent of instructor. Research methods in applied plant physiology with examples drawn primarily from agronomic and vegetable crops. Field and laboratory projects, data reduction, and preparation of written reports. (P/NP grading only)

224. Water in Physiology and Ecology of Plants (4) III. Hisao (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 year.

270. Reproductive Biology of Flowering Plants (3) I. Wu (Environmental Horticulture) 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.

291. Seminar in Postharvest Biology (1) I, II, III. Salvet (Vegetable Crops) in charge. Discussion—1 hour. Prerequisite: consent of the instructor; open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables and ornamentals. (S/U grading only)

298. Group Study (1-5) I, II, III. The Staff To be arranged.

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**Plastic Surgery**

See Medicine, School of

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**Political Science**

(College of Letters and Science)

Larry Berman, Ph.D., Chairperson of the Department Department Office, 1246 Social Sciences and Humanities Building (616-752-0966)

**Faculty**

Larry Berman, Ph.D., Professor
Scott S. Gartner, Ph.D., Assistant Professor
John B. Gates, Ph.D., Associate Professor
Emily O. Goldman, Ph.D., Assistant Professor
Stuart L. Hill, Ph.D., Associate Professor
Robert W. Jackson, Ph.D., Professor
Scott C. James, Assistant Professor
Bruce W. Jentzen, Ph.D., Associate Professor
Jeanette Money, Ph.D., Assistant Professor
Miroslav Nincic, Ph.D., Professor
Larry J. Paterman, Ph.D., Professor
Donald S. Robichaud, Ph.D., Professor
Gary M. Segura, Ph.D., Assistant Professor
Richard Sinopoli, Ph.D., Associate Professor
Randolph M. Siverson, Ph.D., Professor
Andrew Sklaba, Ph.D., Assistant Professor
James F. Spriggs II, Assistant Professor
Larry W. Wade, Ph.D., Professor
Geoffrey A. Wandelwebers-Smith, Ph.D., Associate Professor

**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
Mary Zerba, Ph.D., Professor Emeritus

**Academic Senate Distinguished Teaching Award**

Paul E. Zimmer, Ph.D., Professor Emeritus

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**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, bureaucratic, 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...
Political Science

A.B. Major Requirements:

Preparatory Subject Matter

Political Science 1, 4
Two courses from Political Science 2, 3, 4, 5...12

Depth Subject Matter

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, 112, 113

Group B
Field (3) Parties and political behavior: Political Science 160, 170
Field (4) Public law: Political Science 150, 151, 152

Group C
Field (6) International relations: Political Science 120, 130, 140...

Additional upper division units in political science to achieve a total of 36...12

Only two units of Political Science 192 (Internship) may be counted towards the 36 units 190, 191, 192, 193, 194, 195...

Minimum Total Units for the Major

Political Science—Public Service

A.B. Major Requirements:

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 from Political Science 100, 104, 105, 108, 113, 180, 181...
One course from Political Science 108, 109, 111, 114...

Internship, Political Science 192A, 192B...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 (2) Policy implementation and evaluation: Political Science 150, 151, 152, 153, 154, 155, 156...
Field (3) Policy interpretation—Substance and procedures (public law): Political Science 150, 151, 152, 153, 154, 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, 171...
b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 167, 168, 169, 170...
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

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans:

Plan I: Upper division units in political science (may include 4 units of lower division coursework) distributed among at least two of the three groups: A, B, and C...

Plan II: A 24-unit plan approved by a faculty adviser...

Major Advisers: Consult Departmental Office...

Political Science

Courses in Political Science (POL)

1. American National Government (4) I; II; III.
The Staff: III,erman
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. General Education credit: Contemporary Societies.

2. Introduction to Comparative Politics (4) III.
The Staff: 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 both cultural and the informal dimensions of politics as well as to formal political and governmental structures. General Education credit: Contemporary Societies.

3. International Relations (4) I, II; III.
Sternovitch
Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

4. Basic Concepts in Political Theory (4) I.
Sinopoli
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. General Education credit: Civilization and Culture.

5. Contemporary Problems of the American Political System (4) III.
The Staff: 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. General Education credit: Civilization and Culture.

6. Contemporary Issues in Law and Politics (4) I, II; III.
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.

90X. Lower Division Seminar (4) I, II, III.
The Staff: Chairperson in charge...
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 (1-8).
The Staff: Chairperson in charge...
Prerequisite: consent of instructor (P/N grading only).

Upper Division Courses

100. Local Government and Politics (4)
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 conflict, legislation and executive patterns, expertise, decision making, and the politics of structure. Observation of local governing boards.

101. Urban Political Economy (4)
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)
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.

103. American Federalism (4) I. The Staff
Lecture—3 hours; research paper. Prerequisite: course
358 Political Science

115. Medieval Political Thought (4) I. 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 events.

116. Foundations of Political Thought: A Study
In Depth of a Major Political Philosopher (4) I.
Peterman
Lecture/discussion—3 hours; term paper. Intensive
analysis and evaluation of the seminal works of a
major political philosopher.

117. Marxian (4) III. I. The Staff
Lecture—3 hours; discussion—1 hour. Examination of
the political and social philosophy of Karl Marx, with
reference to the development 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.

118B. History of Political Theory (4) II.
Peterman
Lecture—3 hours; special assignments. Critical analy-
ses of the works of major political philosophers.
Modern political philosophy—Machiavelli, Hobbes, Locke,
Rousseau, Burke.

118C. History of Political Theory (4) III. Sinopoli
Lecture—3 hours; term paper. Critical analysis of the
works of major political philosophers. Nineteenth and
twentieth centuries: Hegel, Tocqueville, Mill, Marx,
Nietzsche, Sartre.

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 nine-
teenth and twentieth century political thought. Empha-
sis will be upon modern political philosopher or concept
rather than upon a survey of modern political thought.

120. Theories of International Politics (4) I.
Ninicic, Siverson
Lecture—3 hours; discussion—1 hour. Prerequisite:
upper division standing or consent of instructor. Major
contemporary approaches to the study of interna-
tional politics, including balance of power, game the-
ory, Marxist-Leninist theory, systems theory, and
decision-making analysis.

121. War (4) III. Siverson
Lecture—3 hours; discussion—1 hour. Prerequisite:
course 3 recommended. An analysis of political
processes involved in the initiation, conduct, and ter-
minal of military warfare.

122. International Law (4) III. Waldestorff-Smith
Lecture—4 hours. Selected topics in international law:
territory, sovereign immunity, responsibility, the
peaceful settlement of or non-settlement of international
disputes.

123. The Politics of Interdependence (4).
Money, I. III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper
division standing or consent of instructor. In the past
several decades, growing economic interdepen-
dence has generated new problems in international
relations. Course will deal with difficulties in man-
ging the complex interdependence and its implications
on national policies and politics.

124. The Politics of Global Inequality (4).
The Staff; I. Money
Lecture—3 hours; term paper. Prerequisite: upper
division standing; course 123 recommended. Long-
standing 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 politi-
cal relations.

126. Ethnic Self-Determination and
International Conflict (4) III. Rothchild
Lecture—3 hours; individual meetings with students
to discuss term papers. Prerequisite: one international
relations course recommended. Compares the claims
of the races and ethnic peoples in countries under-
going internal conflicts, e.g., South Africa, Northern
Ireland. Analyzes the role of the international community
in facilitating the peaceful resolution of conflicts.

130. Recent U.S. Foreign Policy (4) III. I.
The Staff
Lecture—4 hours. Prerequisite: upper division stand-
ing; course 3 recommended. Theory of nation build-
ing illustrated through U.S. and non-U.S. experi-
experiences. Offered in alternate years.

131. Analysis of U.S. Foreign Policy (4)
I. The Staff
Lecture—4 hours; term paper. Prerequisite: upper
division standing or consent of instructor. Detailed
presentation and examination of the formation of execu-
tion of U.S. foreign policy. Survey of numerous factors
influencing policy outcomes and how such
determinants vary according to policy issue areas.

132. National Security Policy (4) I.
The Staff; III. Gardner
Lecture—4 hours; term paper. Prerequisite: upper
division standing. Development of national security
policies since 1945. Analysis of deterrence and as-
sumptions 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.

133. The American Role in East Asia (4) I.
The Staff
Lecture—4 hours. Prerequisite: upper division stand-
ing; 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) II.
Rothchild
Lecture—3 hours; discussion—1 hour. Prerequisite:
upper division standing in Political Science or consent
of instructor. Overview of American foreign policy
throughout Africa. Relationship to global adversities.
Legacies of colonialism, anxiety of self-
determination and white racism. Policies on nonalign-
ment, producer cartels, multination corporations,
continental integration, and trade and aid relations.

135. Russian Foreign Policy (4) II. The Staff
Lecture/discussion—4 hours. Prerequisite: upper
division standing and course 2. The making and imple-
mentation of foreign policy after Soviet rule; the
legacies of Tsarism and Bolshevism; resources, con-
straints and capabilities of the "new Russia" in the
international system.

137. International Relations in Western
Europe (4) III. Money
Lecture—4 hours. Prerequisite: upper division stand-
ing. Analysis of European unity, problems of the
Atlantic alliance, Alliance for Progress in Western
Europe, Communism in Western Europe and the
relationship between domestic politics and foreign
policy.

*Course not offering this academic year.
138. International Relations: East Asia (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing in international relations or consent of instructor. Examination of selected problems in 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. Nilay
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 different topics are studied.

*140. Comparative Public Policy (4) I. Skalaian
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 in the Communist political systems with emphasis on the Soviet Union and the states of Eastern Europe.

142. Politics and Inequality (4) II. Jackman
Lecture—4 hours. Prerequisite: 150. An analysis of the processes by which political systems work in modern societies. Emphasis upon the relationships between the structure of political systems and the distribution of valued resources.

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. The making of the Commonwealth of Independent States; the problems of the Baltic. Emphasis upon the political and economic transition from the Soviet Union to the Commonwealth of Independent States.

144. Russian Politics and Policy (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. The development of the Soviet state; the political and social structure of the Soviet Union; the role of the Communist Party in government and society.

145. Government and Politics in Emerging Nations (4) III. The Staff
Lecture—4 hours. Prerequisite: course 2. The political and social structures of emerging nations; the process of political development; the role of the state in economic development.

146. Contemporary African Politics (4) II. Rothschild
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. An examination of the political and social structures of Africa, the role of the state in economic development.

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. The Staff
Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political institutions and political life in China with emphasis on the period 1910-1945. Primary attention to nationalization, modernization, and political and economic policies.

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. The Staff
Lecture—3 hours; term paper. Prerequisite: course 2 recommended. Evolution of political culture, institutions, economy, and political organization in Southeast Asia including Vietnam plus two or three other examples. Emphasis on political culture, international building in multi-ethnic communities, and contrast between socialist and non-socialist political development. Offered in alternate years.

149. Politics of Development in Africa (4) II. Rothschild
Lecture/discussion—4 hours. Prerequisite: course 134 recommended. Analysis of the development process in sub-Saharan Africa. Emphasis will be placed upon state and institutional state-society relations, political, socioeconomic class, women, ideology, party systems, bureaucracy, military, and development.

150. Judicial Politics and Constitutional Interpretation (4) I. Gates; III. Spriggs
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science. The role of judicial policymaking; issues surrounding constitutional interpretation and judicial decision-making; principles for considerations 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 the issues of association, abstraction, association, the right to exercise religious beliefs, and the right to privacy.

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 process; issues surrounding constitutional doctrine and judicial policymaking; special attention on civil and sexual equality. Offered in alternate years.

153. The Constitutional Politics of the Justice System (4) III. 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. Sinopoli
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law, an analysis of the influence of social control and the relationship between law and morality. Offered in alternate years.

155. Judicial Process and Behavior (4) II. 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.

156. Law and Society (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Social basis and origins of law, relationships between law, institutions, and social change. Offered in alternate years.

158. Political Elites (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140 or consent of instructor. The role of political elites in the political system. The political role of political elites in the political system. The relationship between political and economic elites.

160. American Political Parties (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Analysis of the historical development of the political parties in the United States. The functions of political parties in the democratic process. The effects of party organization on the political process. The effects of party organization on the political process.

161. Comparative Political Parties (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Organization, operation, governmental function and social bases of political parties in Western Europe and non-Western Europe.

162. Elections and Voting Behavior (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Analysis of American elections and the role of the parties in the American political system. The voting behavior of American citizens.

163. Group Politics (4) I. Wade
Lecture—3 hours; discussion—1 hour. Groups, institutions, and individuals in American politics. The relationship between political participation, partisanship, and individual and group determinants of voting.

164. Public Opinion (4) I. Skalaian
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 social stability and institutions.

165. Mass Media and Politics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Organization of and decision making within the media; audiences and the effect of the media on attitudes and beliefs; the relationship of the media to other institutions (censorship, secrecy, freedom of the press, government regulation); the media in election campaigns.

166. Women in Politics (4) I. The Staff
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 different social classes and ethnicities on the involvement of women in politics.

167. Political Socialization (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 164 or consent of instructor. What do we mean by political社会化? What is the nature of political社会化? How do we measure political社会化?

168. Chicano Politics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Political aspects of Chicano life in America; examines the Chicano role in American society. What is the nature of Chicano politics? What is the role of Chicano in American society?

169. Political Elites (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 4, or consent of instructor. The role of political elites in the political system. The political role of political elites in the political system. The relationship between political and economic elites.

170. Politics and Personality (4) III. Berman
Lecture—3 hours; discussion—1 hour. How is the concept of political influence 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 psychologists.

171. The Politics of Energy (4) II. Wandesford-Smith
Lecture/discussion—4 hours. Prerequisite: upper division standing. Analysis of the nature and performance of the energy sector in selected countries; the role of energy in national and state politics. 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. James
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 demo-
173. Community Power and Change (4) II J. 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) III Skalaban
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political basis of economic policy (taxation and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest.

175. Science, Technology, and Policy (4) II H. Hill
Lecture—3 hours; discussion—1 hour. Analysis of policy-making 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.

176. Power and Coercion (4) II J. Jackman
Lecture—3 hours; discussion—1 hour. 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, policy-making, and ideological hegemony.

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, bureaucrats, communalism, public opinion with comparisons to U.S. processes.

178. Political Development in Modern Societies (4) III J. 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, resistance, violence, and the politics of integration.

179. Special Studies in Comparative Politics (4) II The Staff
Seminar—4 hours. Prerequisite: consent of instructor and divisional approval. 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 W. Wandorfer-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 the state, 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 bureaucracies.

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. Role of bureaucracy in American political society; focus on design and reorganization, and the relationship of structure to performance, at the national, state, and local levels.

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.

183. Administrative Behavior (4) II The Staff
Lecture—3 hours; discussion—1 hour. Implications for American public administration of evolving concepts about behavior in organizations.

187. Administrative Theory (4) I Hill
Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies, the impact of such concepts as decision making, bureaucratic authority and power, communication and control, and the examination of the role of government bureaucracies in the total society.

188. Managerial Policy and Personnel Administration (4) III The Staff
Lecture—3 hours; discussion—1 hour. Policies 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; fieldwork—1 hour. Fiscal role of government in mixed economy and democratic society; politics of revenue and resource allocation; tax policy; inter-governmental financial relations; budgets and taxation, fiscal policies, budgetary and administrative 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 juniors 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 field work in one or more communities are emphasized.

192A. Internship in Public Affairs (5) I, II, III
The Staff (Chairperson in charge)
Prerequisite: course 192B, enrollment dependent on availability of intern positions with highest priority assigned to students with Public Science—Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations (P/NP grading only).

192B. Internship in Public Affairs (5) I, II, III
The Staff (Chairperson in charge)
Prerequisite: course 192A; enrollment dependent on availability of positions with highest priority assigned to students with Public Science—Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations (P/NP grading only).

192W. Internship in the UC Davis Washington Center Program (6-8) I, II, 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 empirical experience to concepts, literature, and theory of political science.

194A. 194B-194HC. Special Study for Honors Students (2-5) I, II, III. The Staff
Directed research in Political Science or Political Science—Public Service with junior standing and overall grade-point average of 3.5. Directed reading, research, and writing culminating in the preparation of a senior honors thesis under direction of faculty advisor. (Deferred grading only, pending completion of sequence.)

195. Special Studies in American Politics (4) III The Staff
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 different subject matter is covered.

196. 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 (1-6) 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, policy-making 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 state's political systems, institutions and processes and their role in the Federal system. Offered in alternate years.

203A. American Government: The Presidency (4) I. J. Segura
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 state's political systems, institutions and processes and their role in the Federal system. Offered in alternate years.

203B. American Government: Congress (4) III. Segura
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 state's political systems, institutions and processes and their role in the Federal system. Offered in alternate years.

203C. American Government: Courts (4) I. Spriggs
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 state's political systems, institutions and processes and their role in the Federal system. Offered in alternate years.

205. Field Research in Urban Politics and Policy (4) III. The Staff
Seminar—2 hours. 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 observational analysis. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

207. Environmental Policy Analysis (4) II. Wandorfer-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 methods, and general discussion of the literature.

208. Policy Analysis (4) III. Hill
Seminar—4 hours. Social science techniques applied to public policy formation and evaluation.

209. The American Political System (4) I. Wride
Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

*Courses not offered this academic year.*
211. Research Methods in Political Science (4) I. James 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. Skelton 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) I. Gartner 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, problems in multiple regression, and advanced topics (probability analysis, simultaneous models, time-series analysis, etc.).

214A-214B. Research in Political Science (2-2) II-I. The Staff Seminar—2 hours. Prerequisite: courses 211, 212. Research seminars. Seminar sequence required of all Ph.D. students. Design, execution, and defense of original research in a 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) I. Gartner Seminar—3 hours. Prerequisite: courses 211 and 212. Introduction to formal and game theoretic analyses of political behavior. Students will learn basic game theory modeling skills. We examine the benefits of modeling and look at the examples of formal analysis in a variety of political science subfields. Offered in alternate years.

216. Political Theory (4) II. Piterman Seminar—3 hours; term paper.

223. International Relations (4) III. Gartner Seminar—3 hours; term paper.

225. The International System (4) I. Siverson 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. Ninic Seminar—4 hours; term paper.


241. Communist Political Systems (4) III. The Staff Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic survey of theories and methods used in study of Communist Politics.

242. Seminar in Comparative Politics (4) II. The Staff Seminar—3 hours; term paper. Prerequisite: graduate status or consent of instructor. Systematic survey of selected topics dealing with the political process of Communist political systems.

246. Policymaking in Third-World Societies (4) III. Rothchild Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policy-mechanism in Third-World countries are such topics as political resources, institutional resources, decision-making, resources allocation, 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 world and international relations in East Asia.

250. Political Parties (4) II. Segura Seminar—3 hours; term paper. Survey of selected topics in American and European parties.

251. Political Behavior (4) II. Segura Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion.

274. Political Economy (4) III. The Staff Seminar—4 hours. Politics of economic policy as reflected in tax, 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.


283. Organizational Behavior (4) II. The Staff Seminar—4 hours. Organizational behavior as it relates to public administration. Offered in alternate years.

286. Administrative Values (4) III. The Staff Seminar—3 hours; term paper. Examination of administrative values. Offered in alternate years.


290A. 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) I, II, III. The Staff 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 analysis of 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 and systematic observation in public and political agencies. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)
Courses in Pomology (POM)

Lower Division Courses

10. The Art and Science of Fruit Production (3) I, Polito
Lecture—3 hours; field trip on second Saturday of quarter.
Prerequisites: biological and environmental principles of fruit and nut crop production. Topics include temperate and subtropical species, biotechnology and genetic improvement, environmental physiology, plant and animal control, harvest and storage. General Education credit: Nature and Environment.

92. Internship in Pomology (1-12) 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/NC grading only)

Upper Division Courses

102. Internship in Pomology (1-12) 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/NC grading only)

198. Directed Group Study (1–5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NC grading only)

199. Special Study for Advanced Undergraduates (1–5) I, II, III.
The Staff (Chairperson in charge)
(P/NC grading only)

Graduate Courses

210. Plant Reproductive Morphology (4) III.
Polito
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: 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, Michail
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 112, 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.
Bilas
Lecture—3 hours. Prerequisites: 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.

260. Seminar (1) I, II, III.
The Staff (Chairperson in charge)
Seminar—1 hour. (S/U grading only)

268. 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)

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Population Biology (A Graduate Group)

Michael Turelli, Ph.D., Chairperson of the Graduate Group
Office: 22221 Sather Tower (916-752-8523)

Faculty: Includes 30 members from the Division of Biological Sciences; the Division of Environmental Studies; and the Departments of Agronomy; Entomology; Geology; Philosophy; Veterinary Medicine and Biotechnology; 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 discipline, chosen in consultation with a guiding committee.

Graduate Adviser. Consult the Population Biology Graduate Office.

Courses in Population Biology (PBG)

Graduate Courses

206A. Principles of Population Biology (5) I.
Gillaspie, Mangle
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.

206B. 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, mutualism, food webs and trophic cascades, interactions between simple ecological communities, island biogeography, succession, and large-scale patterns.

206C. Principles of Population Biology (5) III.
Turelli, Ward
Lecture—3 hours; discussion—2 hours. Prerequisite: course 200B. Principles of macroevolution. Topics include evolutionary quantitative genetics, sex ratio evolution, sexual selection, Darwinian, speciation and hybridization, the fossil record, vicariance, biogeographic processes, and phylogenetic reconstruction.

*203. Advanced Evolution (3) III.
Gottlieb
Lecture—1 hour; discussion—2 hours. Prerequisite: graduate status. 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 ecology or behavior. Insect parasitoids will be investigated as model systems to address current 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 Entomology 206.)
Population Health and Reproduction

(School of Veterinary Medicine)
Robert H. Bondurant, D.V.M., Chairperson of the Department
Department Office, 1114 Medical Science 1A
(916-752-1358; FAX: 916-752-4278)

Faculty
Edward R. Atwill, D.V.M., Ph.D., Assistant Professor
Robert H. BonDurant, D.V.M., Professor
Ann Tommervik-Bowling, Ph.D., Adjunct Professor
Bruno B. Chomet, D.V.M., Ph.D., Assistant Professor
Thomas B. Farver, Ph.D., Professor
Yvette A. Hart, M.D., Ph.D., Assistant Professor
Charles A. Holmberg, Ph.D., Professor
Phillip Jardim, D.V.M., M.P.H., M.V.S., Clinician
Phillip H. Kass, D.V.M., Ph.D., Assistant Professor
Aline H. Kidd, Ph.D., Adjunct Professor
Jay F. Kirkpatrick, Ph.D., Associate Adjunct Professor
Donald J. Klinking, D.V.M., Lecturer
Bill L. Lasley, Ph.D., Professor
Terri Lehnbauer, D.V.M., M.P.H., Ph.D., Assistant Professor
Nicholas W. Larche, D.V.M., M.P.H., Assistant Adjunct Professor
Irwin K. Liu, D.V.M., Ph.D., Professor
Narda M. Loskutoff, Ph.D., Assistant Adjunct Professor
James Murray, Ph.D., Professor (Population Health and Reproduction, Small Animal)
Joan D. Rowe, D.V.M., Ph.D., Assistant Professor
Mark Vanderzant, B.V.Sc., M.P.H., M.V.S., Clinician
Patricia S. Wakenell, D.V.M., Ph.D., Assistant Professor
Leon D. Wexler, Sr. Lecturer
George B. W. West, D.V.M., M.P.H., Lecturer

Emeriti Faculty
Domenico Bernoco, D.V.M., Libera Docenza, Associate Professor Emeritus
Charles E. Farnth, Ph.D., Professor Emeritus
Constantin Gineogoris, 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. McCampbell, 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. Schubbe, D.V.M., M.P.H., Sc.D., Professor Emeritus
Clyde J. Stormont, Ph.D., Professor Emeritus
Richard Yamamoto, Ph.D., Professor Emeritus

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. Prerequisites: approval of project prior to or during 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 animals on humans.

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; emphasis upon animal management factors in disease.

150. Food-Borne Infections and Intoxications (4) III. Genieogoris, Ickmann
Lecture—4 hours. Prerequisites: Food Science and Technology 104 or Veterinary Microbiology and Immunology 127. Prevalence and characteristics of those diseases of man which are derived from food or food sources; assessment of disease agents to distribution of food and food sources; emphasis upon 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. Prerequisites: 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 (1-6) 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. Prerequisites: Epidemiology and Preventive Medicine 101 or the equivalent; consent of instructor. A 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. Prerequisites: Epidemiology and Preventive Medicine 401 or the equivalent; consent of instructor. Multivariate procedures covered are principal component analysis, factor analysis, two-group and k-group multivariate analysis, 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.

207. Analytical Epidemiology (3)** III. Kass
Lecture—2 hours; laboratory—3 hours; prerequisites: successful completion of two courses in epidemiology, or consent of instructor. Theory and practice of epidemiologic data analysis. Topics include confounding, stratification, matching, interaction, logistic regression, and survival analysis. Emphasis on computer application and complementary readings from the current epidemiologic literature.

212. Epidemiology of the Zoonoses (4)** II. Chomet
Lecture—2 hours; discussion—2 hours. Prerequisites: graduate standing or third-year standing in School of Veterinary Medicine, or consent of instructor. Epidemiologic, biological, and ecological features of some major infections shared by man and 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.

220. Advanced Avian Medicine (3)** III. Wakenell, Larr
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. Prerequisites: enrollment in avian medicine elective 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. Lasley
Lecture—3 hours. Prerequisites: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals, including gonadal function, fertilization, implantation, pre-natal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, sexuality and behavior. Offered in alternate years.

254. Public Health Aspects of Meat and Meat Products Technology (3)** III. Genieogoris
Lecture—3 hours. Prerequisites: course 150 or consent of instructor. Study of the influence of techniques and procedures for processing meat and meat products upon the wholesomeness of 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. (SU grading only.)

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. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

309. Research (1-12) I, II, III. The Staff (SU grading only)

Professional Courses

404. Medical Statistics III (4)** I. Farver
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisites: course 403. Continuation of course 403. Analysis of covariance, variable selection; analysis of multivariate 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). Prerequisites: course 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). Prerequisites: course 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 formulation of recommendations 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. Prerequisites: Veterinary Medicine 401 or consent of instructor. Studies of various approaches to control/eradication diseases in animal populations. Design and economic evaluation of control programs.

419. Fundamentals in Zoonoses (1) III. Chomet
Lecture—1 hour. Prerequisites: upper-division or second-year medical students. Basic knowledge of major zoonotic infections transmitted by domestic animals, pets and wildlife, especially in North America. For each animal species and each infection or infestation, a short review of symptoms in animals and humans, diagnostic, epidemiology and control will be presented. (SU grading only.)

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*Course not offered this academic year.*
Preventive Veterinary Medicine

(A Graduate Program)

Group Office, 125 Surge IV (916-752-2375/9174)
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

401. Biomedical Information Resources and Retrieval (3 I). Bookman Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Introduction to the skills and tools needed to find information in the biomedical sciences with an emphasis on veterinary medicine. Emphasis will be placed on selection of appropriate sources to solve a particular information need using both print and electronic reference and bibliographic resources.

402. Medical Statistics (4 I 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, F, T, and Chi-square distributions; elementary nonparametric methods; simple linear regression and correlation; contingency tables. Computer applications of statistical procedures in population medicine.

403. Medical Statistics (4 I IV). Farver Lecture—3 hours; laboratory—2 hours. Prerequisites: 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 are taught in lecture.

Psychiatry
See Medicine, School of

Psychology

(College of Letters and Science)

Philip R. Shaver, Ph.D., Chairperson of the Department

Department Office, 136 Young Hall (916-752-1800)

Faculty

Linda P. Acordio, Ph.D., Professor, Academic Senate Distinguished Teaching Award Leo M. Chalupa, Ph.D., Professor Richard G. Coxx, Ph.D., Professor Alan C. Elms, Ph.D., Professor Robert A. Emmons, Ph.D., Associate Professor Kenneth E. Hopson, Ph.D., Professor Michael S. Gazaniga, Ph.D., Professor (Center for Neuroscience)

Gail S. Goodman, Ph.D., Professor Albert A. Harrison, Ph.D., Professor Kenneth R. Henry, Ph.D., Professor

Preventive Veterinary Medicine

(2 I II). Chomel Lecture—2 hours. Prerequisite: second-, third-, or fourth-year standing in School of Veterinary 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 major zoonoses and major livestock diseases prevention and control. Food safety and hygiene and new environmental issues as well as animal welfare.

429A. Hard Health Management of Beef, Cattle, Swine, Sheep, and Goats (4 I I). Weaver Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. 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 I). Weaver Lecture—10 sessions; discussion—laboratory—five 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Introduction to interfaces of 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. (SU grading only.)

432. Reproductive Technology in Mammals and Birds (1 I I II). BonDurant Lecture—10 sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Introductory course in the application of technology to the active 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. (SU grading only.)

438. Beef Cattle Nutrition (1 I I I). The Staff Lecture—10 hours. Prerequisite: third-year standing in 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 ruminant-associated diseases of beef cattle.

445A. Food Animal Theriogenology (3 I II). BonDurant Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on spermatozoa, physiopathology, treatment, control, prevention, and herd health applications.

445B. Equine Theriogenology (3 I 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.

446A. Food Animal Reproduction (1 I I I). 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 spermatozoa, physiopathology, treatment, control, prevention, and herd health applications.

446B. Equine Reproduction (1 I I). Liu Lecture—2 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 I I). Lasley Lecture—12 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.

453. Pet Loss Support Groups (1-2, 1, III, IV). Hart Discussion/laboratory—5-6 hours. Prerequisite: veterinary student status. Training and experience study for pet loss hotline counselors who are experiencing grief associated with an animal's death. Students gain proficiency in supportive listening and referral to community resources and increased effectiveness in dealing with upset pet owners. (SU grading only.)
The majors

Psychology provides knowledge of and means of studying human and animal behavior. The program offers the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science degree for students with an interest in either biology or mathematics. The psychology program is extremely broad and represents a variety of topics. The courses are organized around three focal points: psychological approaches to the individual, the social environment, and the individual's responses to that environment. Thus, the program offers courses in both the social and natural sciences.

Preparatory Requirements. Before declaring a major in psychology, students must complete the following courses with a combined grade point average of at least 2.00 (all courses must be taken for letter grades):

- Psychology 1, 41: 8 units
- Statistics 13 or 102: 4 units
- Biological Sciences 1A: 4 units

A.B. Major Requirements:

- Preparatory Subject Matter: 21-25
- Psychology 1 or the equivalent: 4
- Psychology 41: 4
- Statistics 13 or 102: 4

- Biology Emphasis: 52-61
  - Psych 51: 4
  - Statistics 13 or 102: 4
  - Mathematics 16A-16B or 21A-21B: 8
  - Physics 10 or 5A-5B or 57A: 8
  - Biological Sciences 1A: 18
  - Chemistry 2A, 2B: 10
  - Chemistry 2A-2B: 18

- Preparatory Subject Matter: 49
  - Seven Psychology courses as specified:
    - Group A: two courses from 130, 131, 132, 135, 136: 8
    - Group B: three courses from 108, 129, 134, 150, 160: 14-15
    - Group C: two courses from 112 or Human Development 100A or 100B, 143, 145, 147, 166: 8
  - Additional units to achieve a total of 40 upper division units in psychology: 9-10

- Preparatory Subject Matter: 101-110
  - Biologial Sciences 145A, 145B: 18
  - Biological Sciences 101: 4
  - Neurobiology and Behavior 101: 5

- Mathematics Emphasis: 4
  - Psychology 51: 4

- Psychology 41: 4

- Course not offered this academic year.

- Statistics 13 or 102: 4
- Mathematics 21A, 21B, 21C: 12
- Computer Science Engineering 30 or Engineering 5: 3
- Chemistry 10 or 5A-5B or 57A-57B: 4
- Physics 10 or 5A-5B or 57A-57B: 4
- Biological Sciences 1A or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Psychology and Behavior 10: 5

- Psychology 41, and Statistics 13 or 102: 5

- B.S. Major Requirements:

- Preparatory Subject Matter: 44-58
- Psychology 1 or the equivalent: 4

- Preparatory Subject Matter: 101-110

- Mathematics Emphasis: 4

- Psychology 41: 4
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. 10 credits allowed to those who have taken courses 15 and 16. Course offered every semester. (P/NP grading only)

2. Freshman Psychology Seminar (4) I, II, 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 by expository writing and brief presentations. (P/NP grading only)

41. Research Methods in Psychology (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. 10 credits allowed to those who have taken both courses 15 and 16.

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

103. Advanced Research Design and Data Analysis (5) I. Kroll, Johnson Lecture—6 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) I. Walder Lecture—4 hours. Prerequisite: course 41 and 103. 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.

106. Statistical Inference from Psychological Experiments (4) I, II. Kroll Lecture—4 hours. Prerequisite: course 41, course 103 or consent of instructor. Probability theory, sampling distributions, hypothesis testing, statistical inference, and nonparametric statistics, with applications in sen-

sory, perceptual, comparative, physiological, and other areas of psychology.

108. Physiological Psychology (5) I, II, III. Chulapa, Henry, Mendoca Lecture—4 hours; laboratory—2 hours. Prerequisite: course 1, 41; at least one of zoology or psychology course required. 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 in situational situations.

112. Developmental Psychology (4) I, II, III. Shields, Acredolo, Goodman, Tomlinson-Kreasy Lecture—4 hours. Prerequisite: course 1, 41. An introduction to the development of human behavior through adolescence. Psychology of skills, emotional development, 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) I. Shields Lecture—4 hours. Prerequisite: courses 1, 41. Biological and social factors that influence gender and how psychological sex-related differences will be expressed in human behavior. Special attention to the scientific and social rationales which underlie the study of gender.

120. History of Psychology (4) I. Lecture—3 hours; term paper. Prerequisite: courses 41, 101; upper division standing or consent of instructor. Development of psychological thought and research in context of history of philosophy and science.

123. Sensory Processes (5) I, II, III. Henry, Mendoca, Marguin Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: course 1 or Biological Sciences 18 or consent of instructor and course 41. Psychology of sensory systems in man and other animals. Perception of behavior to physiology, structure, and function of the senses.

130. Human Learning and Memory (4) I, II, III. Kroll, Parks, Goodman Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 41, and either course 132 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. Parks, Kroll Lecture—3 hours. Prerequisite: courses 1, 41. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. Perception of objects, space, movement.

132. Language and Cognition (4) I, III. Long Lecture—4 hours. Prerequisite: course 1 or the equivalent, course 41, and 6 hours of upper division work in psychology or linguistics. Psychological, cultural, and individual perspectives of linguistic actions; their production, perception, cognitive significance, and their roles in human conduct, enunciation, and cognitive development.

134. Animal Learning and Motivation (5) I, II, III. Kroll Lecture—5 hours. Prerequisite: course 1 or 15 or consent of instructor; course 41. General theories of phylicic differences in learning and motivation drawing upon data from laboratory and field observations. Linate physiological mechanisms, developmental changes, effects of conditioning and other constraints on these processes are examined.


143. Human Emotion and Feeling (4) I. Shields, Shaver Lecture—4 hours. Prerequisite: introductory psychology course, and course 41. An introduction to current theories and research on emotion and body feelings with special reference to self-knowledge.

144. Environmental Awareness (4) I, 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.

145. Social Psychology (4) I, II, III. Simonson, Johnson, Shaver Lecture—4 hours. Prerequisite: courses 1, 41. Behavior of the individual in the group. Examination of basic social psychological principles and their application in social situations, surveysing various problems of social interaction: group tensions, norm development, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, III. Eims, Enick Lecture—4 hours. Prerequisite: courses 1, 41. Theories of Freud, Erikson, and other major twentieth-century approaches to personality.

149. Gender and Human Reproduction (4) I, II, III. Enick 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—1 hour. Prerequisite: courses 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 (5) I, II, III. Mendoca Lecture—5 hours. Prerequisite: courses 108 or Neuroscience, Physiology, and Behavior 101 and 102. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behavioral processes 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. 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, health, disease, cancer, compliance, and health maintenance and promotion. Application of principles in laboratory and clinical settings.

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, Walder Lecture—4 hours. Prerequisite: courses 1, 41. Descriptive and functional account of behavioral disorders, with primary consideration given to neurolologic and psychotic behavior.

175. Genius, Creativity, and Leadership (4) I. Simonon 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 understanding creativity, leadership, and their manifestations in science, art, music, literature, philosophy, science, war, and politics. General Education credit: Contemporary Societies.

177. Psychobiography and Life History (4) I, II, III. Eims Lecture—4 hours. Prerequisite: course 1 or 16, 41, consent of instructor; course 41. Case-history research as a nonquantitative approach to studying personality. Psychological interpretation of life histories of out-
standing individuals in the arts, politics, science and other areas. General Education credit: Contemporary Societies.

**180A. Research in General Experimental Psychology (4)**. The Staff Lecture—2 hours, laboratory—4 hours. Prerequisite: courses 143 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, social development, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when the content differs.

**180B. Research in Psychobiology (4)**. 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 the specific content differs.

**180C. Research in Personality and Social Psychology (4)**. 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 the specific content differs.

**181. Interactive Computer Programming for Psychological Experiments (4)**. Kroll Lecture—2 hours; laboratory—4 hours. Prerequisite: consent of instructor, course 41 and one of courses 130, 152, or 136. Instruction in programming with an emphasis on programming desktop computers as an interactive research tool.

**183. Organizational Psychology (4)**. 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)**. The Staff Seminar—4 hours. Prerequisite: junior or senior standing, major 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 (1-3)**. I, II, III. Harrison, Sommers Fieldwork—1-3 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, III. The Staff Independent study. 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 192, and four upper division Psychology courses. 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.)

**187. Tutoring in Psychology (1-3)**. I, II, III. The Staff 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 Undergraduate Students (1-5)**. I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

**Graduate Courses**

**200. Proseminar in Psychology (3)**. 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/discussion—6-8 hours. Prerequisite: consent of instructor. (S/U grading only)

**204. Advanced Applied Psychometrics: An Introduction to Measurement Theory (4)**. Wells 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, validity, 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 III (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, factor and repeated measures, Latin square designs, and tests of trends.

**207. Causal Modeling of Correlational Data (4)**. Sinton Lecture—4 hours. Prerequisite: course 205, 206 or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral and social 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, Mendez 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)**. 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.

"230. History of Psychology (4)** III. 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, Mangum, 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)**. Pelletier 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)**. Johnson Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

**247. Personality (4)**. Emmons, Ericksen 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 content differs. Offered in alternate years.

**252. Topics in Psychology (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.

**253. Topics in Cognitive Psychology (4)**. 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 computational underpinnings of cognitive processes. May be repeated for credit when content differs. Offered in alternate years.

**254. 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.

**255. 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.

*Course not offered this academic year.*
Range and Wildlands Science

Range and Wildlands Science (College of Agricultural and Environmental Sciences)

Admission to the Range and Wildlands Science major has been discontinued. Students interested in this area should refer to the Agricultural Systems and Environment and the Environmental Biology and Management majors.

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 program 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's desired, it is recommended that trainees 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 shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs

English Composition Requirement: 0-8

Preparatory Subject Matter: 63-67
Animal science (Animal Science 2) ........................ 4
Biology (Biology 1A, 1B, 1C) .......................... 15
Chemistry (Chemistry 2A, 2B, 8A, 8B) .............. 16
Computer science (Agricultural Science and Management 1A, 1B, Engineering 5, or Computer Science Engineering 10) .............. 3
Economic principles (Economics 1, Economics 1A, or 1B) ................ 4-6
Geology (Geology 1-11) ................................ 4
Mathematics (Mathematics 11A; 16B recommended) .................. 8-9
Physics (Physics 1A, 1B) ................................ 8
Soil science (Soil Science 100) .......................... 4
Statistics (Agricultural Science and Management 150) .................. 4

Breadth/General Education Requirement: 26-24

Satisfaction of General Education requirement to include two non-introductory courses in Agricultural Economics, Economics, Environment Studies, or Geography.

Depth Subject Matter: 51-58

Plant physiology (Botany 111 or Water Science 104) .............. 3-4
Plant ecology (Botany 117 or Plant Science 101) .............. 4-5
Meteorology (Geography 3; Atmospheric Science 115) .......... 3-4
Soil science, two upper division courses .......................... 6-8
Watershed management (Water Science 141) .................. 2-3

Animal nutrition (Nutrition 115) ................................ 4
Wildlife ecology or management, one upper division course in wildlife, fish and conservation, or forestry .................. 3-6
Forage crops (Agronomy 112) ................................ 3
Select units from Range Science: 3-18
Range and wildland plants (Range Science 100) .............. 4

Range ecology (Range Science 123, 134, 135) .............. 2
Range field course (Range Science 105) ........................ 3
Range livestock production (Range Science 160) .............. 4

Rangeland vegetation of disturbed lands (Range Science 135) .............. 3

Range Science 192, 198, 199 (not more than a total of 3 units can be counted) .............. 4

Aerial photo interpretation and remote sensing (Geography 106) .................. 4

Courses in Range Science (RMT)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center. 132 Hunt Hall.

Lower Division Courses

92. Range Science Internship (1-12) I, II, III, summer. The staff (Department Chairperson in charge)
Internship—30 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

105. Field Course (2) II. Menke
Lecture—10 hours total; laboratory—30 hours total (given each week following first three weeks). Prerequisite: course in plant or range ecology. Field studies of rangeland vegetation as a livestock grazing resource and as wildlife habitat. Range management and improvement strategies for enhancing multiple use carrying capacity: grazing systems, water developments, seedling of improved species, and prescribed fire. Considered a spring quarter course for pre-enrollment. Offered in alternate years.

*134. Comparative Ecology of Major Rangeland Systems (3) II. Menke
Lecture—3 hours; one Tuesday field trip. Prerequisite: course 100 or the equivalent; general ecology course recommended. Study of vegetation structure, composition, and succession in representative Northern American rangeland plant communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of management strategies used in these systems today. Offered in alternate years.

*135. Ecology and Community Structure of Grassland and Savanna Herbivores (3) I. Demmert
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or the equivalent; general ecology course 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 savanna systems. Offered in alternate years.

Restricted Electives: 6-8

Two upper division courses in natural science or applied biological science courses in one or two of the following: animal science, botany, entomology, genetics, geography, mathematics, meteorology, plant pathology, plant science, environmental and resource sciences, water science, or weed science.

Unrestricted Electives: 17-47

Total Units for the Major: 180

Major Advisor. Contact department office.

Advising Center for the major is in 132 Hunt Hall.

Graduate Study. See under Ecology Graduate Group.
Religious Studies

(College of Letters and Science)

Naomi Janowitz, Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-9932)

Committee in Charge
John R. Hall, Ph.D. (Sociology)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Naomi Janowitz, Ph.D. (Religious Studies)
Phyllis Jeste, Ph.D. (History)
Whalen Lai, Ph.D. (Religious Studies)
Jay Meckling, Ph.D. (American Studies)
Jacob Oltz, Ph.D. (American and African Studies)

Faculty
Lincoln D. Hurst, Ph.D., Associate Professor
Naomi Janowitz, Ph.D., Associate Professor
Whalen W. Lai, Ph.D., Professor
Barbara Metcalfe, Ph.D., Professor (History)

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. This religious studies major 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 at 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 work in international relations, especially in the humanities, and for professional schools including law, business, and foreign service.

A.B. Major Requirements:

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<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>24</td>
</tr>
<tr>
<td>Religious Studies</td>
<td>20</td>
</tr>
<tr>
<td>Anthropology 2 or, with approval from adviser, a lower division course related to religion</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology 2 or, with approval from adviser, a lower division course related to religion from Philosophy, Native American Studies, African American and African Studies, American Studies, or other departments</td>
<td>4</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>40</td>
</tr>
<tr>
<td>Religious Studies</td>
<td>24</td>
</tr>
<tr>
<td>Five upper division courses plus Religious Studies 100 to be taken in junior/senior year</td>
<td>6</td>
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<tr>
<td>History</td>
<td>6</td>
</tr>
<tr>
<td>Two upper division courses related to religion</td>
<td>8</td>
</tr>
<tr>
<td>Sociology, philosophy, anthropology</td>
<td>8</td>
</tr>
<tr>
<td>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</td>
<td>8</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>64</td>
</tr>
</tbody>
</table>

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.


Minor Program Requirements:

The following four minor program options and others responsive to students' needs are subject to approval by the major adviser and Committee. The four areas of emphasis are Religious Studies, Asian Religions, Judaism, and Christian Studies.

| Unit Requirements | Minor Program
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Religious Studies</td>
<td>20</td>
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<tr>
<td>Lower division course</td>
<td>14</td>
</tr>
<tr>
<td>Religious Studies 100 required</td>
<td></td>
</tr>
<tr>
<td>Some substitutions from other departments or programs allowed with consent of adviser.</td>
<td></td>
</tr>
</tbody>
</table>

Preministerial Training

Students interested in applying for admission to a theological school should consult the Religious Studies office and make an appointment with the preministerial adviser. Students are encouraged to take as part of their preministerial training one of the canonical languages: Hebrew, Greek, or Latin.

Preministerial Adviser, L. D. Hurst.

Jewish Studies.

Students interested in Jewish studies should contact N. Janowitz of Religious Studies or H. Morav of Comparative Literature.

Courses in Hebrew (HEB)

Lower Division Courses

1. Elementary Classical Hebrew (5). 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 credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

2. Elementary Classical Hebrew (5). 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). 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.

Courses in Religious Studies (RST)

Lower Division Courses

1. Survey of Religion (3). 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. General Education credit: Contemporary Societies.

2. Myth, Ritual, and Symbolism (4). Lai and 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. General Education credit: Contemporary Societies.

3A-C. Topics in Comparative Religion (4). 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 Experiential Dimension: Pilgrimage; (B) The Mythic Dimension: Death and Afterlife; (C) The Ritual Dimension: Sacrifice. May be repeated for credit in a different subject area. General Education credit for 3A, 3B, 3C: Civilization and Culture.

4. Eastern Religions (4). Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism, and Taoism from their origins to the present. General Education credit for 3A, 3B, 3C: Civilization and Culture.

10. Introduction to Religious Studies (2). 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). Janowitz Lecture—3 hours; discussion—1 hour. 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). General Education credit: Civilization and Culture.

22. Introduction to Judaism (4). Janowitz Lecture—3 hours; discussion—1 hour. Introduction to the study of Judaism using examples from the rabbis andHoral texts of Judaism. No prior knowledge of other Judaism or the study of religion is necessary. General Education credit: Civilization and Culture.


60. Introduction to Islam (3). McErlane Lecture—discuss. Hours. Introduction to topics at core of Islamic tradition including Muhammad, the
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)

Rhetoric and Communication

(College of Letters and Science)

Robert Sommer, Chairperson of the Department of English
Academic Senate Distinguished Teaching Award
Ralph S. Pomeroy, Ph.D., Professor Emeritus

The Major Program

The major in rhetoric and communication centers on human beings as communicators, on the ways in which messages and their uses influence our lives.

The Program: The program of study in rhetoric and communication examines communication from several points of view. Courses are offered which deal with both historical and contemporary perspectives. Other classes focus on language and the symbolic components of messages. Persuasion and argumentation are studied as well. In addition, it is important to examine communication as it occurs in various kinds of social settings, and therefore the department also offers courses in public communication, mass communication, interpersonal communication, and organizational communication.

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:

Preparatory Subject Matter.................................................8
Rhetoric and Communication 1, 3.................................8

Depth Subject Matter......................................................44
Rhetoric and Communication 110, 114, 115, 120.............................16

Two courses from each of the following three groups.................................24
(a) Interpersonal communication:
  Rhetoric and Communication 103, 120, 123, 134, 138, 139, 152;
(b) Rhetoric: Rhetoric and Communication 113, 121, 122, 124, 125, 126, 151;
(c) Mass communication: Rhetoric and Communication 140, 141, 143, 145, 152.

One additional upper division course in Rhetoric and Communication......................4

Total Units for the Major..................................................52
Rhetoric and Communication

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.

105. Semantic and Pragmatic Functions of Language (4) II. 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.

110. Origins of Rhetoric (4) II, III. Abbott
Lecture/discussion—4 hours. Prerequisite: course in ancient history recommended. 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. General education credit: Civilization and Culture.

113. Current Humanistic Trends in Rhetorical Theory (4) II. Ono
Lecture—4 hours. Contemporary developments in traditional rhetorical concepts such as style, meaning, theory of argument, and persuasion.

114. Contemporary Theories of Human Communication (4) I, III. The Staff
Lecture/discussion—4 hours. Rhetoric as a social science, characteristics of social theories, components of theories, development and testing of hypotheses, general models, theories, and research.

115. Empirical Methods in Communication (4) I, III. Bell
Lecture—4 hours. Interpretation of formal and inferential scientific reports via the logic and methods of scientific inquiry, with emphasis on experimental and descriptive research in communication.

120. Rhetorical Criticism (4) I. The Staff; II. Blair
Lecture—4 hours. Survey of critical methods and their use in the interpretation of rhetorical discourse.

121. Public Address in Western Culture (4) II.
Lecture/discussion—4 hours. Notable and representa- tive speeches from antiquity to the present. Speeches are examined both as dynamic and significant events in their historical contexts, and as noted instances of rhetorical art.

122. Public Discourse in American Culture (4) III. The Staff
Lecture—4 hours. Major individuals, movements, and media. Case studies of rhetoric as it has contributed to and is influenced by American culture. Variable content; may be repeated once for credit.

124. Rhetoric of Social Issues (4) I, II. The Staff
Lecture—4 hours. Overview of nature and function of rhetoric in public controversy. Analysis and evaluation of argumentative discourses and other rhetorical strategies used in the social issues and movements. Study of how rhetoric structures and informs opinions on controversial matters in the public realm.

250. Introduction to Argument (4) II, III. The Staff

90XX. 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.

105. Semantic and Pragmatic Functions of Language (4) II. 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.

107. Rhetoric in Ancient Greece (4) II, III. Abbott
Lecture/discussion—4 hours. Prerequisite: course in ancient history recommended. 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. General education credit: Civili- zation and Culture.

113. Current Humanistic Trends in Rhetorical Theory (4) II. Ono
Lecture—4 hours. Contemporary developments in traditional rhetorical concepts such as style, meaning, theory of argument, and persuasion.

114. Contemporary Theories of Human Communication (4) I, III. The Staff
Lecture/discussion—4 hours. Rhetoric as a social science, characteristics of social theories, components of theories, development and testing of hypotheses, general models, theories, and research.

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Lecture—4 hours. Major individuals, movements, and media. Case studies of rhetoric as it has contributed to and is influenced by American culture. Variable content; may be repeated once for credit.

124. Rhetoric of Social Issues (4) I, II. The Staff
Lecture—4 hours. Overview of nature and function of rhetoric in public controversy. Analysis and evaluation of argumentative discourses and other rhetorical strategies used in the social issues and movements. Study of how rhetoric structures and informs opinions on controversial matters in the public realm.

250. Introduction to Argument (4) II, III. The Staff

90XX. 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)

Rhetoric and Communication 371

placed on identifying and amending ineffective communication within organizations.

136. 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.

140. Mass Communication and the Public (4) I, III. 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.

141. Mass Communication Theory and Research (4) I, III. Alcorn
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.

142A. News Practices and Policies 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 Practices and Policies 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, mytholog- ical and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture.

145. Mass Communication and Social Change (4) II. Alcorn
Lecture—4 hours. Prerequisite: course 115 or the equivalent. Study of communication 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 practices of campaigns in such areas as health, intercul- tural and international communication.

151. Methods of Advocacy (4) II. The Staff
Lecture—4 hours. Prerequisite: course 51 or consent of instructor. Study and practice of methods involved in the effective advocacy of positions on current controversial issues. Relation of inquiry and explanation to advocacy. Consideration of logical and nonmon- istic reasoning.

152. Theories of Persuasion (4) I. Bell
Lecture—4 hours. Prerequisite: course 114 or 115 recommended. Theory and research on the effectiveness of various communicative techniques used to influence the perceptions and behaviors of others. Focuses on scientific research into the processes of persuasion and resistance to persuasion in various contexts.

180. Current Topics in Rhetoric (4) II, III. The Staff
Seminar—4 hours. Prerequisite: upper division standing with a major in Rhetoric and Communication or consent of instructor. Group study of a special topic in Rhetoric and Communication. May be repeated once for credit. Enrollment limited.
190X. Upper Division Seminar (4-6) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: upper division standing and consent of instructor. In-depth examination of 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 Rhetoric and Communication (1-6) I, II, III. The Staff (Chairperson in charge)
Seminar—2-6 hours. Prerequisite: declared major in Rhetoric and Communication and 20 units of upper division Rhetoric and Communication courses. Work-research projects, usually at off-campus sites under departmental supervision. May be repeated for credit up to a total of 30 units, not to count toward major requirement. (P/NF 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 advisor. (P/NF grading only.)

197T. Tutoring in Rhetoric and 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 Rhetoric and Communication and consent of Department Chairperson. Tutoring in undergraduate Rhetoric and Communication courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units. (P/NF grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
The Staff (Chairperson in charge)
(P/NF grading only.)

Graduate Courses
Seniors may take graduate courses with consent of instructor.

210. Contemporary Rhetorical Theory (4) III.
Ono Lecture—4 hours. Prerequisite: upper division course in rhetoric or philosophy. Critical and the rhetoric of the twentieth century. Processes of rhetorical invention, arrangement, style, and delivery in the works of Kenneth Burke, F. A. Richards, Richard Weaver, and Stephen Toulmin.

212. Practices of Inquiry in Rhetoric (4) I.
The Staff Seminar—4 hours. Prerequisite: graduate standing in Rhetoric and Communication. Examines alternative modes of inquiry in contemporary rhetorical studies. Explores philosophical orientations and methodological entailments of research and writing standards and practices.

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 coverage of interpersonal, small group, and theoretical concepts of communication, causal modeling, scientific realism and grounded theory. Research design and measurement implications of these perspectives are examined.

214. Mass Communication Theory and Research (4) III.
Seminar—4 hours. Prerequisite: course 220 or the equivalent. Examines the basic theories, models, and assumptions of mass communication. Reviews the current state of the 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) II. Alcala Seminar—4 hours. Prerequisite: course 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) II, 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 statistical methods.

222. Practicum in Rhetorical Criticism (4) II.
Blair Seminar—4 hours. Prerequisite: course 120, an equivalent course in rhetoric or criticism, or consent of instructor. Analysis of selected persuasive messages. Particular attention to the rhetorical situation and its elements in the rhetorical process.

240. Advocacy in Contemporary Society (4) II.
The Staff Seminar—4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocacy stance. Analysis of the persuasive impact of argumentation occurring in current public controversies. Offered in alternate years.

Motley Seminar—4 hours. Prerequisite: course 220. Examination of language and other symbolic codes in communication. Students will explore the ways in which communication may include stylistic variation, speech acts, cognitive processes, communication rules, and audience effects. Offered in alternate years.

243. Persuasion Theory (4) II. Bell Lecture/seminar—4 hours. Prerequisite: course 152, 212, or consent of instructor. Major scientific theories of persuasion. Research programs related to persuasion theories.

244. Organizational Communication (4) III. Voehs Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

245. Classical Rhetorical Theory (4) II. Abbott Lecture-seminar—4 hours. Prerequisite: course 110 or the equivalent. Critical survey of the Greek and Roman rhetorical theory, particularly those in the works of Plato, Aristotle, Cicero, and Quintilian. Special attention to problems of invention and style. Frequent seminar reports involving propositions derived from readings.

246. Perspectives on Rhetorical Communication (4) II.
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 resolving relationships.

247. Theories of Rhetorical Criticism (4).
Ono Discussion/seminar—4 hours. Prerequisite: one course in rhetorical theory or criticism. Historical evolution of critical standards from pre-Socratic to the twentieth century. Emphasis on contemporary questions of textuality, objectivity, intentionality, and justification.

248. Media Communication (4) I. Ono Seminar—4 hours. Prerequisite: a course in criticism. Examines broad trends, print, and visual media by means of rhetorical, psychological, sociological, and cultural studies and perspectives. Examination 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, 212, or consent of instructor. Major theories of interpersonal communication and related research.

250. Special Topics in Rhetoric (4) II.
Blair Discussion/seminar—4 hours. Selected topics in rhetoric and communication. May be repeated for credit when a different topic is studied.

*Course not offered this academic year.

251. Special Topics in Interpersonal Communication (4) I. Berger Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in interpersonal communication. May be repeated for credit when topic changes.

252. Special Topics in Mass Communication (4) I.
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 changes.

253. Negotiation (4) I. Voehs Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on negotiation. Offered in alternate years.

255. Medieval and Renaissance Rhetorical Theory (4) II.
Abbott Seminar—4 hours. Prerequisite: course in ancient Greek and Roman rhetoric. Rhetorical theory from time of Socrates (570 B.C.E.-420 B.C.E.) to end of Renaissance (A.D. 1500). Three medieval rhetorical genres. Rise of universities. Effets of Renaissance humanism, printing, and science. Influence of major theorists such as Cicero, Erasmus, Melanchthon, Ramus, and Bacon.

256. Early Modern Rhetorical Theory (4) Seminar—4 hours. Prerequisite: course in Medieval or Renaissance rhetoric. Development of English and Continental rhetoricians of rhetoric. Emphasis on the works of Plato, Aristotle, Cicero, Quintilian, and other ancient philosophers. Special attention to psychology, epistemology, and belittlementist elements. Offered in alternate years.

258. Communication Applications (2-4) I, II, III.
The Staff (Chairperson in charge)
Discussion—1 hour; supervised field work—3-9 hours. Prerequisite: course 220. Field work in communication organization and implementation of a research project for a specific application of a communication program. May be repeated once for credit. (SU grading only.)

266. Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Lecture—3 hours.

269. Individual Study (1-12) I, II, III.
The Staff (Chairperson in charge)
(SU grading only)

The Staff (Chairperson in charge)
Independent study—3-36 hours. Prerequisite: graduate standing in Rhetoric and Communication. (SU grading only)

Professional Course
390. Teaching Communication Skills at the College Level (4) I. Voehs Lecture—2 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: graduate standing or consent of instructor. Problems and techniques of teaching basic communication skills courses at the college level. (SU grading only)

Russian
(College of Letters and Science)
James Gallant, Ph.D., Program Director
Program Office, 422 Sproul Hall (916-752-4117)

Committee in Charge
Robert C. Crummey, Ph.D. (History)
James Gallant, Ph.D. (Russian)
Harriet Murav, Ph.D. (Russian)
Daniel Rancou-Lafertre, Ph.D. (Russian)

Faculty
Yuri Druzhnikov, Ph.D., Associate Professor
James Gallant, Ph.D., Lecturer
Lisa Little, M.A., Lecturer
Harriet Murav, Ph.D. Associate Professor
Daniel Rancou-Lafertre, Ph.D., Professor
The Major Program

The Russian major exposes 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 Language emphasis concentrates on the evaluation of Russian literature and movement of imaginative and cultural trends. The second area of study, the Russian Literature 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 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:

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<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
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<tbody>
<tr>
<td>0-38</td>
<td>Literature/Language emphasis Russian 1 through 6 (or the equivalent) 0-30</td>
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<td></td>
<td>Russian 41, 42 8</td>
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Recommended, Linguistics 1.

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<th>Units</th>
<th>Area Studies emphasis Russian 1 through 6 (or the equivalent) 0-30</th>
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<tbody>
<tr>
<td></td>
<td>Russian 41 or 42 or the equivalent course in basic literary analysis 4</td>
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<tr>
<th>Units</th>
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<tbody>
<tr>
<td>38-44</td>
<td>Russian Literature emphasis Russian 101A, 101B, 101C 12</td>
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<tr>
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<td>Russian 102 or 103 or 105 4</td>
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<td>Russian 121, 125 6</td>
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<td>Additional upper division units chosen in consultation with adviser 8</td>
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<tr>
<td></td>
<td>Russian 160 4</td>
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<td></td>
<td>Additional upper division units chosen in consultation with adviser 12</td>
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<table>
<thead>
<tr>
<th>Units</th>
<th>Russian Area Studies emphasis Russian 121, 123 4</th>
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<tbody>
<tr>
<td></td>
<td>Russian 101A, 103, or 104 4</td>
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<tr>
<td></td>
<td>Russian 150 4</td>
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<tr>
<td></td>
<td>Three literature courses to be chosen from Russian 121, 123</td>
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<tr>
<td></td>
<td>126, 128, 140, 141, 142 History 137B, 137C 8</td>
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<td></td>
<td>Three courses, with no more than two in one area, to be chosen from the following two areas: (a) History 137A, 138, 139, 129; (b) Social 138, Political Science 138, Economics 117, Geography 124 12</td>
</tr>
</tbody>
</table>

(Meet special interest course needs, a student should obtain written approval from an advisor.)

Total Units for the Major 44-78

<table>
<thead>
<tr>
<th>Units</th>
<th>Major Advisor: J. Gallant. Honors and Honors Program. The honors program comprises an all-year course of study under course 194H, which will include a research paper. See also the University and College requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Russian</td>
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<tr>
<td></td>
<td>Russian Language emphasis 20</td>
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<tr>
<td></td>
<td>Russian 6 4</td>
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<td></td>
<td>Russian 101A, 101B, 101C 12</td>
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<tr>
<td></td>
<td>Literature course from Russian 120, 123, 126, 105, 160 4</td>
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<tr>
<td></td>
<td>Russian Literature emphasis 20</td>
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<tr>
<td></td>
<td>Russian 41 or 42 or the equivalent course in basic literary analysis required 4</td>
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<tr>
<td></td>
<td>Russian 121, 123, 126, 150, 154 4</td>
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<tr>
<td></td>
<td>One course from Russian 120, 126, 150, 154 4</td>
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<tr>
<td></td>
<td>Russian Area Studies emphasis 20</td>
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<tr>
<td></td>
<td>Three courses to be chosen from Russian 123, 126, 128, 150, 154 4</td>
</tr>
<tr>
<td></td>
<td>One course from Political Science 136, Economics 117, Geography 124 4</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Units</th>
<th>Teaching Credential Subject Representative: J. Gallant. See also under Teacher Education Program.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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 Advisor. Admission to the graduate program in Russian is closed for the 1965-66 academic year.</td>
</tr>
<tr>
<td></td>
<td>Graduate Advisor: D. Rancour-Lafiere. Prerequisite credit. Credit normally will not be given for a course if the course is the prerequisite for a course already completed.</td>
</tr>
</tbody>
</table>

Courses in Russian (RUS)

<table>
<thead>
<tr>
<th>Units</th>
<th>Lower Division Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Units</th>
<th>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 grades in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.

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) I, II. The Staff Discussion—2 hours. Prerequisites: 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). The Staff 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.

42. Survey of Twentieth-Century Russian Literature (in English) (4). The Staff Lecture—3 hours. Introduction to major literary trends such as Symbolism, Acker, Dostoevsky, Realism, and Socialist Realism. Readings from representative writers such as Gorky, Bela, Pasternak, Solzhenitsyn, and Tertz. Offered in alternate years.

44. Children's Literature in Russia (4). D. 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. General Education credit: Civilization and Culture.

96. 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. Four-year 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.

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. Druzhnikov Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: 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) I. Gallant Discussion—3 hours; individual tutorial with instructor. Prerequisite: course 6. Develop skill 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.

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.
121. Nineteenth-Century Russian Prose (in English) (4) I. Rancou-Lafriere Lecture—3 hours; term paper. Examination of various trends including Academic Symbolism, Neorealism, and Socialist Realism in development of prose. Readings from such authors as Gorky, Zamyatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in alternate years.

122. 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 Gorky, Tolstoy, Chekhov, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in alternate years.

123. Twentieth-Century Russian Prose (in English) (4) II. The Staff Lecture—3 hours; term paper. Examination of various trends, including Academic Symbolism, Neorealism, and Socialist Realism in development of prose. Readings from such authors as Gorky, Zamyatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in alternate years.

124. Women's Autobiography (in French) (4) II. Rancou-Lafriere Lecture—3 hours; seminar. 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 method of self-definition. Offered in alternate years.

125. Russian Culture (4) III. The Staff Lecture—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in the first half of the 20th century. Brief introduction to the developments of the 18th through the 19th centuries, Russian art, music, philosophy, church, traditions, and daily life. Offered in alternate years.

126. Eighteenth-Century Russian Literature (4) II. Druzhnikov Lecture—3 hours; seminar. Any introductory course in literature. History of Russian literature; social and political conditions; the Russian empire; the Russian nation; the Russian state; the Russian people; the Russian language; the Russian culture. Offered in alternate years.

127. Russian Film (4) I. Murav Lecture—3 hours; seminar. Any introductory course in literature. History of Russian literature; social and political conditions; the Russian empire; the Russian nation; the Russian language; the Russian culture. Offered in alternate years.

128. Russian Phonology and Morphology (4) II. Gallant Lecture—3 hours; laboratory—1 hour. Prerequisite: course 101A, 101B, or consent of instructor. Linguistic analysis of the Russian sound system and of Russian word formation. Offered in alternate years.

129. Representations of Sexuality in Russian Literature (4) I. Rancou-Lafriere Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written literature from a dual perspective of the Russian and Western psyche. Offered in alternate years.

130. Twentieth-Century Russian Literature (4) II. Rancou-Lafriere Lecture—3 hours; essays. Prerequisite: History 3 or 4C, and 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. General Education credit: Civilization and Culture.

131. Literature of Revolution (4) II. Murav Lecture—3 hours; seminar. 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. General Education credit: Civilization and Culture.

132. Nature and Culture in the Soviet Union (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course in the study of Russian literature and culture. An examination of the development of Soviet society and culture from the 18th century to the present. Offered in alternate years.

194. Special Study for Honors Students (1-5) I, II. The Staff (Chairperson in charge) Prerequisite: open to honors students. Guided research leading to an honors paper.

196. Directed Group Study (I-5) I, II, III. The Staff (Chairperson in charge) (PAP 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.

202. History of the Russian Language (4) II. Gallant Lecture—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 of the original texts from the fourteenth to the eighteenth centuries. 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 Lecture—3 hours; discussion—1 hour. Introduction to modern Russian phonology and morphology. Offered in alternate years.

210B. Style and Syntax (4) II. Druzhnikov Lecture—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 Lecture—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and discuss problems of style and content. Conducted in Russian.

220. Old Russian Literature (4) II. The Staff Seminar—3 hours. Advanced study of intellectual movements and literary works of the period, including works such as The Song of Igor's Campaign, Zadonschina, Epifaniy's Lives, Ivan IV's cycle of epistles. May be repeated for credit when different topics are studied. 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 and poetry. The works of writers such as Karamzin, Lomonosov, Sumarokov, Radischev and Karamzin will be examined. May be repeated for credit when different topics are studied. Offered in alternate years.

222. Nineteenth-Century Russian Literature (4) I. Rancou-Lafriere, Murav Seminar—3 hours. Advanced study of the works of one or several writers or of movements in the period. May be repeated for credit when different topics are studied. Offered in alternate years.

223. Early Twentieth-Century Russian Literature (4) I. Rancou-Lafriere 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 different topics are studied. Offered in alternate years.
Science and Society

(College of Agricultural and Environmental Sciences)

Howard G. Schutz, Ph.D., Program Director
Program Office, 228 Maker Hall (916-752-8699)

Committee In Charge

Patricia J. Berger, Ph.D., Associate Professor (Animal Science)
Jeffrey A. Ganzert, Ph.D., Professor (Entomology)
Gloria E. Helfand, Ph.D., Assistant Professor (Agricultural Economics)
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)
Janet Monsen, Ph.D., Professor (Geography)
David S. Reid, Ph.D., Professor (Food Science and Technology)

Course Descriptions

Courses in Science and Society (SAS)

Lower Division Courses

1. Preparing for the 21st Century (4) I. 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 textile changes, and consumer cultures.

2. Feeding the Planet: Security of the Global Food Supply (3) II. Reid Lecture/Discussion—4 hours. Scientific principles and dynamic interactions involved in food production, food processing, nutrition, shelf life, and marketing, including different viewpoints. Physical, biological, and social science issues influencing the availability and safety of the food supply worldwide.

3. Science, Technology, and Society (4) III. Kennedy Lecture/Discussion—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.

5. Pathways to Discovery: Science and Society (3) I, II, III. The Staff Lecture/Discussion—3 hours. A current issue and/or controversy found in contemporary society and how it affects the physical, social, and biological sciences. Course varies with topic offered. May be repeated twice for credit.

20. Genetics and Society (3) III. Ronald, Tyler Lecture/Discussion—3 hours; field trips. Examination of basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery, and the public perceptions of science. Presentation, evaluation, and critical discussions of the present and future impact of genetics on society. General education credit: Nature and Environment.

ASA. Issues in Environmental and Resource Sciences (2) I. The Staff Seminar—2 hours. Discussion of historical and current issues in environmental and resource sciences. Lectures, reading, and two Saturday field trips will provide background for selected topics.

90B. Observing and Writing in Biology (2) I. Jaffe Seminar—1 hour; laboratory—1 hour; term paper. Prerequisite: freshman standing. Students will observe interactions between microscopic organisms, conduct simple laboratory experiments, describe and analyze observations and discuss scientific observation and writing.

90C. Herbal Medicine: Rejuvenation and Relevance for the 21st Century (2) F. Weinbaum Seminar—2 hours. 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 irrational viewpoints will be covered. A Saturday 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. Limited enrolment. May be repeated for credit.

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 institutional settings. (WP grading only.)
Social Theory and
Comparative History

William W. Hagen, Ph.D., Program Director
Program Office: 2231 Social Sciences and Humanities Building, 752-8707

Graduate Study. The program comprises coursework 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 on 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. 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 exam as one area of specialization in the departmental Ph.D. qualifying examination; 3) 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 requirements.

Courses in Social Theory and Comparative History (STH)

Graduate Courses

250. Research in Social Theory and Comparative History (4) I, II, III. The Seminar—3 hours; term paper. Prerequisite: admission to the Social Theory and Comparative History Designated Emphasis. Theoretical coursework in comparative history. Students read and 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 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.

395. Advanced Problem Research in Social Theory and Comparative History (1-4) I, II, III. The Seminar—1 hour. Prerequisite: consent of instructor. Participation in research workshops led by the Center for Comparative Research in History, Society, and Culture. May be repeated for credit. (Su grading only.)

Sociology

(College of Letters and Science)

Fred Block, Ph.D., Professor (Sociology, Management)
Fred Block, Ph.D., Professor (Sociology, Management)
Lawrence E. Cohen, Ph.D., Professor
James C. Crandall, Ph.D., Associate Professor
Diane F. Helft, Ph.D., Associate Professor
Jack A. Goldberg, Ph.D., Professor
John R. Hall, Ph.D., Professor
Frank Hirtz, Ph.D., Assistant Professor (Applied Behavioral Sciences)
Mary J. Jackson, Ph.D., Professor
Carole E. Joffe, Ph.D., Professor (Sociology, Women's Studies)
Carl C. Jorgensen, Ph.D., Associate Professor
Lyn H. Lofland, Ph.D., Professor
Dario Melosi, Ph.D., Associate Professor
Donald A. Palmer, Ph.D., (Management)
Belinda Robinet, Ph.D., Assistant Professor (Sociology, Women's Studies)
Vicki Smith, Ph.D., Associate Professor
Judith Stacey, Ph.D., Professor (Sociology, Women's Studies)
John H. Stanfield, Ph.D., (African American and Afro Studies)
John T. Walton, Ph.D., Professor (Anthropology, Sociology)
Diane L. Wolf, Ph.D., Associate Professor

Emeritus Faculty

Bruce M. Hackett, Ph.D., Professor Emeritus
Edward M. Lerner, Ph.D., Professor Emeritus
John F. Lofland, Ph.D., Professor Emeritus
Leon H. Mayhew, Ph.D., Professor Emeritus
Julia 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. Sociologists, like all 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 broad 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 are designed to 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 can prepare 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 is designed to develop a graduate background in any 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 opportunities, particularly in the field of management. The major has been specifically designed to meet 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 MAJOR

A.B. Degree Requirements:

General emphasis:

Preparatory Subject Matter ................................. 24-25
Sociology 1, 2, or 3; 46A and 46B (or the equivalents) ................................................................. 12-13
Select units from Anthropology 2, 20, 21 .................. 4
Select units from History 4 A, 4 B, 4 C, 8, 9A, 9B, 10, 15, 16, 17A, 17B ........................................ 4
Select units from Philosophy 5, 6, 14, 14 .......................... 4

Depth Subject Matter .................................... 4

A. Sociology 100 ................................................. 4

B. Select one course from each of the following four clusters ......................................................... 16

Individual, Culture and Society: Sociology 125, 128, 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 119, 129, 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, 145, 150, 155, 159, 160A, 180B, 181, 182, 183, 185
Social Dynamics: Sociology 123, 125, 138, 141, 143A, 145A, 145B, 147, 148, 156, 157, 170
Student-initiated thematic minor developed with a faculty advisor and approved by the Sociology Undergraduate Curriculum Committee

Course not offered this academic year.
D. Eight units of Sociology beyond courses taken to fulfill above requirements, and outside of 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, 191X, 194AH-194BH.

Total Units for the Major: 68-69

(General emphasis)

Law and Society emphasis:

Preparatory Subject Matter: 24-27
Sociology 1, 3, 46A and 46B (or the equivalents): 17
Select units from Anthropology 1, 2, Economics 1A, 1B, History 3, 14, 15, 17A, 17B, Philosophy 1, 12, 21, 22, 23, Political Science 1, 1A, 2, 3, 15, 17B, Psychology 1, 15, 17: 7-10

Depth Subject Matter: 40
Sociology 155: 4
Select units from Sociology 120, 150, 152: 8
Select units from Sociology 118, 122, 123, 130, 131, 139, 140, 141, 143A or 143B, 156, 156B, 180A or 180B, 188: 12
At least 16 additional units in upper division sociology courses to achieve a minimum of 40 units.

Total Units for the Major: 65-67

(Law and Society option)

Social Services emphasis:

Preparatory Subject Matter: 28
Sociology 2, 3, 46A and 46B (or the equivalents): 16
Psychology 1: 4
Select units from African American 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, 143A, 149, 157, 158: 4

Race and Ethnicity:
African American Studies 100; Applied Behavioral Sciences 176; Asian American Studies 1, 2, 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, 103C, 106 (or the equivalents): 192, 194AH-194BH: 4

Total Units for the Major: 72

(Social Services option)

Comparative Studies and World Development emphasis:

Preparatory Subject Matter: 30-67
Sociology 1, 46A and 46B (or the equivalents): 13
Economics 1A, 1B: 10

Comparative, Area and Ethnic Studies:
Sociology 131, 140, 185: 12
Select units from African American Studies 100; Applied Behavioral Sciences 176; Asian American Studies 1, 2, Chicano Studies 110, Native American Studies 112, 124; Sociology 129, 130, 134: 4

Total Units for the Major: 70-71

*Course not offered this academic year.

Anthropology 2: 4
At least 4 units from Geography 2-20, History 10, Political Science 2: 4
Course work in language instruction in modern foreign language equivalent to 26 units at UC: 26

Depth Subject Matter: 48

Sociology 141, 144, 147: 16
Economics 115A, Anthropology 126: 8
At least twelve units from Sociology 118, 130, 131, 143A, 144, 145B, 156: 12
Region 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:

Total Units for the Major: 79-105

(Comparative Studies and World Development)

SOCIETY-ORGANIZATIONAL STUDIES MAJOR

A. B. Degree Requirements:

Preparatory Subject Matter: 26
Sociology 1, 46A, 46B (or Statistics 13): 13
Economics 1A, 1B, 143A, 143B: 10
Mathematics 16A: 3
Recommended: Computer Science Engineering 10, Mathematics 16B, 16C

Depth Subject Matter: 44-45
Sociology 160A, 160B: 5
Sociology 103 (or the equivalent): 4
Sociology 106 (or the equivalent): 4
Economics 100 or Agricultural Economics 400A: 5

Sociology 119, 120, 122, 124, 139, 143A, 144, 146, 150, 152, 154, 155, 170: 8

Social Interaction:
Sociology 126, 127, 128, 143A, 149, 157: 4

Race and Ethnicity:
African American Studies 100; Applied Behavioral Sciences 176; Asian American Studies 1, 2, Chicano Studies 110, Native American Studies 112, 124; Sociology 129, 130, 134: 4

Minor Adviser. Consult the departmental Advising Office, 1289 Social Science 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 Adviser. Consult the Graduate Administrative Assistant, 1289 Social Sciences and Humanities Building.

Courses in Sociology (SOC)

Lower Division Courses
1. Introduction to Sociology (5) I, II, III. The Staff Lectures—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.

2. Self and Society (4) I, II, III. The Staff Lectures—3 hours; discussion—1 hour. Principles and basic concepts of sociological social psychology. The study of the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Contemporary Societies.

3. Social Problems (4) J. Jorgensen; I. The Staff Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs.
for improvement. General Education credit: Contemporary Societies.

4. Immigration and Opportunity (4) I. Cramer

Lecture—3 hours; discussion—1 hour. Social and demographic analysis of immigration: motives and experiences of immigrants; immigration and social mobility; assimilation, acculturation, and social change in multicultural societies. Detailed study of immigration into the U.S., with comparative studies of Europe, Australia, and other host countries. General Education credit: Contemporary Societies.

25. Sociology of Popular Culture (4) I, III

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 trends. Theories and methods for analyzing cultural expressions in pop music, street art, film, television, and advertising. General Education credit: Contemporary Societies.

46A. Introduction to Social Research (4) I

The Staff; III. J. Lolland

Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Examination of the methodology of social research. Selection and interpretation of methods 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)

Seminary—12 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Sociology through shared readings, 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 low division students. (P/N grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor (P/N grading only)

Upper Division Courses

100. Classical and Modern Sources of Sociological Thought (4) I

Hall

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 to students who have received credit for course 165A.

103. Evaluation Research Methods (4) I, III

The Staff

Lecture—3 hours; discussion—1 hour or field research (decided at the time course offered). Prerequisite: course 46A and 46B, or Statistics 13 or the equivalent. Surveys applications of research methods to the evaluation of social programs, primarily emphasizing methodology and design; collection and data interpretation; use of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project.

106. Intermediate Social Statistics (4) I

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, hypothesis testing, and use of statistical measures, matrices, and mathematical models especially relevant to sociological analysis.

118. Political Sociology (4) I.积kman; II. Goldstone

Lecture—3 hours; discussion—1 hour or term paper or research project. Analysis of social movements and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social norms of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

119. Peace Institutions (4) II. J. Lolland

Lecture—3 hours; discussion—1 hour or term paper or project. Survival mechanisms 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 spheres.

120. Deviation and Society (4) I. The Staff; II. Melossi

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.

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 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. Social structure and social processes in the United States; community, social mobility, and occupational mobility. The structure of social classes and their interrelationships. The dynamics of social change.

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 and the social structure. Socialization; familial assimilation and educational achievement. Education and socialization. Occupational and structural organization of schools. Discussion of selected topics.

126. Social Interaction (4) II, III. Lolland

Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 2 or 3. Every fourth term in residence (instructor's option). Prerequisite: one course from courses 2, 3, or 4. Afro-American Studies 10, Asian American Studies 1, 2, Chicago Studies 10, Native American Studies 1, 2, 4. Analysis of the influences of cultural differences and social interaction on interpersonal interaction in instrumental settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minorities/ethnicity.

129. Sociology of Black Experience in America (4) I

Jorgensen

Lecture—3 hours; discussion, research, or term paper (instructor's option). Survey of historical and contemporary sociological perspectives of the Black experience in the United States. Emphasis on multiracial Black sociological perspectives and mainstream perspectives of specific sociological topics.

130. Race Relations (4) I, III

Jorgensen

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.

131. The Family (4) I. The Staff; II. Stacey; III. Wolf

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 changes. Attention to power relationships in and between the family and to the social implications of family transformation.

132. The Sociology of Gender (4) I. The Staff; II. Robnett; III. Stacey

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.

133. Sexual Stratification and Politics (4) II

Joffe

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. Dinerstein. Attention to selected issues in social movements and against sexual equality.

134. Sociology of Racial Ethnic Families (4) II

Robnett

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.

135. Social Relationships (4) I. Felmlee

Lecture—3 hours; discussion—1 hour. Term paper. Prerequisite: course 1 or 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.

136. Economic Sociology (4) I

Block

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or 1B. 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 structured. The relationship between individual and collective rationality will also be emphasized. Offered in alternate years.

139. Corporations and Society (4) I

Goldstone; III. 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 monopolistic and conglomerate corporation; and mass markets and consumerism.

140. Social Stratification (4) I. Jackman; II. The Staff; III. Goldstone

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) II

The Staff

Lecture—3 hours; discussion—1 hour or term paper or research project. Selected technological and social factors. Preconditions of economic development and

*Course not offered this academic year.
190X. Seminar in Sociological Analysis (4) I, II, III. The Staff
Seminar—3 hours; term paper. Prerequisite: upper-division standing and course 165A (former course 100). 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) II. Hall
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 to empirical inquiry on problems of interest to students. Contemporary theory considered in relation to classical and modern influences, concept formation, explanation, 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. The Staff; II. Wolf; III. The Staff
Internship—3-33 hours; discussion—1 hour. Prerequisite: upper-division standing; course 46A; approval of proposed internship. Supervised internship and study in agencies, organizations or institutions; application of core concepts in Sociology to the work experience. May be repeated for credit only by permission. Maximum of 4 units of 152 may be counted toward the Sociology major.

184HA-189HB. Special Study for Honor Students (4-4) I-II. The Staff
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 advisor. ( Deferred grading only pending completion of course sequence.)

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
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Block in charge)
Prerequisite: open to seniors only. (P/NP grading only.)

Graduate Courses

201. Social Research (4) II. Goldstone
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing, or consent of instructor. Survey of sociological inquiry, taught as practical. Philosophy of social science; values and research; research agendas and research problem formulation; research process; explanation vs. interpretation; study design; data analysis, measurement, sampling, data acquisition, inference; rhetoric and presentation of findings.

206. Quantitative Analysis in Sociology (4) III. Cohen
Lecture—4 hours. Prerequisite: course 106. Survey of the statistical models and methods that serve as a foundation for quantitative research in sociology. An emphasis on multivariate regression analysis, as well as measurement theory and time series analysis. (SU grading only.)

207A-207B. Methods of Quantitative Research (4-4) II-II. Felmlee, Cramer
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, Politics, and Society (4) II. Block
Seminar—3 hours; paper. Prerequisite: consent of instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics in the economic and political issues that have long dominated the sociological agenda. Emphasis on theoretical and methodological issues. (Deferred grading only, pending completion of sequence.)

220. Deviance, Law, and Social Control (4 I. Cohen
Seminar—3 hours; projects. Prerequisite: course 120 or consent of instructor. Analysis and interpretation of conformity and deviance on several aspects of the social construction of reality. Emphasis on the social and political implications of law and social control. (Deferred grading only, pending completion of sequence.)

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, consent of instructor. Advanced study of the various approaches, methods, issues and topics of concern to sociological social psychology. Analysis of theories and representative historical and contemporary works.

227. Sociology of Reproduction (4) I. Joffe
Lecture—3 hours; discussion—1 hour. Recent sociological research in such areas as youth 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. Robnett
Lecture—3 hours; discussion. Advanced study of the determinants of ethnic groupings and their interrelationships. Major focus on 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. Major theoretical traditions and concerns in family sociology and sociological and gender. Analysis of selected classical and contemporary works representative of functionalist, Marxist, psychoanalytic, feminist and critical theoretical approaches. (Deferred grading only, pending completion of sequence.)

242A-242B. Comparative Methods in Historical Sociology (4-4) II-II. Hall
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucracy, feudalism, capitalism, and colonialism. The relevance of psychological and sociological theories to historical interpretation; the validity of historically grounded hypotheses; the meaning of analogy, correspondence and causality. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

243. Urban Sociology (4) I. 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. Hall
Seminar—3 hours; term paper or project. Prerequisite: graduate standing 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 of the world economy and interdependence in the global political economy. Offered in alternate years.

246. Social Movements (4) I. J. Lofland
Seminar—3 hours; paper. Analysis of current issues in social movements, including the role of inequality, class, race and gender in movements 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. (SU grading only.)

255. Sociology of Law (4) III. Melosi
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.

256A. Classical Sociological Theory (4) I. The Staff
Seminar—3 hours; discussion—1 hour. Introduces graduate students to the work of the classical theorists, with an emphasis on the tradition of Karl Marx, Durkheim, Weber, Simmel, Freud, G.H. Mead, and Parsons, locating them within the historical, cultural, and philosophical milieu in which their ideas originated.

256B. Theory in Contemporary Sociology (4) II. Melosi
Seminar—3 hours; discussion—1 hour. Prerequisite: course 256A. 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) III. Cramer
Seminar—4 hours. Prerequisite: 201 or consent of instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphasis 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

290. Seminar (4) I, II, III. The Staff (Block in charge)
Seminar—3 hours; term paper. (SU grading only.)

292A-292B. Field Research (4-4) II-II. Joffe, Stacey
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; participants complete a field work project. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

293. Proseminar in Sociology (2) I. Joffe
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. (SU grading only.)

295. Special Topics Seminar (4) I, II, III. The Staff (Chairperson in charge)
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 (Block in charge)
Prerequisite: consent of instructor. (SU grading only.)
Soil Science

See 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.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees in Soil Science are available. Information regarding these programs may be obtained from the graduate adviser and the Graduate Announcement. See also the Graduate Studies section in this catalog.

Graduate Adviser, M. J. Singer (Land, Air, and Water Resources).

Soil Science Courses

Queslions pertaining to the following courses should be directed to the instructor or to the Resources Science Teaching Center, 148 Hoagland Hall (916-752-1669).

Lower Division Courses

1. Concepts of Soil Science (3). Dahlgren Lecture—3 hours. Not open to students who have successfully completed course 100 or similar introductory course in soil science. 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. General Education Credit: Natural Environment. 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). Slinger 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 soil, aqueous, gaseous, and biotic components; Soil-plant-weather relationships; Soil development and geography, management, and conservation.

102. Soil and Water Chemistry (5). Zawadski 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, analysis, adsorption, weathering and leaching; soil colloidal behavior, models of solution and solid-phase interactions.

105. Field Studies of Soil Resources (4) Extra session summer. Dahlgren, Singer, Southard Fieldwork—daily for five weeks, off campus; lecture—1 week, on campus. Prerequisite: consent of instructor; course 120 recommends study of soil in the field throughout California. Emphasis on identification, description and classification of soils; relations 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; Geology 10; or the equivalent. Description of soil physical properties of water, gas, heat, and solute movement in soil, with selected examples related to soil and water management. Influence of soil physical properties on process transfers.

109. Soil Fertility and Fertilizers (4). I. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in elements of soil science. Forms and availability of plant nutrients in soils; effects of fertilizers and soil amendments on crop and soil characteristics; conduct and interpretation of soil fertility assays.

111. Soil Microbiology (4). I. Scoy 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-microorganism relationships; Transformations of organic and inorganic pollutants.

118. Soils in Land Use and the Environment (4). I. Singer Lecture—3 hours; discussion—1 hour, one-day field trips. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics
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—4 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 Biogeochimistry (3) III
Dahlgren, Bledsoe
Lecture—4 hours; laboratory—discourse—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 internal 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.

290. Special Topics in Soil Science (1) I, II
The Staff
Seminar—1 hour. Prerequisite: graduate standing. Oral presentation and discussion of scientific material and procedures for review and critique of publications. (SU grading only.)

298. Group Study (1-12) I, II, III
The Staff
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III
The Staff
(Chairperson in charge) (SU grading only.)

### Soil Science (A Graduate Group)

Randal J. Southard, Ph.D., Chairperson of the Group
Office, 148 Hoagland Hall (916-752-1669)

**Faculty** includes faculty members from the Department 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, environmental geochemical matrices, 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 biogeochemistry; soil-plant interactions; and special areas of general soil science. For detailed information regarding the programs, address the chairperson of the group.

**Graduate Advisers**, M.J. Singer (Land, Air, and Water Resources); R.J. Zasowski (Land, Air, and Water Resources).

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*Course not offered this academic year.

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### Spanish

(Complete Letters and Science)

Robert Blake, Ph.D., Chairperson of the Department
Department Office (Spanish and Classics), 616
Squirrel Hall (916-752-0635)

**Faculty**

Marta E. Allsdeit, Ph.D., Associate Professor
Samuel G. Armstead, Ph.D., Professor
Robert Blake, Ph.D., Professor
Cecilia Colombi, Ph.D., Assistant Professor
Linda Egan, Ph.D., Assistant Professor
Germán Guallón, Ph.D., Professor
Almendro E. Ojeda, Ph.D., Associate Professor

**Emeriti Faculty**

Donald G. Castañer, Ph.D., Professor Emeritus
Zustica Gertel, Ph.D., Professor Emerita
Mario González, PhD., Lecturer Emeritus
Dietrich J. Jaud, Ph.D., Professor Emeritus
Daniel S. Keller, Ph.D., Professor Emeritus
Fabian A. Samañiego, M.A., Senior Lecturer
Emterised

**The Major Program**

The major program is designed to assure proficiency in all four language skills—speaking, understanding, reading, and writing—and to acquaint 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 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 interested in working closely with the department’s academic advisors are encouraged to enroll in a program of studies tailored to their individual 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 approved options and other arrangements.

**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:**

Preparatory Subject Matter.................4-37
Spanish 1, 2, 3, 21, 22, 23, and 24...........0-33
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 ........................................... 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

Spanish 100 ........................................... 4
Spanish 111N, 115N, or 116 ...................... 3-4
Spanish 130, 131N, or 134N ...................... 4
Spanish 150B, 150C, 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.

Several electives may be chosen in consultation with the student's major adviser. Courses 26-28

Several electives may be taken with EAP, preferably those chosen 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) Chicana/Latina 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/Latina Studies (e.g., Chicana/Latina 19, 155, 16), Comparative Literature, History (e.g., History 161A, 161B, 164, 165, 166A, 166B, 168W, 169A, 169B, 170), and Linguistics (e.g., Linguistics 115, 116). 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.

Total Units for the Major ....... 49-65


Minor Program Requirements:

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 150B, 150C, or 157 ...................... 4
Spanish 117, 174, or 176 ......................... 4

One upper division elective in Spanish ................. 4

As many as, but not 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 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 maintain a Q point 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 arrange-

ments must be authorized by the department chair. Only students who, at the end of their 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 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.

The Master of Arts Degree. 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 Study Office and the Department of Spanish. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

The Degree of Doctor of Philosophy. The Department 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 Description—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 Description—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 Description—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

4. Elementary Spanish Conversation (2) I, II, III. The Staff Description—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 Description—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 transfer to the next sequence in the second-year program at this point. (Former course 4.)

22. Intermediate Spanish (5) I, II, III. The Staff Description—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.)

*Course not offered this academic year.

23. Spanish Composition (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. Blaise 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 Description—5 hours; laboratory—1 hour. Frequent writing assignments. Prerequisite: course 31 or the 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 7A.)

32. Intermediate Spanish for Native Speakers II (5) I, II, III. The Staff Description—5 hours; laboratory—1 hour. Frequent writing assignments. Prerequisite: course 32 or the 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. Student will develop a research paper. Designed for students whose native language is Spanish. (Former course 7C.)

33. Intermediate Spanish for Native Speakers III (5) I, II, III. The Staff Description—5 hours; laboratory—1 hour. Frequent writing assignments. Prerequisite: consent of instructor. (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. 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 103 is prerequisite to all upper division literature courses.

100. Principles of Hispanic Literature and Criticism (4) I, II, III. Atsienst, Guifon, 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.)
172. Mexican Culture (4) II. Egan
Lecture—3 hours; 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.)

174. Chicano Culture (4) II. Alarcón
Lecture—3 hours; term paper. 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.)

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 United States: Chicanos, Puerto Ricans, Cuban-Americans, Central Americans, and other Latinos.

193L. Internship in Spanish (1-12) I, II, III.
The Staff (Chairperson in charge)
Independent study—12 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, journalism, interpreting). May be repeated for credit for a total of 6 units. Units will not count toward the Spanish major. (P/NP grade 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 the faculty member, leading to a senior honors thesis on a topic in Hispanic literature, civilization, or language studies. (P/NP grading only.)

197T. Tutoring in Spanish (1-4) I, II, III.
The Staff (Chairperson in charge)
Tutor—4 hours. Prerequisite: Upper division standing and permission of the chair. Tutoring in public school in the presence 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)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

Graduate Courses

201. Literary Theory I (4) I, II.
Altméndez, Gulón
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Basic theories and practices of modern and contemporary Hispanic literature. Focus on formalism, poststructuralism, socio-cultural discourses, and ideologies.

202. Literary Theory II (4) III.
Gulón, 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 Deconstruction to Psychoanalytical 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 an 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 160: 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, II.
Blake, Torreblanca
Seminar—3 hours; term paper. Prerequisite: Latin I. (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 century, 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. (May not be repeated for credit.)

212. Applied Linguistics (4) II.
Colombi, Blake
Seminar—3 hours; term paper. Prerequisite: graduate standing and course 215 and 216. 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: courses 205, 206, and consent of instructor. 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) I, II.
Altméndez, Gulón, 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) III.
Altméndez, Armistead, Gulón, Scari
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. A review of the main critical approaches to Spanish literature and the essay.

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 genre, diffusion, and character of the Medieval epic. Relationship of epic to modern 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 provincial, troubadour poetry, kharjas, villancicos, cortigambre, and courtly lyric.

255. Spanish Literature of the Early Renaissance (4) I.
Armistead
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.
The Staff
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 though its language structures, styles, ("Culturismo-Conceptismo"), rhetorical devices, myths, and themes (love, death, time).

257. Spanish Literature of the Renaissance and Golden Age: Drama (4) I.
The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of major 16th and 17th century literary and cultural developments through the study of selected dramas.

258. Spanish Literature of the Renaissance and Golden Age: Prose (4) I.
The Staff
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.
Altméndez, Armistead, Gulón
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, II, Scari, Altméndez
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, II.
Gulón
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The Spanish literary production of the postmodern period.

264. Contemporary Spanish Literature: Essay (4) III.
Gulón, Scari, Altméndez
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major thinkers from Giner de los Ríos and Ortega y Gasset. 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.
Altméndez, Gulón
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.
Egen, Verani
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.
Professional Courses

300, The Teaching of Spanish (3) III. The Staff Lecture—3 hours. Prerequisite: senior or graduate standing; a major course 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 teaching. 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. Rountree, Ph.D., Chairperson of the Division and Associate Dean of Statistics Division Office, 409 Kerr Hall (916-752-2361)

Faculty

Prabir Burman, Ph.D., Associate Professor

Christina Drake, Ph.D., Assistant Professor

Alan P. Fehnke, Ph.D., Associate Professor

Wesley O. Johnson, Ph.D., Professor

Yue-Pok (Ed) Mack, Ph.D., Professor

Hans-Georg Muhlhauser, Ph.D., Professor

George G. Rountree, Ph.D., Professor Emeritus

Francisco J. Samaniego, Ph.D., Professor

Robert H. Shumway, Ph.D., Professor

Jessica M. Utts, Ph.D., Professor, Academic Senate Distinguished Teaching Award

Jie-Ling Wang, Ph.D., Professor

Emeriti Faculty

P.K. Bhattacharya, Ph.D., Professor Emeritus

Alvin D. Wiggins, Ph.D., Professor Emeritus

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 are vital tools to researchers in agricultural, social, engineering, and medical sciences.

The Program. Statistics majors receive either a Bachelor of Arts or a Bachelor of Science degree. The B.A. degree is very flexible, facilitating a double major or extensive elective coursework 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 the programs require theoretical and applied coursework 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

In addition, due to space limitations on 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 advisor.

Career Alternatives. Probability models and statistical methods are used in a great many fields, including the biological and physical sciences, business, and engineering. The wide applicability of statistics has created in both the public and private sectors a demand for graduates with statistical training. Currently employed 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:

Preparatory Subject Matter

Calculus, Mathematics 21A, 21B, 21C...

Linear algebra, differential equations, Mathematics 22A, 22B...

Computer science, Computer Science Engineering 30 or Engineering 5 (or the equivalent)...

Statistics through computers, Statistics 2...3

Depth Subject Matter

Analysis of variance, multiple regression, Statistics 106, 108, the equivalent...

Probability and mathematical statistics, Statistics 131A, 131B, 131C...

Three Statistics courses with Statistics 131B as a prerequisite...

Related elective courses...

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:

Options: Statistics—General; Statistics—Computer Science

Preparatory Subject Matter

Calculus, Mathematics 21A, 21B, 21C...

Linear algebra, differential equations, Mathematics 22A, 22B...

Computer science...

Statistics—General Option

Computer Science Engineering 30 or Engineering 5...

Statistics—Computer Science Option...

Mathematics 22A, 22B...

Electrical and Computer Science Engineering...

Statistics through computers, Statistics 32...

Statistics—General Option

Depth Subject Matter

Analysis of variance, multiple regression, Statistics 106, 108...

Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C...

Four Statistics courses having Statistics 131B as a prerequisite...

Three upper division Mathematics courses selected from 108, 127A-127B, 127C...

12B-128B, 128C, 168 (Mathematics 127 strongly recommended for students considering graduate work in Mathematics or Statistics)...

Related elective courses...

Two upper division Computer Science 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

(Generic option)
Statistics—Computer Science option

Depth Subject Matter
Analysis of variance, multiple regression, Statistical software for computer science... 49-53
Introduction to probability, mathematical statistics, Statistics 313A, 13B, 13C......12
Two courses having Statistics 13B as a prerequisite...... 6-7
Statistical computing, Statistics 141...... 13-33
Operating systems and System programming, Computer Science Engineering 150......6
Data structures, Computer Science Engineering 110...... 11-30
Data base systems, Computer Science Engineering 168 or Mathematics 160......6-9
Computer Science Engineering 122, or Computer Science Engineering 175......4
Total Units for the major...... 73-84
(Computer Science option)

Major Adviser: J.M. Uts

Students are encouraged to meet with an advisor 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 advisor 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 106, 108, and 130A-130B or 131A-131B...... 18
One lower division 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 teaching 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 (916-750-6096).

Courses in Statistics (STA)

Lower Division Courses

10. Statistical Thinking (3) II, III, IV
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, sampling error, health studies, etc., understanding probability, risk and odds. General Education credit: Nature and Environment.

12. Introduction to Discrete Probability (3)
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; The Law of Large Numbers; polling 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.

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; confidence intervals and hypothesis testing; correlation and regression theory. (Students who have had courses 130A or 131A may not receive credit for Statistics 13.)

13A. Self-Paced Modular Instruction in Elementary Statistical Computing
Lecture—4 hours. Prerequisite: two years of high school algebra, no prior knowledge of computers assumed. Computer tutorial. Corresponds to course 13; students who previously took a more advanced course are encouraged to take the examination. (Students may be allowed to take the examination more than once.)

Lecture—4 hours. Prerequisite: Mathematics 160B or 168B; ability to program in a high-level computer language such as Pascal. Overview of probability models, descriptive statistics, and statistical inference. Problem solving through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming.

90X. Seminar (2-12) I, II, III, IV
Lecture—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, IV
Lecture—1-5 hours. Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

Lecture—4 hours. Prerequisite: Math 168B or its equivalent. Introduction to probability and statistics with emphasis on 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 of credit.

102. Introduction to Probability Modeling and Statistical Inference (4) I, II, III
Lecture—4 hours. Prerequisite: two years of high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precursory level. Topics include: probability models—binomial, Poisson, geometric; normal and sampling distributions; histograms; exploratory data analysis; parameter estimation; hypothesis testing; estimation and tests of significance; analysis of variance; regression; computing with MiniTab package. Students who have had course 13 may receive only 2 units of credit for course 102.

133. Applied Statistical Methods for Business and Economics (4) I, II, III, IV
Lecture—4 hours. Prerequisite: course 132, or 132A and Mathematics 160A, 16B. Descriptive statistics, expectation; binomial, Poisson; 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.


106. Applied Statistical Methods: Analysis of Variance (4)
Lecture—4 hours. Prerequisite: course 132, or 102. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design. Multiple comparisons procedures. One-way random effects model.

Lecture—4 hours. Prerequisite: course 132 or 102. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages.

110. Applied Statistical Methods: Multivariate Analysis (4) III, IV
Lecture—4 hours. Prerequisite: courses 13, 32, or 102, and 128A or 128B. Multivariate normal distribution, One-sampling Hotelling's T2, Pairwise comparisons. One-way MANOVA, Multiple correlation analysis, discriminant analysis, cluster analysis. Emphasis on intuition, use of computer packages, and interpreting results. Offered in alternate years.

120. Probability and Random Variables for Engineers (4) I, II, III
Lecture—4 hours. 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.

130A. Mathematical Statistics: Brief Course (4) I
Lecture—4 hours. Prerequisite: Mathematics 160B. Basic statistical methods, distributions, mean, variance, covariance, Chebyshev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, confidence intervals, analysis of variance, F-test, regression and correlation, multiple regression. Selected topics.

130B. Mathematical Statistics: Brief Course (4) II
Lecture—4 hours. Prerequisite: course 130A. Transformation random variables, large sample properties of estimates. Basic ideas of hypothesis 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)
Lecture—4 hours. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, law of large numbers and the central limit theorem. Students who have had Mathematics 131A may not receive credit for Statistics 131A.

131B-131C. Introduction to Mathematical Statistics (4-4-4) III, IV
Lecture—4 hours. 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)
Lecture—4 hours. Prerequisite: course 103 and Mathematics 16B, or their 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 principle, basic hypotheses testing (one-sample).

134. Nonparametric Inference (3) III, IV
Lecture—4 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference focusing on a one-sample and k-sample point of view. Topics include Kolmogorov-Smirnov type tests; confidence intervals for the medians, correlation, and scale parameters; rank test, dispersion tests, efficiency. Offered in alternate years.

*Course not offered this academic year.
135. Multivariate Data Analysis (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 303B, and preferably course 131B. Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and covariance matrix; MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets.

*136. Applied Linear Models: Analysis of Variance (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A and any one of courses 130B, 131B, or 133. Review of linear algebra and statistics, probability concepts, linear model, analysis of variance, advanced topics in analysis of variance, variance components model.

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 analysis of variance; 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. Variance structures; contingency tables, cross-classification; log-linear models, contingency tables; independence; multidimensional tables and log-linear models, maximum likelihood estimation, goodness-of-fit; Logit models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data.

*139. Applied Linear Models: Regression Analysis (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B, or courses 106 and 108. Basic probability concepts and results; diagnostic tests; common distributions; sampling distributions and central limit theorem; likelihood methods; hypothesis testing; likelihood ratio tests; tests based on the t-distribution and the chi-square distribution.

140. Introduction to Biostatistics I (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A or 130B. Observational studies; clinical trials; survival analysis; dose-response analysis.

141. Statistical Computing (3) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A or 131A, and one of courses 13, 32, 106, 102, or the equivalent, and experience in computer programming; course 130B is recommended. Use of computer in statistics. Numerical foundations of statistical procedures; properties of statistical inference. Computer-based simulations and programs. 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 and maintenance policies and their optimization. Offered in alternate years.

*143. Sampling Theory of Surveys (3) I. The Staff
Lecture—3 hours. Prerequisite: course 119B or 131B. Description and analysis of sample surveys with applications to the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in alternate years.

144. Bayesian Statistical Inference II. The Staff
Lecture—3 hours. Prerequisite: courses 130A or 131B, or 130B. Bayesian inference, Bayes Theorem, conjugate priors, non-informative priors, 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), II, III, Roussas Seminar—1.5 hours. Prerequisite: courses 13, 33, 102, 105, or 130. In-depth examination of a special topic in statistics. Selected topics.

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)

194A-194HB. Special Studies for Honors (4-4) II. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research, writing, culminating in a senior honors thesis or project under direction of a faculty advisor. (P/NP grading only, pending completion of sequence)

199B. Directed Group Study I (1-5), II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

199F. Special Study for Advanced Undergraduate I (1-3) 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 136, 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 measures designs, optimal designs based on various criteria, analysis of covariance.

221. Biostatistics I (4) III. The Staff
Lecture—3 hours. Prerequisite: courses 121A, 130A, 131A, or 131B, or 133. Random vectors and matrices, characteristic functions; multivariate normal; multiple and canonical correlation; Multiple Regression; multivariate GLM; growth curve analysis; maximum likelihood; likelihood ratio and union-intersection tests; simultaneous inference; spatial linear models; projection pursuit; Bayesian multivariate methods; Stein and shrinkage estimators. Offered in alternate years.

238. Theory of Multivariate Analysis (4) III. The Staff
Lecture—3 hours. Prerequisite: courses 133A or 131B. Multivariate normal distribution, sampling distributions, estimation, tests of hypotheses, regression, discrimination, and classification; analysis of variance, ARIMA processes, state space models, and maximum likelihood estimation. Offered in alternate years.

238A. Theory of Multivariate Analysis II (4) III. The Staff
Lecture—3 hours. Prerequisite: courses 231A or 231C. Multivariate normal distribution, sampling distributions, estimation, tests of hypotheses, regression, discrimination, and classification; analysis of variance, ARIMA processes, state space models, and maximum likelihood estimation. Offered in alternate years.

241. Asymptotic Theory of Statistics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 232A or 232B or 234A. Asymptotic theory of 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.

250. Advanced Data Analysis (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 141, 123A and either course 230 or 231A. Resampling methods and one of three additional topics.
ic's selected from nonparametric and semi-parametric methods, incorporate data analysis, diagnostics, non-standard 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 (1-3) II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Guided orientation to original statistics research papers, and oral presentations in class by students under the supervision of a faculty member. (SU 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. (SU grading only)

292. Graduate Group in Statistics Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Statistics seminars, mostly in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (SU 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. (SU 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 a major professor. (SU grading only)

Professional Course

390. Methods of Teaching Statistics (2) I. The Staff (Chairperson in charge)
Lecture/discussion—2 hours, workshop—1 hour. 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. (SU grading only)

Professional Course

401. Methods in Statistical Consulting (3) I, II. 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. (SU grading only)

Statistics

(A Graduate Group)

George C. Roussas, Ph.D., Chairperson of the Group

Group Office, 469 Kerr Hall (916-752-2362)

Faculty. The Group has approximately 38 faculty members from 49 colleges, schools, and divisions, including 13 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. is designed to give students a strong foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Faculty 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 quarter of advanced calculus must be completed.

Graduate Adviser. W.O. Johnson.

Subject A

See University Requirements (Bachelor's Degree Requirements chapter)

Surgery

See Surgery (Medicine, School of); and Surgical and Radiological Sciences (Veterinary Medicine), below

Surgical and Radiological Sciences

(School of Veterinary Medicine)

Janet E. Ikow, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 2112 Medical Sciences 1A (919-752-2399)

Faculty

Cleta S. Bailey, D.V.M., Ph.D., Professor
Eugene M. Bresnock, D.V.M., Ph.D., Professor
Nedim C. Buyukmihci, V.M.D., Professor
Clare R. Gregor, D.V.M., Associate Professor
Steve C. Huskens, D.V.M., M.S., Professor
Susan V. Hildebrand, D.V.M., Professor
William J. Hohol, D.V.M., M.S., Professor
Janet E. Ikow, B.V.Sc., Ph.D., Associate Professor
James H. Jones, D.V.M., Ph.D., Associate Professor
Philip D. Koblik, D.V.M., M.S., Professor
Richard A. Le Couteur, B.V.Sc., Ph.D., Professor
Bruce R. Madewell, V.M.D., M.S., Professor
Thomas G. Nyland, D.V.M., Ph.D., Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
John R. Paceco, B.V.Sc., Ph.D., Professor
Peter J. Paceco, B.V.Sc., Associate Professor
Jack R. Snyder, D.V.M., Ph.D., Associate Professor
Eugene P. Steffee, D.V.M., Ph.D., Professor
Pia M. Thien, M.D., Ph.D., Assistant Professor
Philip B. Vasseur, D.V.M., Professor
Frank J. M. Verstraete, Dr. Med. Vet., B.V.Sc., M.Med., Assistant Professor

Courses in Surgical and Radiological Sciences (VSR)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only)

Graduate Courses

230. Principles of Anesthesia and Surgery (2) II. Steffee
Lecture—2 hours. Prerequisite: graduate or professional student or consent of instructor. Presentation and integration of principles of anesthetic and surgery for laboratory animals. Course is not restricted to student interns. Offered in alternate years.

230L. Principles of Anesthesia and Surgery (2) II. Steffee
Lecture—4 hours. Prerequisite: courses 230 concurrently. Laboratory to complement course 230L. Limited enrollment. Offered in alternate years. (SU grading only)

265A. Principles and Practice of Veterinary Radiation Oncology - A (1.5) II. Thomson
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, biologic effects of therapeutic radiation, and applications in veterinary oncology. Offered in alternate years. (Same course as 465A.) (SU grading only)

265B. Principles and Practice of Veterinary Radiation Oncology - B (1.5) III. Thomson
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.
methods of radiation therapy, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465B.) (SU grading only.)

280. Structure and Function of the Mammalian Respiratory System (4) II. Jones
Lecture—2 hours; Laboratory—1 hour. Prerequisite: Biochemistry 101A–101B, Mathematics 16A, 16B and 16C, Physics 5A and 5B. Advanced study of respiratory physiology and morphology with emphasis on principles of respiration, ventilation and perfusion, gas distribution, exchange, transport, and delivery at rest, during exercise, and at high altitude. Offered in alternate years.

280A. Clinical Neurology/Neuropathology Conference (1) I, II, III. Cardenas, Haggard, Bailey
Seminar—1 hour. Prerequisite: third- or fourth-year standing in the School of Veterinary Medicine, Veterinary Medicine Teaching Hospital, or UC Davis resident or graduate student in appropriate discipline. Discussion and review of selected neurological case studies from the Veterinary Medicine Teaching Hospital. (SU grading only.)

281. 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 study of essential scientific foundations of safe anesthesia and critical care. Format is directed by discussion following reading of assigned material emphasizing concepts in pharmacology and physiology. (SU grading only.)

282. 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 selected topics pertaining to critical care and supportive care in small animals. Material to illustrate specific medical problems and their prevention and management. (SU grading only.)

304. Anesthesia in Veterinary Surgery (1) I, II, III. Kombebede
Seminar—1 hour. Prerequisite: DVM, or equivalent degree and resident in specialty training or graduate student in related discipline. Discussion of selected topics pertaining to clinical anesthetic and supportive care in veterinary surgery. Review of current principles and treatment modalities of veterinary surgery in large and small animal clinic. (SU grading only.)

305. Group Study (1-6) I, II, III. The Staff (Steffey in charge)
(SU grading only.)

309. Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Courses

408. Special Procedures Rounds (21) II, II, III. The Staff
Lecture—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 discussed, with participants leading the discussions. Special procedures such as angiography, nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (SU grading only.)

409. Known Case Conference (1.5) I, II, III. The Staff
Discussion—1 hour. Prerequisite: a DVM degree and consent of instructor. Approved for graduate degree credit. Review of current VM Teaching Hospital proven cases. Intended for radiology residents and others with background in diagnostic radiology. May be repeated for credit. (SU grading only.)

410. Current Topics in Radiological Sciences (1.5) I, II, III, IV. The Staff
Lecture—1 hour. 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. Case studies and related alternate imaging modalities. Clinically oriented but also including relevant research material. (SU grading only.)

411. Small Animal Surgery (1.5 per week) I, II, III. The Staff (Wilson 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 staff. May be repeated for credit. (SU 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 clinics including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior staff. May be repeated for credit. (SU grading only.)

413. Foundations in Veterinary Dentistry (2) III. Valette
Lecture—20 hours total. Prerequisite: second-, third-, or fourth-year veterinary students; residents in specialty training, or graduate students. Overview of current knowledge and practical techniques used in small animal dentistry. (SU 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 room under the supervision of the senior staff. May be repeated for credit. (SU grading only.)

415. Lameness in Dogs (1.5) III. Valette
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. (SU grading only.)

417L. Lameness in Dogs (0.5) III. Valette
Laboratory—2 hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Students will be supplied with small animal radiographic and ultrasonographic case studies. Weekly discussion sections will be held to discuss assigned cases in small groups with instructors. Limited enrollment.

420. 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.

465A. Principles and Practice of Veterinary Radiation Oncology - A (1.5) II. Thoem
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, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265A.) (SU grading only.)

465B. Principles and Practice of Veterinary Radiation Oncology - B (1.5) III. Thoem
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, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265B.) (SU grading only.)

466. Mixed-Animal Anesthesia (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 anesthesia for junior veterinary students. Special techniques and consideration for anesthetizing a variety of species including horses, small domestic animals, and non-domestic species, cats and dogs. (SU grading only.)
Textile Science
See Fiber and Polymer Science

Textiles (A Graduate Group)
You-Lu Hisieh, 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, biological, and mechanical properties of fibers and polymers as well as fabrics, 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. Hisieh (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
Yoo-Lo Hisieh, Ph.D., Professor
Susan B. Kaiser, Ph.D., Professor
Emory Meinel, Ph.D., Associate Professor
Ning Pan, Ph.D., Associate Professor
Margaret H. Rucker, Ph.D., Professor

Emeriti Faculty
Mary Ann Nix (Textiles and Clothing, Emeritus)
Howard L. Needles, Ph.D., Professor Emeritus
S. Haig Zeroming, Ph.D., D.Sc., Professor Emeritus

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 marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production, distribution, and consumer use of textile products and apparel. (See also the Fibers and Polymer Science program.)

The Program. The textiles and clothing major offers two options: multidisciplinary and marketing/economics. The Multidisciplinary 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 management positions within the textile and apparel industry or in related fields, e.g., merchandising and marketing, production, research and development, technical service and product development. Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selection of restricted elective coursework.

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 ..................................................................................4
Preparatory Subject Matter ......................................................30-41
Computer science (Agricultural and Environmental Science and Engineering 21, Computer Science Engineering 10) .........................................................3-4
Economic principles (Economics 1A-1B) .................................10
History of art or cultural anthropology (Anthropology 2A, Art 10H) ..........................3-4
Physics (Physics 10 or Physics 1A) ............................................3-4
Psychology (Psychology 1) .......................................................4
Sociology and human behavior (Sociology 10A, 10B) ...............4
Statistics (Statistics 13) .........................................................4
Textiles and Clothing (Textiles and Clothing 6, 8) ....................8

Restrictions

Enforced

Required Courses

Total Units for the Degree ..................................................180

Restrictions

(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.

Major Adviser: N. Pan

Advising Center for the major is located in 129 Everson Hall (916-752-4417).
The Minor Program:
The Division of Textiles and Clothing offers a minor program for non-majors interested in satisfying second- or third-year general education requirements. For information about the program, see the staff advisor in 120 Everston Hall.

TEXTILES AND CLOTHING
18 credits
One course from Textiles and Clothing 8, 68 4
Courses selected from Fiber and Polymer Science, 110, 111, 161, 161L, Textiles and Clothing 107, 162-162L, 163-163L, 164, 165, 171, 173, 174, 177

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. The Staff Lecture—4 hours. Instructor in laboratory—2 hours. Introduction to the structure and properties of textiles. Consumer use and fabrication characteristics are emphasized.

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.

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 textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty.

98. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge) Prerequisite: consent of instructor. (PINP grading only)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Rucker in charge) (PINP grading only)

Upper Division Courses

162. Textile Fabrics (3) III. Pan Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance.

162L. Textile Fabrics Laboratory (1) III. 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. The Staff Lecture—2 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 finishing agents; factors affecting application and fastness; maintenance of dyed and finished textiles.

163L. Textile Coloration and Finishing Laboratory (1) III. The Staff 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. Heise Lecture—3 hours. Prerequisite: course 6 or 8. Overview of characteristics, technology, processes, and research in apparel manufacturing industries. Analysis of government regulations, material utilization, 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, weaving, knitting, processing, and finishing.

171. Clothing Materials Science (4) I. Heise, Pan Lecture—3 hours. Laboratory/discussion—3 hours. Prerequisite: course 6, 8, and senior standing. The properties, characteristics, and performance evaluation of clothing materials and structures for specific functional applications. Principles and methods related to rating and transport properties, fabric hand and aesthetic properties, clothing comfort, and material and assembly technology.

173. Principles of Fashion Marketing (3) I. Rucker Lecture—3 hours. Prerequisite: course 6. Economics 1A, Agricultural Economics 133 or 135. 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) I. Rucker Lecture—2 hours. Prerequisite: course 6. Study of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic, and technological factors that are shaping these industries and their markets. Offered in alternate years.

177. Clothing and Social Perception (3) I. Kaiser Lecture—3 hours. Prerequisite: course 107. Sociology 2, Psychology 1. Social and cognitive processes related to the meanings people assign to clothing styles when perceiving one another. Particular attention is directed to the following appearance-related stereotypes: age, sex, physical attractiveness, status, ethnicity, influences of clothing and appearance on social interaction.

180A-180B. Introduction to Research in Textiles (2-3) I, II, III. The Staff (Rucker in charge) Laboratory—5 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 textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty.

197. Tutoring in Textiles and Clothing (1-5) I, II, III. The Staff (Rucker in charge) Discussion—3-15 hours. Prerequisite: upper division textiles-related major and consent of instructor. Tutoring of students in Textiles and Clothing courses. Assistance with discussion sections and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. (PINP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge) (PINP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Rucker in charge) (PINP grading only)

Graduate Courses
250. 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 149). 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) II. Zerounian 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)

260. Seminar (1) I, II. The Staff Seminar—1 hour. Critical assessment of selected topics of current interest in textiles. (SU grading only)

290. Research Conference (1) I, II, II. 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. (SU grading only)

293. Recent Advances in Textiles (3) II. The Staff (Zerounian in charge) Lecture—3 hours. Prerequisite: two upper division courses in textiles and clothing or consent of instructor. Critical review 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) (SU grading only)

UC Davis Washington Center
Prof. Bruce W. Jentleson, Director
UC Davis Washington Center, 2301 M Street, NW, 5th Floor, Washington, DC 20037
(202-296-8221)

Information:
UC Davis Washington Center On-Campus Office
Internship and Career Center
274 Voche Hall, 916-752-7280

The UC Davis Washington Center began operations in the 1990-91 academic year. Its central objective is to provide students and faculty new and expanded opportunities 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

*Course not offered this academic year.
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 (6-8 units)**: Students work three to four days per week as interns 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 governmental committees and federal agencies, and other relevant Washington experiences.

Courses are taught by UC Davis faculty in residence, faculty from the UCLA and UC Santa Barbara 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 are offered directly by the Washington Center, including the University of California President’s Washington Scholarship Program, and the Joyce and Norman Well Scholarships.

Students live in university-approved 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 some of the same educational, cultural, historical and social activities but no courses or research projects. The program fee is $250.

The Washington Center also has two positions during the academic year for graduate students as Graduate Fellows (combination of a pre-doctoral research fellowship and a teaching assistantship) and Graduate Summer Internships.

In partnership with faculty on campus, the Washington Center also conducts satellite interactive “teacourses” in which students on the Davis campus participate in interviews and seminars with federal government officials and other experts from the nation’s capital.

### 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 Amsden Hall

(916-752-0516)

**Faculty**

- Lars W. Anderson, Ph.D., Lecturer
- David E. Baker, Ph.D., Professor
- Alan B. Bennett, Ph.D., Professor
- Arnold J. Bloom, Ph.D., Professor
- Kent J. Bradford, Ph.D., Professor
- Marla Cantwell, Ph.D., Lecturer
- Joseph M. DiTomaso, Ph.D., Lecturer
- Clyde L. Ernoe, Ph.D., Lecturer
- Timothy K. Fultz, Ph.D., Lecturer
- Louise E. Jackson, Ph.D., Associate Professor
- Richard A. Jones, Ph.D., Professor
- W. Thomas Lanini, Ph.D., Lecturer
- Muhammad Marruss, Ph.D., Lecturer
- Jeffrey R. Mitchell, Ph.D., Lecturer
- Richard W. Michelmore, Ph.D., Professor
- Donald J. Navins, Ph.D., Professor
- Robert F. Norris, Ph.D., Associate Professor
- Carlos F. Quero, Ph.D., Professor
- Frederick J. Furay, Ph.D., Lecturer
- Dina S. Stoddard, Ph.D., Assistant Professor
- Michael J. Stoddart, Ph.D., Professor
- Carol Sherman, Ph.D., Associate Professor
- Layne F. Spurr, Ph.D., Lecturer
- Ronald E. Voss, Ph.D., Lecturer
- John I. Yoder, Ph.D., Associate Professor

**Emeriti Faculty**

- James F. Harington, Ph.D., Professor Emeritus
- Robert F. Kasnite, Lecturer Emeritus
- James M. Lyons, Ph.D., Professor Emeritus
- Jim W.B. McNish, Ph.D., Professor Emeritus
- Lawrence W. Mitchell, Ph.D., Lecturer Emeritus
- Leonard L. Morris, Ph.D., Professor Emeritus
- Harlan W. Pratt, Ph.D., Professor Emeritus
- Lawrence Rapoport, Ph.D., Professor Emeritus
- Charles R. Rick, Ph.D., Professor Emeritus
- Vincent Rutabikia, 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
- Masao H. Watanabe, 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. Information can be obtained from the graduate advisor. Also see the Graduate Studies section in this catalog.

**Graduate Advisor:** H. Timm.

**Related Courses.** Vegetable crops faculty also teach the following courses that contribute to major and graduate programs in Agricultural Systems and Environment, Biological Sciences, Genetics, and Plant Biology:


**Concordance**

The following courses in Vegetable Crops have been transferred to other subject areas.

<table>
<thead>
<tr>
<th>Former Course Number</th>
<th>Equivalent new course and number</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Agricultural Systems and Environment 100 (Principles of Vegetable Crop Production)</td>
</tr>
<tr>
<td>105</td>
<td>Plant Science 114 (Biology, Evolution and Systematics in Vegetables)</td>
</tr>
</tbody>
</table>

*Courses not offered this academic year.*

**Courses in Vegetable Crops (VCR)**

Questions pertaining to the following courses should be directed to the instructor or to the Vegetable Crops Office, 148 Amsden Hall.

**Lower Division Course**

92. **Internship in Vegetable Crops (1-6)**, I, II, III.
- The Staff (Department Chairperson in charge)
- Internship—3-6 hours. Experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Minimum of 12 units permitted in the Vegetable Crops 92-192 series. (PNP grading only)

**Upper Division Courses**

192. **Internship in Vegetable Crops (1-12)**, I, II, III.
- The Staff (Chairperson in charge)
- Internship—3-6 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. Minimum of 12 units permitted in the Vegetable Crops 92-192 series. (PNP grading only)

**197T. Tutoring in Vegetable Crops (1-3)**, I, II, III.
- The Staff (Chairperson in charge)
- Tutoring—3-6 hours. Prerequisite: consent of instructor. Tutoring for upper division students who desire help in teaching experience. Undergraduate students may teach laboratory modules, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (PNP grading only)

199. **Dissertation Group Study** (1-5), I, II, III.
- The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. (PNP grading only)

199. **Special Study for Advanced Undergraduates** (1-6), I, II, III.
- The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. (PNP grading only)

**Graduate Courses**

212. **Postharvest Physiology of Vegetables** (4)
- Salwitz
- Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 112 or Plant Science 112. Comparative physiology of harvested vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Laboratories stresses concepts and research procedures. Offered in alternate years.

216. **Ecology and Agriculture** (3)
- Jackson
- Lecture/discussion—3 hours. Prerequisite: Ecology 206 or 208 and Plant Pathology 210 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 physiology, biotic interactions among crops and pests, and crop systems ecology. (Same course as Ecology 216/Plant Science 216)

220. **Biotechnology and Genetics of Crop Improvement** (3)
- Michelmore
- Lecture—5 hours. Prerequisite: Molecular and Cellular Biology 161 or Plant Science 105, 113. Emphasizes the integration of modern biotechnology and classical plant breeding including: transposable elements, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms.
Veterinary Medicine, School of

Frederick A. Murphy, D.V.M., Ph.D., Dean of the School
John R. Pascoe, B.V.Sc., Ph.D., Associate Dean—Academic Programs
Benni E. Oshurn, D.V.M., Ph.D., Associate Dean—Research
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. Klingsborg, D.V.M., Assistant Dean—Public Programs; Director, Veterinary Extension
Ian Gardner, D.V.M., M.P.H., Ph.D., Director, Master's of Preventive Veterinary Medicine Program
School Office, Rooms 101-142, Surge IV (916-722-1360)

Courses in Veterinary Medicine (VMD)

Lower Division Courses

92. Internship in Veterinary Science (1-12) I, II, III, IV. Pascoe
Discussion—laboratory—1 hour. Prerequisite: approval of prior period of internship by preceptor. Supervised work experience in Veterinary Medicine. (P/NP grading only.)

170. Ethics of Animal Use (4) III. Brooks
Dundon, Price
Lecture—3 hours; discussion—1 hour. Prerequisite: any basic course in composition or speech. Study of applied ethical methodology, tight and 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. General Education credit: Civilization and Culture or Contemporary Societies.

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 program prior to period of internship by preceptor. Supervised work experience in Veterinary Medicine. (P/NP grading only.)

Professional Courses

460. Informatics (1.0) I. Cardinet
Discussion—5 hours; laboratory—3-36 hours. 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. (P/NP grading only.)

401. The Normal Anatomy of the Canine Locomotor System and Head (4.0) I. Stover
Lecture—20 hours; laboratory—35 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Normal canine anatomy and musculoskeletal histology of bones, joints, muscles, ligaments, tendons, nerves and vessels of the vertebral column, limbs, and head, including the eye and ear. Some references made to comparable features in other domestic animals.

402A. Cardiovascular Anatomy and Physiology (2.4) I. Jones
Lecture—16 sessions; laboratory—8 sessions. 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.

402C. Pulmonary Anatomy and Physiology (2.1) II. Jones
Lecture—14 sessions; laboratory—7 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine; residents in Specialty Training or graduate students, with consent of instructor. Integrated view of respiratory function.

402D. Structure and Function of the Urinary System and Body Fluids (2.3) II. Bruss
Lecture—15 sessions; laboratory—7 sessions. Prerequisite: first-year standing in veterinary curriculum or consent of instructor. For first-year veterinary students. 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 (4.6-26) I, II. Hansen
Lecture—36 sessions/15 sessions (403A/403B); discussion—4 sessions/2 sessions; laboratory—6 sessions/3 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Emphasizes biochemical concepts used to analyze problems and evaluate metabolic relationships important in animal health and disease.

404A. Small Animal Radiology (1.9) II-III. Nyberg
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 pending completion of sequence.)

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 basic understanding of the important biological and clinical aspects of parasites and the diseases 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 Anaesthesia (2.4) I. Pascoe
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 conducting of surgery.

407L. Principles and Techniques of Operative Surgery Laboratory (1.4) I-II. Pascoe
Lecture—14 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 426. Introduction to surgical anatomy, operative, and anesthetic skills. (SU grading only.)

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. Prerequisites of nutrition and their application to the solution of nutritional disorders of animals.

409. Epidemiology (1.7) I. Bird
Lecture—11 hours; discussion—3 hours. Prerequisite: first-year standing in School of Veterinary Medicine.
Approved for graduate degree credit. Introduction to epidemiology, and its applications in veterinary medicine.

414A. Principles of Veterinary Pharmacology and Toxicology (2-4-1) Joy Lecture—22 hours; laboratory—1 to 2-hour sessions. 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 the pharmacological classes of drugs which are of major importance in veterinary medicine.

414B. Veterinary Pharmacology (1-8-1) 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 (2-1-3) 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. Veterinary Pathophysiology (Zee, Yilmaz) 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, morphological and physiological aspects of reproduction of animal viruses, covering the molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases in animals.

420. Immunology (3.0, 3.0) Gernet 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 vaccine development, responses to pathogens, and the development of hypersensitivity and autoimmune reactions.

421. Principles of Neurosciences (2.7, 2.7) II. 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 neurological disorders and clinical neurology.

422. Veterinary Ophthalmology (1.4, 1.4) Buynak 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 ophthalmic diseases of various species.

424. Introduction to the Abnormal Musculo-skeletal System (3.3) Stover Lecture—24 hours; laboratory—6 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the principles of orthopedic diseases of animals, including etiology and pathological, basic responses of musculo-skeletal tissues to major types of injuries and diseases.

425. Principles of Veterinary Anesthesiology and Critical Patient Care (1.7) II. Stetley Lecture—18 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 patients undergoing anesthesia.

426. Cell and Tissue Structure (2.3) I. Benton Lecture—17 sessions; laboratory—6 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Relationships between structure and function, including the visualization of 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 Radiographical Anatomy (3.3) III-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 commonly used radiographic techniques. Normal and pathological 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 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 Urinary Systems (3.3) II. Tablin Lecture—22 sessions; laboratory—11 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic understanding and correlation of the structure and function of the gastrointestinal and urinary systems. Multiple species’ differences examined.

433. Veterinary Oncology (1) I. Medowell Lecture—20 sessions. 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, histopathology, cytology, immunology, and the clinical manifestations of neoplastic diseases in animals.

435A-435B. Clinical Hematology and Biochemistry (4.0, 2.5) II-III. Zink Lecture—26 sessions; laboratory—14 sessions/5 sessions; discussion—4 sessions (435B only). Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Knowledge and understanding of normal and reference ranges of the hematologic, coagulation, and biochemical systems. Introduction to the principles of the assessment and interpretation of laboratory results.

436. Veterinary Public Health and Food Safety (2.4) III. Gelengor Lecture—24 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Introduction to the prevention and spread of zoonoses, protecting the consumer from disease problems associated with consumption of foods of animal origin and advising the public on public health issues having to do with their profession and animals.

437A. Issues in Veterinary Medicine: Ethics, Animal Use, Professional Standards, and Communications (2-6) I. Brooks Discussion—8 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the importance of professionals in society through their role as health care providers. (S/U grading only.)

437B. Ethics and Issues in Veterinary Medicine (0.8) II. Brooks 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 (1.3) I. 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)

439. Veterinary Neurology (2.7) I. Waller 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 various neurodiagnostic aids.

440. 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. Prerequisites: 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. Cowgille Lecture—36 hours; laboratory—15 three-hour sessions. 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—36 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—16 hours; laboratory—13 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the basic principles of medical pathology and 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. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities. (S/U grading only.)

459. Systemic Pathology (4.9) II. MacLauchlan Lecture—36 hours; laboratory—13 three-four sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Presents a basic understanding of the pathobiology of major organ systems relevant to a variety of animal species. Emphasis will be on mechanisms of injury, patterns of responses to injury, and on balance between damage and repair.

470A-470B-470C. Hospital Practices (1.1-1.2-1.1) I, II, III. The Staff (Smith in charge) Lecture—6 hours. Prerequisites: second-year standing in the School of Veterinary Medicine. Clinical training in Veterinary Medicine. Assignments in the medical and surgical services and clinical diagnostic facilities of the Veterinary Medical Teaching Hospital. (S/U grading only, pending completion of sequence.)
Viticulture and Enology

471. General 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 urban veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the summer-fall sequence. (SU grading only, pending completion of three-term sequence.)

472. Large Animal Practice Clinics (2.5-15) H-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 Session I-II sequence. (SU 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. (SU 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 Sessions I-II sequence. (SU 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. (SU 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. (SU grading only, pending completion of three-term sequence.)

477. Companion Animal Practice Clinics (2.5-15) I-II-III.
Smith
Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor (Summer Session students must be enrolled in DVM/MPVM degree program). Clinical training in veterinary medicine. Assignments in the medical and surgical services and clinical diagnostic laboratories of the VM Teaching Hospital with emphasis on small and exotic animal species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (SU 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. (SU grading only, pending completion of three-term 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. (SU grading only. Deferred grading, pending completion of sequence.)

490B. Hospital Practices: Small Animal Clinic (2) I, II, III.
Ling
Laboratory—10 six-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine and course 490A. Continuation of 490A. (SU grading only, pending completion of sequence.)

490C. Hospital Practices: Small Animal Clinic (2) I, II, III.
Ling
Laboratory—10 six-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and course 490B. Continuation of 490B. (SU grading only, pending completion of sequence.)

Viticulture and Enology
(College of Agricultural and Environmental Sciences)
Linda F. Bisson, Ph.D., Chairperson of the Department
Department of Viticulture and Enology, 1023 Wickson Hall (916-752-0296)

Faculty
Douglas C. Adams, Ph.D., Associate Professor
Linda F. Bisson, Ph.D., Professor
Roger B. Boulton, Ph.D., Professor (Viticulture and Enology, Chemical Engineering)
Susan E. Ebeling, Ph.D., Professor
Mark A. Matthews, Ph.D., Associate Professor
Carole P. Meredith, Ph.D., Associate Professor
Am C. Noble, Ph.D., Professor
Andrew Walker, 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. Max Klepa, Ph.D., Professor Emeritus
Ralph E. Kirkung, Ph.D., Professor Emeritus
Lloyd A. Lider, Ph.D., Professor Emeritus
Herald P. Oom, Ph.D., Professor Emeritus
Cornelius S. Kugh, D.Sc., Professor Emeritus
Vernon L. Singleton, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Robert J. Weaver, Ph.D., Professor Emeritus
A. Dinmoor Webb, Ph.D., Professor Emeritus

The Program of Study. Enology is a specialization under the Food Science major; and viticulture is a specialization under the Agricultural and Environmental Chemistry, Chemical Engineering, Ecology, Food Science, Genetics, Horticulture, Microbiology, Plant Biology, Plant Pathology, and Soil Science.

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, reproduction, 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 Wine Making (3) I. Adams; II. Meredith; III. Waterhouse
Lecture—3 hours; term paper. This broad overview of wines introduces students having a general interest (or potential fermentation science [ferroogy] majors) to history of wine, physiology of alcohol, wine appreciation, viticulture, fermentation, and wines produced in California and other areas of the United States and the world. General Education credit: Civilization and Culture or Nature and Environment.

99. Special Study for Undergraduates (1-5) I, II, III.
The Staff (Chairperson in charge)
(PNP grading only.)

Upper Division Courses
101A. Viticultural Practices (2) I. 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.

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 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 flowering 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, 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. Maegraith, Noble
Laboratory-discussion—3 hours. Prerequisite: course 111 must be taken concurrently, course 126 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 102S or 146. (PIN grading only.)

115. Raisin and Table Grape Production (2) III. Williams
Lecture—2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other parts 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 pruning, 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. Waterhouse, Ebeler
Lecture—4 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.

124. Wine Production (4) I. Bisson
Lecture—2 hours; laboratory—3 hours; independent study—3 hours. Prerequisite: course 3 and Biological Sciences 102. The course 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 fermentation required for each.

125. Wine Types and Sensory Evaluation (4) II. Ebeler
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 124, Agricultural Systems and Environmental Science 120, and 150. 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 affecting the flavor, data from wine analyses of model solutions and wines are analyzed and interpreted in extensive weekly lab reports.

126. Wine Processing (4) I. Boulton
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 124. Principles of equilibration 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.

128. Wine Microbiology (4) III. Bisson
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 123, 124. courses 125, 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines. (Former course 217.)

130. Management, Marketing, and Economics of the California Wine Industry (3) III. The Staff
Lecture—24 hours; lecture/discussion—4 hours; fieldwork—8 hours. Prerequisite: course 126. Introduction to management, marketing, and economics of wine in the United States with particular emphasis on the California wine business. Focuses on market segmentation and explores alternative strategies for grape acquisition, production, brand development, distribution, and social policy formulation. (Offered grading only.)

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 who provides a schematic 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.

146. Fermentation Science (3) III. Oyrydziel (Food Science and Technology)
Lecture—3 hours. Prerequisite: Microbiology 102, Biological Sciences 103. Basic principles of fermentation science and biotechnology with emphasis on industrial applications. Studies 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, research paper. Prerequisite: course 3. Weekly seminar presented by outside speakers on a specific winemaking topic chosen for the quarter. Discussion follow with the speaker and member in charge. May be repeated twice for credit.

192. Internship (1-12) 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 not typed by the student. (PIN grading only.)

198. Directed Group Study (1-9). II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor (PIN grading only.)

199. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Chairperson in charge)
(PIN grading only.)

Graduate Courses

*110. Grape Development and Composition (4) III. Polito, Adams
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102. The physiological and biochemical composition of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Offered in alternate years.

*216. Vineyard Establishment and Development (3) I. The Staff
Lecture/discussion—2 hours; fieldwork—3 hours. Prerequisite: courses 110, 115 or 116, consent of instructor. The physiology and biology of grape development. Emphasis on the development of grape composition relevant to viticulture. Offered in alternate years.

219. Natural Products of Wine (3) III. 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 discussed, including flavonoids and other polyphenols, terpenes, and nortriterpenoids, pyrazines, oak volatiles and other wine constituents.

Advanced Sensory Analysis of Wines (3) III. Noble
Lecture/discussion—2 hours; laboratory—4 hours. Prerequisite: course 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 components analyses and generalized Procrustes analysis to evaluate the judge's performance and interpret the significance of the results. Offered in alternate years.

*286. Winery Design and Economics (5) II. Boulton
Lecture—2 hours: discussion—1 hour; studio—6 hours. Prerequisite: course 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.

Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological science and other fields are chosen from current literature. Students must have previous experience in research and be capable of handling the demands of independent research in an academic environment. Course may be repeated for credit. (SU grading only.)

290. Seminar (1) II, III. Wolpert
Seminar—1 hour. Prerequisite: consent of instructor. (SU 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 proposals, 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. (SU grading only.)

291. Advances in Viticulture (I) I, II. Matthews
Seminar—1 hour. Prerequisite: consent of instructor. Experiences 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. (SU grading only.)

292. Advances in Enology (I) III. Waterhouse
Discussion—1 1/2 hours, seven to ten weeks. Prerequisite: courses 123, 124, 125, 126. Discussions of previously assigned reading material, usually in the form of two to three reprints. Discussions led by faculty to acquaint students with current research interests. May be repeated for credit. (SU 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. Students contact primarily in laboratory or discussion sections, and under direction of a faculty member. (SU grading only.)

298. Group Study (1-5) II, III. The Staff (Chairperson in charge)
(PIN grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(PIN 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:

<table>
<thead>
<tr>
<th>War–Peace Studies</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Approaches</td>
<td>20</td>
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<tr>
<td>One or two courses from the following:</td>
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<tr>
<td>Anthropology 123B, 131</td>
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<tr>
<td>Comparative Literature 157</td>
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<tr>
<td>Philosophy 115, 118</td>
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<tr>
<td>Physics/ Applied Science 137</td>
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<tr>
<td>Political Science 121, 123, 124, 123, 176</td>
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<tr>
<td>Sociology 119, 157</td>
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<tr>
<td>Women's Studies 102</td>
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</tbody>
</table>

| Northern and Western Regions | One or two courses from the following: | |
| 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 | One or two courses from the following: | |
| Anthropology 142, 143, 144 | |
| Economics 170 | |
| History 165, 190C, 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 Science

Water Science
(A Graduate Group)

Students admitted into the Water Science Graduate Group before June 30, 1993 will be allowed to complete their degree in this subject. New students should see the Hydrologic Science Graduate Group section in this catalog.

Information. K. Tanri (Land, Air and Water Resources), 127 Vemheymer Hall (916-752-6540).

Wildlife, Fish, and Conservation Biology
(College of Agricultural and Environmental Sciences)
Joseph J. Ceci, Jr., Ph.D., Chairperson of the Department
Department Office, 1086 Academic Surge (916-752-6586)

Faculty
Daniel W. Anderson, Ph.D., Professor
Louis W. Botsford, Ph.D., Professor
Tim Caro, Ph.D., Associate Professor
Joseph J. Ceci, Jr., Ph.D., Professor
Ronald E. Cole, B.S., Lecturer
Chris Dewees, Ph.D., Lecturer
Don C. Erman, Ph.D., Professor
Nancy A. Evans, Ph.D., Professor
Nadine K. Jacobsen, Ph.D., Associate Professor
Rex E. Marsh, A.B., Lecturer
Peter B. Moyle, Ph.D., Professor
Dirk Van Vuren, Ph.D., Assistant Professor

Emeriti Faculty
Walter E. Howard, Ph.D., Professor Emeritus
Dale F. Lott, Ph.D., Professor
Robert G. Schwab, Ph.D., Professor 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 designed 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 study 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, recreational 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:

<table>
<thead>
<tr>
<th>Written/Oral Expression</th>
<th>4-6</th>
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<tbody>
<tr>
<td>English 1</td>
<td>4</td>
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<tr>
<td>Rhetoric and Communication I</td>
<td>4</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>47-53</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry (Chemistry 2A, 2B, and 2A)</td>
<td>13</td>
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<tr>
<td>Computer science (Agricultural Systems and Environment 21)</td>
<td>3</td>
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<tr>
<td>Mathematics (Mathematics 16A, 16B)</td>
<td>6</td>
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<tr>
<td>Physics (Physics 1A, 1B or 5A, 5B, 5C or 7A, 7B, 7C)</td>
<td>8-12</td>
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<tr>
<td>Statistics (Statistics Ph 100, 102 or Agricultural Systems and Environment 120)</td>
<td>4</td>
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*Course not offered this academic year.*

Areas of Specialization

1. Behavioral ecology: Choose one course from each group:
   a. Neurobiology, Physiology and Behavior 122 or Psychology 154
   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. Evolution and Ecology 144, 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, Chemistry 88B, 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 Water Science 41
   b. Clinical Pathology 101, Medical Microbiology 115 or 116

4. Fisheries biology: Complete Wildlife, Fish, and Conservation Biology 102, 102L, 120, 120L, 121, Chemistry 88B, Biological Sciences 102, 102L, 103, and:
   a. One course from Wildlife, Fish, and Conservation Biology 116 or Evolution and Ecology 112-112L;
   b. Two courses from Environmental Studies 116 (or 150C), 151 or Water Science 122

5. Physiological ecology: Complete Wildlife, Fish, and Conservation Biology 121 and 130, Chemistry 88B, Biological Sciences 102, 103. Choose two courses from Biological Sciences 121, Environmental Studies 129-125L or Neurobiology, Physiology and Behavior 140.

Breadth/General Education

<table>
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<tr>
<th>Satisfaction of General Education requirement.</th>
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<tbody>
<tr>
<td>Ecology (Environmental Studies 100 or Evolution and Ecology 101)</td>
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<tr>
<td>Evolution (Evolution and Ecology 100)</td>
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<tr>
<td>Genetics (Biological Sciences 101)</td>
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<tr>
<td>Physiology (Neurobiology, Physiology and Behavior 101)</td>
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<tr>
<td>Vertebrate anatomy (Anatomy, Physiology and Cell Biology 100 or Evolution and Ecology 170)</td>
</tr>
</tbody>
</table>

Organismal core: Choose three lecture courses and two (or more) 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 102 and 125L) | 3-7

Restricted Electives | 9-24

Choose one from the seven Areas of Specialization shown below.

*Course not offered this academic year.*
6. Vertebrate pest ecology: Complete Wildlife, Fish, and Conservation Biology 151, Agronomy 100, Chemistry 88, Biological Sciences 102, 103, and choose one course from Plant Biology 120, 121, Entomology 110 or 115.

   a. Choose two courses from Plant Biology 102, 103, 121, 122, Range Science 100, Evolution and Ecology 121, 144, Environmental Studies 155.
   b. Choose one course from Wildlife, Fish, and Conservation Biology 131, 136 or Range Science 135.

Unrestricted Electives .................................. 10-65
Total Units for the Degree (minimum).........180

Major Advisor: N. Jacobson.

Students transferring to Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Major Advisor so that their program can be evaluated and a faculty advisor assigned. See receptionist in 1080 Academic Surge Building or telephone 752-6686.

Graduate Study. See the Graduate Studies section in this catalog.

Courses in Wildlife, Fish and Conservation Biology (WFB)

Lower Division Courses

10. Wildlife Ecology and Conservation (4) L.
    Lott, Moyla.

92. Internship (1-6). I, II, III. The Staff (Department Chairperson in charge).
    Internship—3 hours. Field or laboratory experience supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Field Methods in Wildlife Biology (3) III.
    The Staff (Chairperson in charge).
    Fieldwork—12 hours; laboratory—40 hours total (7 days).
    Prerequisite: courses 110, 110L or 111, 111L, and Evolution and Ecology 101, or the equivalent courses chosen with approval of instructor. Methods for research in ecology and conservation of wild birds and mammals. Emphasis on the study of demography, intraspecific and interspecific interactions, activity budgets, home range, diets, and on report writing. Held between winter and spring quarters. Limited enrollment.

102. Field Studies in Fish Biology (1) III.
    Moyla.
    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 how they are used in research projects on ecology, behavior, physiology or population biology of fishes. Offered in alternate years.

102L. Field Studies in Fish Biology: Laboratory (6) III.
    Moyla, Cech.
    Fieldwork—15 hours; laboratory—12 hours; discussion—laboratory—3 hours. Prerequisite: course 102, upper division courses 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 pending completion of projects.)

110. Biology and Conservation of Wild Mammals (3) III.
    The Staff (Chairperson in charge).
    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 and their environment; and research-management techniques are emphasized.

110L. Laboratory in Biology and Conservation of Wild Mammals (3) III.
    The Staff (Chairperson in charge).
    Laboratory—6 hours. Prerequisite: course 110 (may be taken concurrently) and consent of instructor. Laboratory exercises in the morphology, systematics, identification, and habits of wild mammals from different habitats. Limited enrollment.

111. Biology and Conservation of Wild Birds (3) I.
    Anderson, Moyla.
    Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and Evolution and Ecology 101. Physiology, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, population and species interactions, management of bird populations. Limited enrollment.

111L. Laboratory in Biology and Conservation of Wild Birds (2) I.
    Anderson.
    Laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in population, distribution, anatomy, molts and age-sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Limited enrollment.

120. Biology and Conservation of Fishes (3) I.
    Moyla.
    Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and Evolution and Ecology 101. Introduction to evolution, ecology, and conservation of marine and freshwater fishes.

120L. Laboratory in Biology and Conservation of Fishes (1) I.
    Moyla.
    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.

122. Population Dynamics and Estimation (4)
    III.
    Bottrall.
    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.
    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.

130. Physiological Ecology of Wildlife (4) II.
    Jacobsen.
    Lecture—4 hours. Prerequisite: courses 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 relationship for understanding the distribution and abundance of wild ecotones 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 historical distributions, adaptation, behavioral patterns, energetics, growth, production and reproduction, 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).
    The Staff (Chairperson in charge).
    Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: courses 111 and 114 or the equivalent. Determination 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 1A or upper division ecology course (Evolution and Ecology 101). Spacing competition, cooperation, and grouping of wild vertebrates are described and analyzed in terms of their evolutionary history and ecology. Minimal consideration is given to humans and other primates. Offered in alternate years.

141. Behavioral Ecology (3) II.
    Roer.
    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.

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.

153. Wildlife Ectoecology (4) II.
    Anderson.
    Lecture—4 hours. 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 ectoecology, examples/case histories, philosophical/moral and ethical considerations. Offered in alternate years.

154. Conservation Biology (3) III.
    Caro.
    Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Studies 100. Introduction to conservation biology. Background to the biological issues and controversies surrounding sizes of species and habitats.

190. Prosemmin in Wildlife and Fisheries Biology (1) 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—2 hours; 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.)
Women's Studies

(College of Letters and Science)
Linda Morris, Ph.D. Program Director
Program Office, 271 Kerr Hall (916-752-4666)

Committee in Charge
Rosa Linda Fregoso, Ph.D. (Chicano Studies, Women's Studies)
Wendy Ho, Ph.D. (Asian American Studies, Women's Studies)

Carole Joffe, Ph.D. (Sociology, Women's Studies)
Susan Kaiser, Ph.D. (Textiles and Clothing)
Lata Mani, Ph.D. (Women's Studies)
Linda A. Morris, Ph.D. (Psychology)
Judith Newton, Ph.D. (Women's Studies)
Belinda Robnett, Ph.D. (Sociology, Women's Studies)
Irl Rognol, Ph.D. (Art Studies)
Seth Schein, Ph.D. (Comparative Literature)
Judith Stacey, Ph.D. (Sociology, Women's Studies)
Martha West, J.D. (Law)

*Course not offered this academic year.

Women's Studies is an interdisciplinary major founded on the premise that gender is a historically variable construction that concretely 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 one another. 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 and minor, scholars are 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, Chicano/a studies, political science, psychology, sociological 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 affords them research skills. Increasingly, too, specialists in Women's Studies are being used as consultants in industry, higher education, insurance companies, personnel firms, and governmental agencies. Women's Studies programs are designed specifically to study and assist women.

A.B. Major Requirements:

Preparatory Subject Matter

Two courses from Women's Studies 20, 50, 70 .................20
Three courses selected from the following: African American and African Studies 10, 15, American Studies 1, 7, Anthropology 2, Art History 15, Asian American Studies 1, 2, Chicano/a Studies 10, 20, Classics 15, Comparative Literature 12, English 46A or 46B or 46C, History 72A, 72B, Native American Studies 1, 10, Psychology 1, Sociology 1, 2, 3, Women's Studies 80 .......................8

Depth Subject Matter

Choose one of the two tracks: (1) Disciplinary or (2) Thematic. Each track consists of three parts (A, B, C).

A. Core courses in Women's Studies ..........................16

Disciplinary track and Thematic track

Women's Studies 103, 104, 190 and one additional upper division Women's Studies course.

B. Cross-Cultural Requirement

Disciplinary track and Thematic track

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 Part C, Major Emphasis. 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 University


Courses Outside the United States


Historical Material Prior to 1900


(C) Gender-based Courses .....................................12

Disciplinary track:

Choose three courses from one of the following focus groups:

Anthropology focus

Anthropology 131, 133, 134, 139, 148B.

History focus

History 102G, 102H, 148A, 148B.

Literature and Language focus

Comparative Literature 130, 138, 159C, English 185A, 185B, French 133, German 129, Italian 141, Linguistics 113.

Sociology and Psychology focus


OR

Thematic track:

Choose three courses that form a thematic cluster (for example, Gender and Race in the United States: The Cultural Representations of 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. See the Class Schedule and Room Directory.

Minor Program Requirements:

Women's Studies ................................................24

A. Core courses ..................................................4

Women's Studies 90, 190, 50 or 80

B. Ethnic studies/Women of color in the U.S.\n
(choose one) ..................................................4


C. Culture outside the U.S.: ......................................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.

Graduate Study. The Women's Studies Program offers a thesis in the field of Women's Studies, as well as the opportunity for students to complete a Ph.D. program in the P.H.D. programs of twelve other affiliated departments. Please see catalog listing "Women's Studies and Research.

Courses in Women's Studies (WMS)

Lower Division Courses

20. Cultural Representations of Gender (4) III.

The Staff

Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Interdisciplinary investigation of how specific cultural representations of gender influence the development of gender differences in society. Examine a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions.

50. Introduction to Women's Studies (4) I, II, III.

Robinett, Stacey

Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Interdisciplinary introduction which will survey and integrate literary, anthropological, sociological, psychological, and sociological perspectives on the study of sex roles. General Education credit: Contemporary Societies.

60. Feminist Perspectives on Western Sexual Thought (4) II. Fregosio

Lecture/discussion—4 hours. A critical introduction to major traditions of biblical interpretation in the West from a feminist perspective.

70. Theory and History of Sexuality (4) I.

Newton

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, the relation between movements for sexual liberation and the regulation of the body.

80. Special Topics in Women's Studies (4) II.

Robinett

Lecture/discussion—4 hours. In-depth examination of a woman's studies topic related to the research interests of the instructor. May be repeated for credit when topic differs. Limited enrollment.

98. Directed Group Study (1-5) I, II, III.

The Staff (Director of charge)

Prerequisite: consent of instructor. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Director of charge)

(P/NP grading only)

Upper Division Courses

102. Colonialism, Nationalism, and Women (4) III.

The Staff

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.

103. Introduction to Feminist Theory (4) I.

The Staff

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) III.

Newton

Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Explores 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) II, Stacey

Lecture/discussion—4 hours. Prerequisite: any Women's Studies course or Sociology 131 or 132. An examination of contemporary conflict over family values and the changing family from a feminist perspective. Offered in alternate years.

140. Gender and Law (4) I, II, West

Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies. Examination of women's legal rights in historical and contemporary contexts, discussing a variety of legal issues and applicable feminist theories. Topics include constitutional equal
2008. Problems in Feminist Research (4) II. Newton
Seminars—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.

299. Special Study for Graduate Students
(1-12) I, II, III. The Staff
(S/U grading only.)

Zoology

See Biological Sciences: Section of Evolution and Ecology

*Course not offered this academic year.
Concordance for Sections in the Division of Biological Sciences

On July 1, 1993, the faculty and teaching programs of the six departments in the Division of Biological Sciences at UC Davis were reorganized into five new sections: Evolution and Ecology (EVE); Microbiology (MIC); Molecular and Cellular Biology (MCB); Neurobiology, Physiology and Behavior (NPB); and Plant Biology (PLB). On the following pages are lists of courses offered by the former departments, followed by their new names, numbers, and titles. On the following pages are lists of courses offered by the five new sections, followed by their former names, numbers, and titles. Duplicate credit cannot be earned for a course under the new numbering system if credit has been earned for the course it replaced; however, some exceptions are allowed. If you have questions about duplication of credit or about receiving credit for repeating courses, please consult the Undergraduate Academic Programs Office, Division of Biological Sciences, 66 Briggs Hall (916-752-0410).

**Former Departments**

### Concordance List for Biochemistry and Biophysics (BCP)

<table>
<thead>
<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>101A General Biochemistry</td>
<td>Biological Sciences 102, Structure and Function of Biomolecules</td>
</tr>
<tr>
<td>101B General Biochemistry</td>
<td>Biological Sciences 103, Bioenergetics and Metabolism</td>
</tr>
<tr>
<td>101L General Biochemistry Laboratory</td>
<td>Molecular &amp; Cellular Biol 120L, Biochemistry Laboratory</td>
</tr>
<tr>
<td>102L Advanced Undergraduate Laboratory</td>
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</tr>
<tr>
<td>110L General Biochemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>111L General Biochemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>122 Plant Biochemistry</td>
<td>Molecular &amp; Cellular Biol 126, Plant Biochemistry</td>
</tr>
<tr>
<td>123 An Introduction to Enzymology</td>
<td>Food Science &amp; Technology 123, An Introduction to Enzymology</td>
</tr>
<tr>
<td>123L Enzymology Laboratory</td>
<td>Food Science &amp; Technology 123L, Enzymology Laboratory</td>
</tr>
<tr>
<td>133 Behavior and Analysis of Enzyme Systems</td>
<td>Molecular &amp; Cellular Biol 123, Behavior and Analysis of Enzyme &amp; Receptor Systems</td>
</tr>
<tr>
<td>143 Structure-Function Relations of Proteins</td>
<td>Molecular &amp; Cellular Biol 122, Structure and Function of Proteins</td>
</tr>
<tr>
<td>153 Molecular Biology of Eukaryotic Cells</td>
<td>Molecular &amp; Cellular Biol 121, Molecular Biology of Eukaryotic Cells</td>
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<tr>
<td>153 Molecular Biology of Eukaryotic Cells</td>
<td>Molecular &amp; Cellular Biol 141, Cellular Regulation of Gene Expression</td>
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<tr>
<td>153 Molecular Biology of Eukaryotic Cells</td>
<td>Molecular &amp; Cellular Biol 161, Molecular Genetics</td>
</tr>
<tr>
<td>190 Undergraduate Seminar in Biochemistry</td>
<td>Molecular &amp; Cellular Biol 138, Undergraduate Seminar in Biochemistry</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Molecular &amp; Cellular Biol 192, Internship</td>
</tr>
<tr>
<td>194H Biochemistry Honors</td>
<td>Molecular &amp; Cellular Biol 194H, Research Honors</td>
</tr>
<tr>
<td>197T Tutoring in Biochemistry</td>
<td>Molecular &amp; Cellular Biol 197T, Tutoring</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Molecular &amp; Cellular Biol 198, Directed Group Study</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Molecular &amp; Cellular Biol 199, Special Study for Advanced Undergraduates</td>
</tr>
<tr>
<td>200 Current Techniques in Biochemistry</td>
<td>Molecular &amp; Cellular Biol 200B, Current Techniques in Biochemistry</td>
</tr>
<tr>
<td>201A Physical and Chemical Biochemistry</td>
<td>Molecular &amp; Cellular Biol 221A, Physical Biochemistry</td>
</tr>
<tr>
<td>201B Integration of Metabolism and Regulatory Phenomena</td>
<td>Molecular &amp; Cellular Biol 221B, Integration of Metabolism and Regulatory Phenomena</td>
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<tr>
<td>201C Molecular Biology</td>
<td>Molecular &amp; Cellular Biol 221C, Molecular Biology</td>
</tr>
<tr>
<td>201D Cellular Biochemistry</td>
<td>Molecular &amp; Cellular Biol 221D, Cellular Biochemistry</td>
</tr>
<tr>
<td>202L Advanced Biochemistry Laboratory</td>
<td>Molecular &amp; Cellular Biol 220L, Advanced Biochemistry Laboratory Rotations</td>
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<tr>
<td>204 Gene Expression</td>
<td>Molecular &amp; Cellular Biol 231, Membrane Biochemistry</td>
</tr>
<tr>
<td>212 Chemical Modifications of Proteins</td>
<td>Molecular &amp; Cellular Biol 232, Chemical Modifications of Proteins</td>
</tr>
<tr>
<td>215 Kinetics of Biological Systems</td>
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<tr>
<td>250 Biochemical Literature</td>
<td>Molecular &amp; Cellular Biol 290C, Research Conference</td>
</tr>
<tr>
<td>270 Advanced Research Conference</td>
<td>Molecular &amp; Cellular Biol 296, Research Seminar</td>
</tr>
<tr>
<td>298 Group Study</td>
<td>Molecular &amp; Cellular Biol 298, Group Study</td>
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<tr>
<td>299 Research</td>
<td>Molecular &amp; Cellular Biol 299, Research</td>
</tr>
<tr>
<td>390 The Teaching of Biochemistry</td>
<td>Molecular &amp; Cellular Biol 300, Methods of Teaching</td>
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### Concordance List for Biological Sciences (BIS)

<table>
<thead>
<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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</thead>
<tbody>
<tr>
<td>121 Physiological Adaptation of Marine Organisms</td>
<td>NeuroPhysio&amp;Behavior 14: Physiological Adaptation of Marine Organisms</td>
</tr>
<tr>
<td>rory</td>
<td></td>
</tr>
<tr>
<td>XX, 1XX, 2XX All other undergraduate and graduate courses</td>
<td>Biological Sciences XX, 1XX, 2XX, No change to existing courses or numbers.</td>
</tr>
</tbody>
</table>

*See course listing for new upper division common curriculum (Biological Sciences 101, 102, 103, 104).*
### Concordance List for Botany (BOT)

<table>
<thead>
<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX Lower division courses in Botany</td>
<td>Plant Biology XX</td>
</tr>
<tr>
<td>100 Evolutionary Biology of Plants</td>
<td>Evolution and Ecology 100</td>
</tr>
<tr>
<td>101 Survey of Plant Communities of California</td>
<td>Evolution and Ecology 121</td>
</tr>
<tr>
<td>17 Plant Ecology</td>
<td>Evolution and Ecology 117/ Plant Biology 117</td>
</tr>
<tr>
<td>130 Survey of Cell Biology</td>
<td>Biological Sciences 104</td>
</tr>
<tr>
<td>140 Paleobotany</td>
<td>Evolution and Ecology 140</td>
</tr>
<tr>
<td>144 Plant Geography</td>
<td>Evolution and Ecology 144</td>
</tr>
<tr>
<td>1XX All other upper division Botany courses</td>
<td>Plant Biology 1XX</td>
</tr>
<tr>
<td>202 Plant Ecophysiology</td>
<td>Plant Biology (Grad) 210</td>
</tr>
<tr>
<td>203 Ecophysiological Methods</td>
<td>Plant Biology (Grad) 211</td>
</tr>
<tr>
<td>240 Paleobotany and Angiosperm Evolution</td>
<td>Plant Biology and Angiosperm Evolution</td>
</tr>
<tr>
<td>243 Palynology</td>
<td>Evolution and Ecology 243</td>
</tr>
<tr>
<td>2XX All other graduate Botany courses</td>
<td>Plant Biology (Grad) 2XX</td>
</tr>
<tr>
<td>390 The Teaching of Botany</td>
<td>Plant Biology 390</td>
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### Concordance List for Genetics (GEN)

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<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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<tbody>
<tr>
<td>10 Heredity and Evolution</td>
<td>Molecular &amp; Cellular Biol 10</td>
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<tr>
<td>99 Special Study for Undergraduates</td>
<td>Molecular &amp; Cellular Biol 99</td>
</tr>
<tr>
<td>100 Principles of Genetics</td>
<td>Biological Sciences 101</td>
</tr>
<tr>
<td>100L Principles of Genetics Laboratory</td>
<td>Molecular &amp; Cellular Biol 160L</td>
</tr>
<tr>
<td>102A Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 161</td>
</tr>
<tr>
<td>102B Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 170L</td>
</tr>
<tr>
<td>103 Organic Evolution</td>
<td>Molecular &amp; Cellular Biol 163</td>
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<tr>
<td>104 Developmental Genetics</td>
<td>Evolution and Ecology 102</td>
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<tr>
<td>105 Population Genetics</td>
<td>Evolution and Ecology 100</td>
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<tr>
<td>106 Evolutionary Quantitative Genetics</td>
<td>Introduction to Evolution</td>
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<tr>
<td>107 Human Genetics</td>
<td>Molecular &amp; Cellular Biol 162</td>
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<tr>
<td>144 Advanced Developmental Genetics</td>
<td>Molecular &amp; Cellular Biol 166</td>
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<tr>
<td>190C Introduction to Genetics Research</td>
<td>Molecular &amp; Cellular Biol 190C</td>
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<tr>
<td>191 Undergraduate Seminar in Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 178</td>
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<td>192 Internship</td>
<td>Molecular &amp; Cellular Biol 192</td>
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<tr>
<td>193 Research Seminar in Current Topics</td>
<td>Molecular &amp; Cellular Biol 193</td>
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<td>197T Tutoring in Genetics</td>
<td>Molecular &amp; Cellular Biol 197T</td>
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<td>198 Group Study</td>
<td>Molecular &amp; Cellular Biol 198</td>
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<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Molecular &amp; Cellular Biol 199</td>
</tr>
<tr>
<td>202 Plasmids, Recombinant DNA, and Genetic Engineering</td>
<td>Molecular &amp; Cellular Biol 262</td>
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<td>203 Advanced Evolution</td>
<td>Population Biology (Grad) 203</td>
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<tr>
<td>205 Theoretical Population Genetics</td>
<td>Population Biology (Grad) 205</td>
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<tr>
<td>209 Molecular Evolution</td>
<td>Population Biology (Grad) 209</td>
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<tr>
<td>290C Research Conference in Genetics</td>
<td>Molecular &amp; Cellular Biol 290C</td>
</tr>
<tr>
<td>298 Group Study</td>
<td>Molecular &amp; Cellular Biol 298</td>
</tr>
<tr>
<td>299 Research</td>
<td>Molecular &amp; Cellular Biol 299</td>
</tr>
<tr>
<td>300 Methods in Teaching Genetics</td>
<td>Molecular &amp; Cellular Biol 390</td>
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### Concordance List for Microbiology (MIC)

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<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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<td>XX, 1XX, 2XX All undergraduate and graduate courses</td>
<td>Microbiology XX, 1XX, 2XX</td>
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No change to existing courses or numbers.
## Concordance List for Physiology—Animal (PHS)

<table>
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<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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<tbody>
<tr>
<td>2 Introductory Physiology</td>
<td>Neurophysiology &amp; Behavior 10</td>
</tr>
<tr>
<td>2L Introductory Physiology Laboratory</td>
<td>Biological Sciences 104</td>
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<tr>
<td>10 Elementary Physiology</td>
<td>Neurophysiology &amp; Behavior 103</td>
</tr>
<tr>
<td>100A Cellular Physiology</td>
<td>Neurophysiology &amp; Behavior 104L</td>
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<tr>
<td>100B Cellular Physiology</td>
<td>Neurophysiology &amp; Behavior 106</td>
</tr>
<tr>
<td>100L Cellular Physiology Laboratory</td>
<td>Neurophysiology &amp; Behavior 101</td>
</tr>
<tr>
<td>106A Experiments in Physiology: Design and Execution</td>
<td>Neurophysiology &amp; Behavior 104</td>
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<tr>
<td>110 Systemic Physiology</td>
<td>Neurophysiology &amp; Behavior 127</td>
</tr>
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<td>110L Systemic Physiology Laboratory</td>
<td>Neurophysiology &amp; Behavior 128</td>
</tr>
<tr>
<td>120A Comparative Physiology: Neurointegrative Mechanisms</td>
<td>Neurophysiology &amp; Behavior 129</td>
</tr>
<tr>
<td>120B Comparative Physiology: Circulation</td>
<td>Neurophysiology &amp; Behavior 126</td>
</tr>
<tr>
<td>120D Comparative Physiology: Endocrinology</td>
<td>Neurophysiology &amp; Behavior 140</td>
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<tr>
<td>120E Comparative Physiology: Respiration</td>
<td>Undergraduate courses in Neurobiology, Physiology and Behavior</td>
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<tr>
<td>120F Comparative Physiology of Sensory Systems</td>
<td>Graducate courses in the Physiology Graduate Group</td>
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<tr>
<td>147 Aviational Physiology</td>
<td>Physiology (Grad) 2XX</td>
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<tr>
<td>148 Principles of Environmental Physiology</td>
<td>Physiology (Grad) 3XX</td>
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<tr>
<td>1XX All other undergraduate Physiology courses</td>
<td>Physiology (Grad) 3XX</td>
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<tr>
<td>2XX Graduate courses in Physiology</td>
<td>Physiology (Grad) 3XX</td>
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<td>3XX Professional courses in Physiology</td>
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## Concordance List for Zoology (ZOO)

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<tr>
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<tbody>
<tr>
<td>10 Concepts of Zoology</td>
<td>Evolution and Ecology 92</td>
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<tr>
<td>92 Internship</td>
<td>Evolution and Ecology 99</td>
</tr>
<tr>
<td>99 Special Study for Lower Division Students</td>
<td>Molecular &amp; Cellular Biol 150</td>
</tr>
<tr>
<td>100 Embryology</td>
<td>Molecular &amp; Cellular Biol 150L</td>
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<tr>
<td>100L Laboratory in Vertebrate Embryology</td>
<td>Molecular &amp; Cellular Biol 151</td>
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<tr>
<td>101 Senior Colloquium in Developmental Biology</td>
<td>Molecular &amp; Cellular Biol 159</td>
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<tr>
<td>105 Phylogenetic Analysis of Vertebrate Structure</td>
<td>Evolution and Ecology 112</td>
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<tr>
<td>112 Invertebrate Zoology</td>
<td>Evolution and Ecology 112L</td>
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<td>112L Laboratory for Invertebrate Zoology</td>
<td>Biological Sciences 104</td>
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<tr>
<td>121A Cell Biology</td>
<td>Molecular &amp; Cellular Biol 121</td>
</tr>
<tr>
<td>121B Cell Biology</td>
<td>Molecular &amp; Cellular Biol 141</td>
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<td>121C Advanced Cell Biology</td>
<td>Molecular &amp; Cellular Biol 142</td>
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<td>121L Cell Biology Laboratory</td>
<td>Molecular &amp; Cellular Biol 140L</td>
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<td>122 Histology</td>
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<td>125 Animal Ecology</td>
<td>Evolution and Ecology 101</td>
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<td>130 Survey of Cell Biology</td>
<td>Evolution and Ecology 133</td>
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<td>130L Survey of Cell Biology</td>
<td>Evolution and Ecology 134</td>
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<td>133 Patterns in Vertebrate Biology</td>
<td>Evolution and Ecology 134L</td>
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<td>134 Herpetology</td>
<td>Evolution and Ecology 136</td>
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<td>134L Herpetology Laboratory</td>
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<td>136 Mammalogy</td>
<td>Evolution and Ecology 137</td>
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<td>136L Mammalogy Laboratory</td>
<td>Evolution and Ecology 137L</td>
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<td>138 Ecology of Tropical Latitudes</td>
<td>Evolution and Ecology 138</td>
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<td>141 Principles of Systematic Zoology</td>
<td>Evolution and Ecology 141</td>
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<td>Equivalent New Course, If Any</td>
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<tr>
<td>142 Invertebrate Physiology</td>
<td>NeuroPhysiol&amp;Behavior 119 Former NPB 142 Invertebrate Physiology</td>
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<td>NeuroPhysiol&amp;Behavior 119L Former NPB 142L Invertebrate Physiology Laboratory</td>
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<td>143 Neurobiology</td>
<td>NeuroPhysiol&amp;Behavior 160 Former NPB 143 Advanced Cellular Neurobiology</td>
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<td>143L Neurobiology Laboratory</td>
<td>NeuroPhysiol&amp;Behavior 160L Former NPB 143L Advanced Cellular Neurobiol. Lab</td>
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<td>147 Zoogeography</td>
<td>Evolution and Ecology 147 Zoogeography</td>
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<td>148 Animal Phylogeny and Evolution</td>
<td>Evolution and Ecology 100 Introduction to Evolution</td>
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<td>149 Evolution of Ecological Systems</td>
<td>Evolution and Ecology 149 Evolution of Ecological Systems</td>
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<td>155 Behavior of Animals</td>
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<td>Evolution and Ecology 170 Comparative Biomechanics</td>
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<td>189 Introduction to Biological Research</td>
<td>Evolution and Ecology 189 Introduction to Research</td>
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<td>190 Undergraduate Seminar in Zoology</td>
<td>Evolution and Ecology 190 Undergraduate Seminar in Evolution and Ecology</td>
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<td>192 Internship</td>
<td>Evolution and Ecology 182 Internship</td>
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<td>194H Research Honors in Zoology</td>
<td>Evolution and Ecology 194H Research Honors</td>
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<td>197T Tutoring in Zoology</td>
<td>Evolution and Ecology 197T Tutoring</td>
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<td>Evolution and Ecology 198 Directed Group Study</td>
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<td>199 Special Study for Advanced Undergraduates</td>
<td>Evolution and Ecology 199 Special Study for Advanced Undergraduates</td>
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<td>200 Current Techniques in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 200A Current Techniques in Cell Biology</td>
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<td>200LA Cell and Developmental Biology Laboratory</td>
<td>Molecular &amp; Cellular Biol 200LA Cell and Developmental Biology Laboratory</td>
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<tr>
<td>200LB Cell and Developmental Biology Laboratory</td>
<td>Molecular &amp; Cellular Biol 200LB Cell and Developmental Biology Laboratory</td>
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<td>202 Biomathematics</td>
<td>Cellular Basis of Morphogenesis</td>
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<tr>
<td>203 Global and Regional Modeling</td>
<td>Molecular &amp; Cellular Biol 252 Molecular &amp; Cellular Biol 252</td>
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<tr>
<td>205 Pattern Formation</td>
<td>Molecular &amp; Cellular Biol 253 Pattern Formation</td>
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<tr>
<td>208 Molecular Mechanisms in Animal Development</td>
<td>Molecular &amp; Cellular Biol 255 Molecular Mechanisms in Animal Development</td>
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<tr>
<td>212 Topics in Invertebrate Evolution</td>
<td>Population Biology (Grad) 212 Topics in Invertebrate Evolution</td>
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<td>221 Behavioral Ecology</td>
<td>Evolution and Ecology 221 Behavioral Ecology</td>
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<tr>
<td>223 Modeling in Behavioral and Evolutionary Ecology</td>
<td>Population Biology (Grad) 223 Modeling in Behavioral and Evolutionary Ecology</td>
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<tr>
<td>225 Biology of Fertilization</td>
<td>Molecular &amp; Cellular Biol 251 Molecular &amp; Cellular Biol 251</td>
</tr>
<tr>
<td>226 Cell and Molecular Biology of Cancer</td>
<td>Molecular &amp; Cellular Biol 256 Cell and Molecular Biology of Cancer</td>
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<tr>
<td>236 Muscle Physiology</td>
<td>Molecular &amp; Cellular Biol 242 Muscle Biophysics</td>
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<td>240 Topics in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 250 Special Topics in Cell Biology</td>
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<td>241 Membrane Biology</td>
<td>Molecular &amp; Cellular Biol 241 Membrane Biology</td>
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<td>242 Research Conference in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 249 Literature in Cell Biology</td>
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<tr>
<td>243 Topics in Cellular and Behavioral Neurobiology</td>
<td>Neuroscience 243 Topics in Cellular and Behavioral Neurobiology</td>
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<td>244 Ecology of Parasites</td>
<td>Molecular &amp; Cellular Biol 248 Seminar in Cell Biology</td>
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<tr>
<td>266 Seminar in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 259 Literature in Developmental Biology</td>
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<tr>
<td>269 Research Conference in Developmental Biology</td>
<td>Population Biology (Grad) 270 Research Conference in Evolutionary Biology</td>
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<td>270 Research Conference in Evolutionary Biology</td>
<td>Neurobiology 283 Neurobiological Literature</td>
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<td>Evolution and Ecology 290 Current Topics</td>
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<td>Evolution and Ecology 290 Seminar in Animal Behavior</td>
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<td>Evolution and Ecology 290C Research Conference</td>
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<td>292 Seminar in Development</td>
<td>Molecular &amp; Cellular Biol 258 Seminar in Development</td>
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<tr>
<td>296 Seminar in Geographical Ecology</td>
<td>Population Biology (Grad) 296 Seminar in Geographical Ecology</td>
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<td>Evolution and Ecology 298 Group Study</td>
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<td>Evolution and Ecology 299 Research</td>
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<tr>
<td>390 Methods of Teaching Zoology</td>
<td>Evolution and Ecology 390 Methods of Teaching</td>
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### New Sections

**Concordance List for Biological Sciences (BIS)**

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<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
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<tbody>
<tr>
<td>101 Genes and Gene Expression</td>
<td>Genetics 100, Principles of Genetics</td>
</tr>
<tr>
<td>102 Structure and Function of Biomolecules</td>
<td>Biochem &amp; Biophys 101A, General Biochemistry</td>
</tr>
<tr>
<td>103 Bioenergetics and Metabolism</td>
<td>Biochem &amp; Biophys 101B, General Biochemistry</td>
</tr>
<tr>
<td>104 Regulation of Cell Function</td>
<td>Botany/Zoology 130, Survey of Cell Biology</td>
</tr>
<tr>
<td></td>
<td>Physiology 100A, Cellular Physiology</td>
</tr>
<tr>
<td></td>
<td>Zoology 121A, Cell Biology</td>
</tr>
<tr>
<td><strong>XX, 1XX, 2XX All other undergraduate and graduate courses</strong></td>
<td>Biological Sciences XX, 1XX, 2XX No change to existing courses or numbers.</td>
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**Concordance List for Evolution and Ecology (EVE)**

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<th>New Number and Course Title</th>
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<td>92 Internship</td>
<td>Zoology 92, Internship</td>
</tr>
<tr>
<td>99 Special Study for Lower Division Students</td>
<td>Zoology 99, Special Study for Lower Division Students</td>
</tr>
<tr>
<td>100 Introduction to Evolution</td>
<td>Botany 100, Evolutionary Biology of Plants</td>
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<td></td>
<td>Genetics 103, Organic Evolution</td>
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<tr>
<td></td>
<td>Zoology 148, Animal Phylogeny and Evolution</td>
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<tr>
<td>101 Introduction to Ecology</td>
<td>Zoology 125, Animal Ecology</td>
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<tr>
<td>102 Advanced Evolution</td>
<td>Genetics 105, Population Genetics</td>
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<td>Genetics 106, Evolutionary Quantitative Genetics</td>
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<tr>
<td>105 Phylogenetic Analysis of Vertebrate Structure</td>
<td>Zoology 105, Phylogenetic Analysis of Vertebrate Structure</td>
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<tr>
<td>112 Invertebrate Zoology</td>
<td>Zoology 112, Invertebrate Zoology</td>
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<tr>
<td>112L Laboratory for Invertebrate Zoology</td>
<td>Zoology 112L, Laboratory for Invertebrate Zoology</td>
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<tr>
<td>117 Plant Ecology (Same course as Plant Biology 117)</td>
<td>Botany 117, Plant Ecology</td>
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<tr>
<td>121 Survey of Plant Communities in California</td>
<td>Plant Biology 121, former BOT 101, Survey of Plant Communities in Calif</td>
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<tr>
<td>133 Patterns in Vertebrate Biology</td>
<td>Zoology 133, Patterns in Vertebrate Biology</td>
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<tr>
<td>134 Herpetology</td>
<td>Zoology 134, Herpetology</td>
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<tr>
<td>134L Herpetology Laboratory</td>
<td>Zoology 134L, Herpetology Laboratory</td>
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<tr>
<td>136 Mammalogy</td>
<td>Zoology 136, Mammalogy</td>
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<tr>
<td>136L Mammalogy Laboratory</td>
<td>Zoology 136L, Mammalogy Laboratory</td>
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<tr>
<td>137 Ornithology</td>
<td>Zoology 137, Ornithology</td>
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<tr>
<td>137L Ornithology Laboratory</td>
<td>Zoology 137L, Ornithology Laboratory</td>
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<tr>
<td>138 Ecology of Tropical Latitudes</td>
<td>Zoology 138, Ecology of Tropical Latitudes</td>
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<tr>
<td>140 Paleobotany</td>
<td>Botany 140, Paleobotany</td>
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<tr>
<td>141 Principles of Systematic Zoology</td>
<td>Zoology 141, Principles of Systematic Zoology</td>
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<tr>
<td>144 Plant Geography</td>
<td>Botany 144, Plant Geography</td>
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<tr>
<td>147 Zoogeography</td>
<td>Zoology 147, Zoogeography</td>
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<tr>
<td>149 Evolution of Ecological Systems</td>
<td>Zoology 149, Evolution of Ecological Systems</td>
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<tr>
<td>170 Comparative Biomechanics</td>
<td>Zoology 170, Comparative Biomechanics</td>
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<tr>
<td>170L Comparative Biomechanics Laboratory</td>
<td>Zoology 170L, Comparative Biomechanics Laboratory</td>
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<tr>
<td>189 Introduction to Research</td>
<td>Zoology 189, Introduction to Biological Research</td>
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<tr>
<td>190 Undergraduate Seminar</td>
<td>Zoology 190, Undergraduate Seminar in Zoology</td>
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<tr>
<td>192 Internship</td>
<td>Zoology 192, Internship</td>
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<td>194HABC Research Honors</td>
<td>Zoology 194HABC, Research Honors in Zoology</td>
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<tr>
<td>197T Tutoring</td>
<td>Zoology 197T, Tutoring in Zoology</td>
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<tr>
<td>198 Directed Group Study</td>
<td>Zoology 198, Directed Group Study</td>
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<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Zoology 199, Special Study for Advanced Undergraduates</td>
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<tr>
<td>221 Behavioral Ecology</td>
<td>Zoology 221, Behavioral Ecology</td>
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<tr>
<td>240 Paleobotany and Angiosperm Evolution</td>
<td>Botany 240, Paleobotany and Angiosperm Evolution</td>
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<tr>
<td>243 Palynology</td>
<td>Botany 243, Palynology</td>
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<tr>
<td>287 Seminar in Animal Behavior</td>
<td>Zoology 287, Seminar in Animal Behavior</td>
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<tr>
<td>290 Current Topics</td>
<td>Zoology 290, Current Topics in Zoology</td>
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<tr>
<td>290C Research Conference</td>
<td>Zoology 290C, Research Conference in Zoology</td>
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<tr>
<td>298 Group Study</td>
<td>Zoology 298, Group Study</td>
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<tr>
<td>299 Research</td>
<td>Zoology 299, Research</td>
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<td>390 Methods of Teaching</td>
<td>Zoology 390, Methods of Teaching in Zoology</td>
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<tr>
<td>10  Introduction to Human Heredity</td>
<td>Genetics 10 Heredity and Evolution</td>
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<td>99  Special Study</td>
<td>Genetics 99 Special Study for Undergraduates</td>
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<td>120L Biochemistry Laboratory</td>
<td>Biochem &amp; Biophys 101L General Biochemistry Laboratory</td>
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<tr>
<td>121 Molecular Biology of Eukaryotic Cells (Not open for credit to students who have completed MCB 141)</td>
<td>Biochem &amp; Biophys 153 Molecular Biology of Eukaryotic Cells Cell Biology</td>
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<tr>
<td>122 Structure and Function of Proteins</td>
<td>Biochem &amp; Biophys 143 Structure-Function Relations of Proteins</td>
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<tr>
<td>123 Behavior and Analysis of Enzyme &amp; Receptor Systems</td>
<td>Biochem &amp; Biophys 133 Behavior and Analysis of Enzyme Systems</td>
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<td>126 Plant Biochemistry</td>
<td>Biochem &amp; Biophys 122 Plant Biochemistry</td>
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<td>138 Undergraduate Seminar in Biochemistry</td>
<td>Biochem &amp; Biophys 190 Undergraduate Seminar in Biochemistry</td>
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<td>140L Cell Biology Laboratory</td>
<td>Biology 121L Cell Biology Laboratory</td>
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<tr>
<td>141 Cellular Regulation of Gene Expression (Not open for credit to students who have completed MCB 121)</td>
<td>Biochem &amp; Biophys 153 Molecular Biology of Eukaryotic Cells Cell Biology</td>
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<tr>
<td>142 Advanced Cell Biology: Contractile and Motile Systems</td>
<td>Biology 121C Advanced Cell Biology</td>
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<tr>
<td>146 Histology</td>
<td>Zoology 122 Histology</td>
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<td>148 Undergraduate Seminar in Cell Biology</td>
<td>Zoology 100 Embryology</td>
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<td>150 Embryology</td>
<td>Zoology 100L Laboratory in Vertebrate Embryology</td>
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<tr>
<td>151L former MCB 151 Advanced Developmental Biology</td>
<td>Zoology 101 Advanced Developmental Biology</td>
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<td>158 Undergraduate Seminar in Developmental Biology</td>
<td>Biology 102 Senior Colloquium in Developmental Biology</td>
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<td>159 Senior Colloquium in Developmental Biology</td>
<td>Genetics 100L Principles of Genetics Laboratory</td>
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<td>160L Principles of Genetics Laboratory</td>
<td>Genetics 102A, 102B Molecular Genetics</td>
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<tr>
<td>161 Molecular Genetics (Not open for credit to students who have completed MCB 121 or 141)</td>
<td>Genetics 102B Molecular Biology of Eukaryotic Cells Cell Biology</td>
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<tr>
<td>162 Human Genetics</td>
<td>Genetics 103 Human Genetics</td>
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<tr>
<td>163 Developmental Genetics</td>
<td>Genetics 104 Developmental Genetics</td>
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<td>164 Advanced Eukaryotic Genetics</td>
<td>Genetics 104 Advanced Developmental Genetics</td>
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<td>166 Advanced Developmental Genetics</td>
<td>Genetics 102L Advanced Molecular Genetics Laboratory</td>
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<td>170L Advanced Molecular Genetics Laboratory</td>
<td>Genetics 199 Undergraduate Seminar in Molecular Genetics</td>
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<td>178 Undergraduate Seminar in Molecular Genetics</td>
<td>Genetics 100C Introduction to Genetics Research</td>
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<td>190C Undergraduate Research Conference</td>
<td>Internship</td>
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<tr>
<td>191 Introduction to Research</td>
<td>Internship</td>
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<tr>
<td>192 Internship</td>
<td>Genetics 193 Research Seminar in Current Topics</td>
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<td>193 Advanced Research</td>
<td>Biochem &amp; Biophys 194H Biochemistry Honors</td>
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<td>Biochem &amp; Biophys 197T Tutoring in Biochemistry</td>
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<tr>
<td>197T Tutoring</td>
<td>Biochem &amp; Biophys 197T Tutoring in Genetics</td>
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<td>198 Directed Group Study</td>
<td>Biochem &amp; Biophys 198 Directed Group Study</td>
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<td>199 Special Study for Advanced Undergraduates</td>
<td>Biochem &amp; Biophys 199 Special Study for Advanced Undergraduates</td>
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<td>200A Current Techniques in Cell Biology</td>
<td>Biochem &amp; Biophys 199 Current Techniques in Cell Biology</td>
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<tr>
<td>200B Current Techniques in Biochemistry</td>
<td>Zoology 200 Current Techniques in Biochemistry</td>
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<tr>
<td>200C Current Techniques in Biophysics (same course as Biophysics 200)</td>
<td>Biochem &amp; Biophys 200 Current Techniques in Biophysics (same course as M&amp;C 200)</td>
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<tr>
<td>220L Advanced Biochemistry Laboratory Rotations</td>
<td>Biochem &amp; Biophys 202L Advanced Biochemistry Laboratory</td>
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<tr>
<td>221A Physical Biochemistry</td>
<td>Biochem &amp; Biophys 201A Physical and Chemical Biochemistry</td>
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<tr>
<td>221B Integration of Metabolism and Regulatory Phenomena</td>
<td>Biochem &amp; Biophys 201B Integration of Metabolism and Regulatory Phenomena</td>
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<tr>
<td>221C Molecular Biology</td>
<td>Biochem &amp; Biophys 201C Molecular Biology</td>
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<tr>
<td>221D Cellular Biochemistry</td>
<td>Biochem &amp; Biophys 201D Cellular Biochemistry</td>
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<tr>
<td>231 Membrane Biochemistry</td>
<td>Biochem &amp; Biophys 208 Membrane Biochemistry</td>
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<tr>
<td>232 Chemical Modifications of Proteins</td>
<td>Biochem &amp; Biophys 212 Chemical Modifications of Proteins</td>
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<tr>
<td>241 Membrane Biology</td>
<td>Zoology 241 Membrane Biology</td>
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<tr>
<td>242 Muscle Biophysics</td>
<td>Zoology 236 Muscle Physiology</td>
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<tr>
<td>248 Seminar in Cell Biology</td>
<td>Zoology 266 Seminar in Cell Biology</td>
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### Concordance List for Molecular and Cellular Biology (MCB) continued

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<th>New Number and Course Title</th>
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<tr>
<td>249  Literature in Cell Biology</td>
<td>Zoology 242, Research Conference in Cell Biology</td>
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<td>250  Special Topics in Cell Biology</td>
<td>Zoology 240, Topics in Cell Biology</td>
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<tr>
<td>251  Biology of Fertilization</td>
<td>Zoology 225, Biology of Fertilization</td>
</tr>
<tr>
<td>252  Cellular Basis of Morphogenesis</td>
<td>Zoology 204, Cellular Basis of Morphogenesis</td>
</tr>
<tr>
<td>253  Pattern Formation</td>
<td>Zoology 205, Pattern Formation</td>
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<tr>
<td>254  Mechanisms of Organogenesis</td>
<td>Zoology 206, Mechanisms of Organogenesis</td>
</tr>
<tr>
<td>255  Molecular Mechanisms in Animal Development</td>
<td>Zoology 208, Molecular Mechanisms in Animal Development</td>
</tr>
<tr>
<td>256  Cell and Molecular Biology of Cancer</td>
<td>Zoology 226, Cell and Molecular Biology of Cancer</td>
</tr>
<tr>
<td>258  Seminar in Development</td>
<td>Zoology 292, Seminar in Development</td>
</tr>
<tr>
<td>259  Literature in Developmental Biology</td>
<td>Zoology 269, Research Conference in Developmental Biology</td>
</tr>
<tr>
<td>262  Recombinant DNA and Genetic Engineering</td>
<td>Genetics 202, Plasmids, Recombinant DNA, and Genetic Engineering</td>
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<tr>
<td>290C  Research Conference</td>
<td>Biochem &amp; Biophys 250, Biochemical Literature</td>
</tr>
<tr>
<td>295  Literature in Molecular and Cellular Biology</td>
<td>Biochem &amp; Biophys 270, Advanced Research Conference</td>
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<tr>
<td>296  Group Study</td>
<td>Biochem &amp; Biophys 296, Group Study</td>
</tr>
<tr>
<td>299  Research</td>
<td>Biochem &amp; Biophys 299, Research</td>
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<tr>
<td>390  Methods of Teaching</td>
<td>Biochem &amp; Biophys 390, The Teaching of Biochemistry, Methods in Teaching Genetics</td>
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### Concordance List for Microbiology (MIC)

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<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
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<td>Microbiology XX, 1XX, 2XX, No change to existing courses or numbers</td>
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### Concordance List for Neurobiology, Physiology and Behavior (NPB)

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<tr>
<td>10   Elementary Physiology</td>
<td>Physiology 10, Elementary Physiology</td>
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<tr>
<td>100  Neurobiology</td>
<td>Physiology 110, Systemic Physiology</td>
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<tr>
<td>101  former NPB 110 Systemic Physiology</td>
<td>Physiology 110L, Systemic Physiology Laboratory</td>
</tr>
<tr>
<td>101L  former NPB 110L Systemic Physiology Laboratory</td>
<td>Physiology 155, Behavior of Animals</td>
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<tr>
<td>102  former NPB 185 Animal Behavior</td>
<td>Physiology 100B, Cellular Physiology</td>
</tr>
<tr>
<td>103  former NPB 100B Cellular Physiology/Neurobiology</td>
<td>Physiology 100L, Cellular Physiology Laboratory</td>
</tr>
<tr>
<td>104L  former NPB 100L Cellular Physiology/Neurobiology Lab</td>
<td>Physiology 106A, Experiments in Physiology: Design and Execution</td>
</tr>
<tr>
<td>105  Introduction to Computer Models</td>
<td>Physiology 111ABC, Advanced Systemic Physiology Laboratory</td>
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<tr>
<td>106  Experiments in Physiology: Design and Execution</td>
<td>Physiology 112, Neuroscience</td>
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<tr>
<td>112  Neuroscience</td>
<td>Physiology 113, Cardiovascular, Respiratory, and Renal Physiology</td>
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<tr>
<td>113  Cardiovascular, Respiratory, and Renal Physiology</td>
<td>Physiology 114, Gastrointestinal Physiology</td>
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<tr>
<td>114  Gastrointestinal Physiology</td>
<td>Physiology 117, Avian Physiology</td>
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<tr>
<td>117  Avian Physiology</td>
<td>Zoology 142, Invertebrate Physiology</td>
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<tr>
<td>119  former NPB 142 Invertebrate Physiology</td>
<td>Zoology 142L, Invertebrate Physiology Laboratory</td>
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<tr>
<td>119L  former NPB142L Invertebrate Physiology Laboratory</td>
<td>Physiology 121, Physiology of Reproduction</td>
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<tr>
<td>121  Physiology of Reproduction</td>
<td>Physiology 121L, Physiology of Reproduction Laboratory</td>
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<tr>
<td>121L  Physiology of Reproduction Laboratory</td>
<td>Physiology 120A, Comparative Physiology: Neurointegrative Mechanisms</td>
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<tr>
<td>126  former NPB 120F Comparative Physiol: Sensory Systems</td>
<td>Physiology 120F, Comparative Physiology of Sensory Systems</td>
</tr>
<tr>
<td>127  former NPB 120B Comparative Physiol: Circulation</td>
<td>Physiology 120B, Comparative Physiology: Circulation</td>
</tr>
<tr>
<td>128  former NPB 120D Comparative Physiol: Endocrinology</td>
<td>Physiology 120D, Comparative Physiology: Endocrinology</td>
</tr>
<tr>
<td>129  former NPB 120E Comparative Physiology: Respiration</td>
<td>Physiology 120E, Comparative Physiology: Respiration</td>
</tr>
</tbody>
</table>
### Concordance List for Neurobiology, Physiology and Behavior (NPB) continued

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>130 Physiology of the Endocrine Glands</td>
<td>Physiology 130 Physiology of the Endocrine Glands</td>
</tr>
<tr>
<td>140 former NPB 148 Principles of Environmental Physiology</td>
<td>Physiology 148 Principles of Environmental Physiology</td>
</tr>
<tr>
<td>141 Physiological Adaptations of Marine Organisms</td>
<td>Biological Sciences 121 Physiological Adaptations of Marine Organisms</td>
</tr>
<tr>
<td>152 Hormones and Behavior (same course as Psychology 152)</td>
<td>NeuroPhys&amp;Behavior 150 Hormones and Behavior (same course as Psychology 152)</td>
</tr>
<tr>
<td>160 former NPB 143 Advanced Cellular Neurobiology</td>
<td>Zoology 143 Neurobiology</td>
</tr>
<tr>
<td>160L former NPB 143L Advanced Cellular Neurobiology Lab</td>
<td>Zoology 143L Neurobiology Laboratory</td>
</tr>
<tr>
<td>161 Developmental Neurobiology</td>
<td></td>
</tr>
<tr>
<td>162 Neuroethology</td>
<td></td>
</tr>
<tr>
<td>190 Prosemin in Physiology</td>
<td>Physiology 190 Prosemin in Physiology</td>
</tr>
<tr>
<td>190C Introduction to Physiological Research</td>
<td>Physiology 190C Introduction to Physiological Research</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Physiology 192 Internship</td>
</tr>
<tr>
<td>194HABC Physiology—Honors</td>
<td>Physiology 194HABC Physiology—Honors</td>
</tr>
<tr>
<td>196AB Voluntary Control of Physiological Processes</td>
<td>Physiology 196AB Voluntary Control of Physiological Processes</td>
</tr>
<tr>
<td>197T Tutoring in Physiology</td>
<td>Physiology 197T Tutoring in Physiology</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Physiology 198 Directed Group Study</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Physiology 199 Special Study for Advanced Undergraduates</td>
</tr>
</tbody>
</table>

### Concordance List for Plant Biology (PLB)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Plants, People and the Biosphere</td>
<td>Botany 10 Plants, People and the Biosphere</td>
</tr>
<tr>
<td>92 Internship</td>
<td>Botany 92 Internship</td>
</tr>
<tr>
<td>98 Directed Group Study</td>
<td>Botany 98 Directed Group Study</td>
</tr>
<tr>
<td>99 Special Study for Undergraduates</td>
<td>Botany 98 Special Study for Undergraduates</td>
</tr>
<tr>
<td>102 California Floristics</td>
<td>Botany 102 California Floristics</td>
</tr>
<tr>
<td>105 Developmental Plant Anatomy</td>
<td>Botany 105 Developmental Plant Anatomy</td>
</tr>
<tr>
<td>108 Systematic Botany of Flowering Plants</td>
<td>Botany 108 Systematic Botany of Flowering Plants</td>
</tr>
<tr>
<td>111 Plant Physiology</td>
<td>Botany 111 Plant Physiology</td>
</tr>
<tr>
<td>111D Problems in Plant Physiology</td>
<td>Botany 111D Problems in Plant Physiology</td>
</tr>
<tr>
<td>111L Introductory Plant Physiology Laboratory</td>
<td>Botany 111L Introductory Plant Physiology Laboratory</td>
</tr>
<tr>
<td>112 Plant Growth and Development</td>
<td>Botany 112 Plant Growth and Development</td>
</tr>
<tr>
<td>112D Problems in Plant Growth and Development</td>
<td>Botany 112D Problems in Plant Growth and Development</td>
</tr>
<tr>
<td>116 Plant Development and Evolution</td>
<td>Botany 116 Plant Development and Evolution</td>
</tr>
<tr>
<td>117 Plant Ecology (same course as Evolution and Ecology 117)</td>
<td>Botany 117 Plant Ecology</td>
</tr>
<tr>
<td>118 Introduction to Phycology</td>
<td>Botany 118 Introduction to Phycology</td>
</tr>
<tr>
<td>119 Introduction to Mycology</td>
<td>Botany 119 Introduction to Mycology</td>
</tr>
<tr>
<td>120 Introduction to Weed Science</td>
<td>Botany 120 Introduction to Weed Science</td>
</tr>
<tr>
<td>121 Biology of Weeds</td>
<td>Botany 121 Biology of Weeds</td>
</tr>
<tr>
<td>122 Action of Herbicides</td>
<td>Botany 122 Action of Herbicides</td>
</tr>
<tr>
<td>125 Molecular Biology of Plant Development</td>
<td>Botany 125 Molecular Biology of Plant Development</td>
</tr>
<tr>
<td>135 Mineral Nutrition of Plants</td>
<td>Botany 135 Mineral Nutrition of Plants</td>
</tr>
<tr>
<td>150 Biology and Management of Freshwater Macrophytes</td>
<td>Botany 150 Biology and Management of Freshwater Macrophytes</td>
</tr>
<tr>
<td>155 Anatomical and Cytological Methods</td>
<td>Botany 155 Anatomical and Cytological Methods</td>
</tr>
<tr>
<td>190C Research Conference in Botany</td>
<td>Botany 190C Research Conference in Botany</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Botany 192 Internship</td>
</tr>
<tr>
<td>194H Special Study for Honors Students</td>
<td>Botany 194H Special Study for Honors Students</td>
</tr>
<tr>
<td>197T Tutoring in Botany</td>
<td>Botany 197T Tutoring in Botany</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Botany 198 Directed Group Study</td>
</tr>
<tr>
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<td>Botany 199 Special Study for Advanced Undergraduates</td>
</tr>
</tbody>
</table>
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 domicile in the U.S. in accordance with 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 intent 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 duration 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. Your residence cannot be derived from your spouse or your parents.

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 dependence 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 resident determination date if: 1) you remained in California after your parent(s) departed; 2) you enroll in a California public post-secondary institution within one year of your parent(s) departure; and 3) once enrolled, you maintain continuous attendance in that institution.

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 deputon 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 of a veteran who has been a dependent of a member of the U.S. military stationed in California less than one year. The exemption is available only if you have lived in California less than one year. You must petition for a waiver of the nonresident tuition fee each term you are eligible. If you are enrolled in an educational institution and the member of the military is transferred 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
   You are entitled to a waiver of the nonresident tuition fee if you are the unmarried dependent child 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 a 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 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 resident determination date must 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 residence 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 temporarily, 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 established 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 recalculation 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 deputes.

Inquiries and Appeals

Inquiries regarding residence requirements, determination and/or recognized exceptions should be directed to the Residence Deputy or Assistant 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 deputes, 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 deputes’ final decision.

UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS, AND PRIVACY

Nondiscrimination. The University of California, in accordance with applicable Federal and State law and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, 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, 463 Memorial Union, 916-752-1128.
Sexual Harassment. Sexual harassment of students, staff, or faculty members is prohibited by law and by University regulation (Policy 380-12). Sexual harassment is unacceptable and will not be condoned on the UCD campus. The campus community will take all necessary and appropriate steps to protect students, staff, and faculty from sexual harassment and all forms of sexual intimidation and exploitation. The Sexual Harassment Education Program (752-2255) provides information and assists students 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 California 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 records;
- To request correction of their records, and
- To file complaints with the Department of Education for alleged violations of the rights accorded them by the Federal Act.

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 Watson, Office of Student Judicial Affairs, telephone 916-752-1128. Copies of the Federal Act, the full text of the UC Policies and the UCD Policy and Procedure Manual, Section 320-21, may be consulted at the Reference Desk of the Shields Library. Copies of Section 320-21 may be obtained at the Office of Student Judicial Affairs.

Categories of personally identifiable information designated by the campus as public information are: name, address (local and/or permanent), telephone numbers, date and place of birth, major field of study, dates of attendance, number of course units in which enrolled; degrees and honors received, the most recent previous educational institution attended, participation in officially recognized activities, including intercollegiate athletics and the name, weight, and height of the participants on intercollegiate University athletic teams, provided, however, that address and telephone numbers are not public information with respect to interns, residents and fellows and that with respect to these students, public information also includes primary hospital assignment, field of residency training, and name of medical school awarding the M.D. degree.

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.

Students may request in writing by the tenth day of instruction that their addresses 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. 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.

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 cannot be verified for potential employers without the student's written consent. Finally any degrees earned and the dates they were conferred may not be confirmed for any third party in connection with the appointment of that graduate to a new position or published in connection with an honor that individual subsequently receives. Students may reverse the decision to withhold their address and phone number at registration for a new quarter on the Student Address Form. The decision to withhold address and phone number or all information can be reversed at any time by filing a form with the Office of the Registrar.

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, 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, 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. Jack W. Peltason 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

Willie L. Brown, Jr.
Speaker of the Assembly

Delaine Eastin
State Superintendent of Public Instruction

David Flinn
President of the Alumni Associations of the University of California

Peter Preuss
Vice President of the Alumni Associations of the University of California

Jack W. Peltason
President of the University

Ralph C. Carmona

Judith W. Levin

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(Current term expires on March 1 of year indicated)

William T. Bagley (2002)
Roy T. Brophy (1998)
Clair W. Burgener (2000)
Glenn Campbell (1996)
Frank W. Clark, Jr. (2000)
Ward Connelly (2005)
John G. Davies (2004)
Tirso del Junco, M.D. (1997)
Alice J. Gonzales (1998)
S. Sue Johnson (2002)
Meredith J. Khachigian (2001)
Leo S. Kolligian (1997)
Howard H. Leach (2001)
David S. Lee (2006)
Velma Montoya (2005)
Tom Sayles (2006)
Dean A. Watkins (1996)

Student Regent
Edward P. Gomez (June 30, 1996)
(UC Riverside)

Faculty Representatives
Arnold L. Leiman
Daniel Simmons (August 31, 1995)

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General Counsel and Vice President—Legal Affairs

Herbert M. Gordon
Treasurer

Patricia L. Trivette
Secretary

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President of the University

Walter E. Massey
Provost and Senior Vice President—Academic Affairs

V. Wayne Kennedy
Senior Vice President—Business and Finance

William B. Baker
Vice President—University and External Relations

Cornellius L. Hopper, M.D.
Vice President—Health Affairs

W.R. (Reg) Gomes
Vice President—Agriculture and Natural Resources

James E. Holst
General Counsel and Vice President—Legal Affairs

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Raymond L. Orbach
Chancellor at Riverside

Richard C. Atkinson
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Joseph B. Martin
Chancellor at San Francisco

Henry T. Yang
Chancellor at Santa Barbara

Karl S. Pister
Chancellor at Santa Cruz

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Chancellor Emeritus
James H. Meyer, Ph.D.

Vice Chancellors
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

Robert N. Shelton, Ph.D.
Vice Chancellor—Research

Carolyn E. Wall, Ph.D.
Vice Chancellor—Student Affairs

Vice Provosts
Peter Dale, Ph.D.
Acting Vice Provost—Academic Programs and Dean—Undergraduate Studies
Michael S. Reid, Ph.D., Associate Dean—Environmental Resource Science and Policy

College of Engineering
Mohammed S. Ghausi, 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

College of Letters and Science
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D. Kern Holoman, Ph.D., Acting Dean—Division of Humanities, Arts, and Cultural Studies
Barbara D. Metcalf, Ph.D., Acting Dean—Division of Social Sciences
Peter A. Rock, Ph.D., Acting Dean—Division of Mathematical and Physical Sciences
George G. Roussas, Ph.D., Associate Dean—Division of Statistics
Jon C. Wagner, Ph.D., Associate Dean—Division of Education
Fred E. Wood, Ph.D., Associate Dean—Undergraduate Education
———, Associate Dean—Undergraduate Advising

Division of Biological Sciences (Intercollege)
Mark G. McNamee, Ph.D., Dean
Mark E. Sanders, Ph.D., Associate Dean—Undergraduate Academic Programs

Graduate School of Management
Robert H. Smiley, Ph.D., Dean
Richard P. Castanias, Ph.D., Associate Dean—Academic Affairs

School of Law
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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Margaret S. Steward, M.D., Associate Dean—Women’s Affairs
Donal A. Walsh, Ph.D., Associate Dean—Curricular Affairs

School of Veterinary Medicine
Frederick A. Murphy, D.V.M., Ph.D., Dean
Robert J. Hansen, Ph.D., Associate Dean—Student Programs
Bennie I. Osburn, D.V.M., Ph.D., Associate Dean—Research
John R. Pascoe, B.V.Sc., Ph.D., Associate Dean—Academic Programs
Bradford P. Smith, D.V.M., Associate Dean—Clinical Programs and Director—VMTH

Graduate Studies
M.R.C. Greenwood, Dean
Rosemarie H. Kraft, Ph.D., Associate Dean

University Extension
Charles A. Lacy, Ph.D., Dean
PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE

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.

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Animal Sciences</th>
<th>Applied Economics</th>
<th>Behavioral Sciences</th>
<th>Computer Science</th>
<th>Food/Consumer Sciences</th>
<th>Biological Sciences</th>
<th>Resource Sciences</th>
<th>Engineering</th>
<th>Fine Arts</th>
<th>Letters</th>
<th>Physical Sciences</th>
<th>Physical Sciences</th>
<th>Social Sciences</th>
<th>Total Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>79</td>
<td>68</td>
<td>66</td>
<td>100</td>
<td>89</td>
<td>61</td>
<td>71</td>
<td>81</td>
<td>30</td>
<td>50</td>
<td>80</td>
<td>58</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>

*Source: A 1994 survey of June 1993 graduates conducted by Student Affairs Research and Information, UC Davis.

RETENTION DATA AND GRADUATION RATES AT UC DAVIS

**Freshmen**

(Retention and graduation rates through Spring 1994 for all undergraduates entering UC Davis from high school.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment</th>
<th>Number of Students</th>
<th>Percent Enrolled 4 Quarters</th>
<th>*Percent Graduating in 12 Quarters</th>
<th>*Percent Graduating in 15 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1984</td>
<td>3,010</td>
<td>93%</td>
<td>28%</td>
<td>72%</td>
</tr>
<tr>
<td>Fall 1985</td>
<td>2,718</td>
<td>91%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>Fall 1986</td>
<td>2,474</td>
<td>93%</td>
<td>28%</td>
<td>72%</td>
</tr>
<tr>
<td>Fall 1987</td>
<td>3,336</td>
<td>93%</td>
<td>29%</td>
<td>72%</td>
</tr>
<tr>
<td>Fall 1988</td>
<td>3,417</td>
<td>93%</td>
<td>31%</td>
<td>72%</td>
</tr>
<tr>
<td>Fall 1989</td>
<td>3,120</td>
<td>94%</td>
<td>34%</td>
<td>68%</td>
</tr>
</tbody>
</table>

**Transfer Students**

(Retention and graduation rates through Spring 1994 for all undergraduates transferring to UC Davis as juniors.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment</th>
<th>Number of Students</th>
<th>Percent Enrolled 4 Quarters</th>
<th>*Percent Graduating in 6 Quarters</th>
<th>*Percent Graduating in 9 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1985</td>
<td>464</td>
<td>92%</td>
<td>40%</td>
<td>75%</td>
</tr>
<tr>
<td>Fall 1986</td>
<td>455</td>
<td>91%</td>
<td>36%</td>
<td>79%</td>
</tr>
<tr>
<td>Fall 1987</td>
<td>520</td>
<td>92%</td>
<td>31%</td>
<td>77%</td>
</tr>
<tr>
<td>Fall 1988</td>
<td>569</td>
<td>91%</td>
<td>31%</td>
<td>75%</td>
</tr>
<tr>
<td>Fall 1989</td>
<td>623</td>
<td>92%</td>
<td>32%</td>
<td>73%</td>
</tr>
<tr>
<td>Fall 1990</td>
<td>844</td>
<td>93%</td>
<td>35%</td>
<td>75%</td>
</tr>
<tr>
<td>Fall 1991</td>
<td>658</td>
<td>93%</td>
<td>41%</td>
<td>74%</td>
</tr>
</tbody>
</table>

*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.)

*Source: Student Affairs Research and Information, UC Davis (March 1995).

AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR’S, MASTER’S, AND DOCTORATE DEGREES

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Bachelor’s</th>
<th>Average Monthly Salary</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$2651</td>
<td>$3155</td>
<td>$4499</td>
</tr>
<tr>
<td>Humanities/Social Sciences</td>
<td>$1874</td>
<td>$2079</td>
<td>$2931</td>
</tr>
<tr>
<td>Health Sciences/Life Sciences</td>
<td>$2516</td>
<td>$2561</td>
<td>$3230</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>$2088</td>
<td>$2812</td>
<td>$3883</td>
</tr>
</tbody>
</table>

*Source: 1994 National Salary Survey data provided by the College Placement Council.
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The Social Sciences and Humanities Building, UC Davis' newest structure, opened in August 1994. Using the geology of the Sacramento Valley as a metaphor, internationally renowned architect Antoine Predock designed a village-like grouping of one- and two-story structures around and between two high-rise sections, using exposed concrete, cement stucco and prefinished aluminum panels as exterior finishes. The building houses classrooms, laboratories, library/study rooms, a lecture hall and academic and administrative offices, including the College of Letters and Science dean's office.